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"an individual.
– 2 are friends.
– 3 is company.
– more than 3 makes a society. The arrangement of these elements makes the letter ‘C’ connoting ‘Computer Society of India’.
– the space inside the letter ‘C’ connotes an arrow - the feeding-in of information or receiving information from a computer."
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Dear Fellow CSI Members,

Grid computing refers to an emerging computing model that provides pervasive, uniform and reliable access to data and resources distributed geographically. This model is used for solving complex computational problems by using unused resources (computers, peripherals, switches, instruments, and data) of large numbers of different computers owned by different organizations at local, national or international level. This has the ability to support computation across various locations that differentiates it from traditional distributed computing.

Grid computing model solves complex problems which are big for a single computer. It makes use of available untapped computing facilities and catering for the intermittent demands of large computational exercises.

Recognizing the importance of Grid Computing and suggestions from our esteemed readers Computer Society of India selected the theme of CSI Communications (The Knowledge Digest for IT Community) November issue as “Grid Computing”.

This issue contains first cover story “Grid Computing” by A. R. Revalti gives a basic idea of grid computing concepts. In “Grid Computing: Fundamentals Step towards Emerging Technology”, G. Sharma has described pros and cons of grid computing along with various aspects of this technology. Third cover story “Grid Computing for Big Data Mining and KDD” by S. Saxena explains advantages and challenges of using grid computing in big data processing. Next cover story “Data Replication in Data Grid Environment” by A. H. Guroob, Manjaiah D.H. explores the challenges in data replication.

In Technical Trends, “Planning, Deploying and Maintaining Business Intelligence (BI) Reporting Systems” by K. V. N. Rajesh and K.V.N. Ramesh gives various steps and concepts related to planning, installing and maintaining BI Reporting tools. The next article in this category “Computer Vision - Recent Trends and Challenges” by M. Anees V. and G. S. Kumar gives research trends in the field of computer vision giving some tools used in this area for research.

In research front “Biological Data Science: Workflow” by S. Ashok, N. T. Vijaykumar and M. V. Judy describes workflow in Biological Data Science Process.


In Security corner we have included “Effective Secret Communication using Scrambling Techniques” by J. L. Gunja that explains the secret communication technique using effective scrambling.

We are thankful to Dr. Neeraj Saxena, TIFAC, DST, New Delhi for providing his views on Industry-Institute relations in his article “Synallagmatic Industry-Academia Linkages”.

In this issue, we have included an exclusive interview with Dr. Aydur Unal, noted researcher and academician from US and Director, and Member of the Executive team, www.amteus.com, UK.

This issue also contains Practitioner’s workshop, Crosswords, CSI activity reports from divisions, chapters, student branches, CSI Education Directorate, Calendar of events, Book review.

I extend my gratitude to the entire ExecCom for their support in bringing this issue successfully.

I take this opportunity to express my sincere thanks to Dr. Vipin Tyagi, Guest Editor, for bringing this issue successfully.

I extend my gratitude to the entire ExecCom and particularly to Prof. M. N. Hoda and Dr. D. K. Mishra for their continuous support in bringing this issue successfully.

On behalf of publication committee, I wish to express my sincere gratitude to all authors and reviewers for their contributions and support to this issue.

I hope this issue will be successful in providing various aspects of Grid Computing to IT community.

Finally, we look forward to receive the feedback, contribution, criticism, suggestions from our esteemed members and readers at csic@csi-india.org.

Wishing all a happy festive season,

Prof. A.K. Nayak

Chief Editor

Prof. A.K. Nayak, Director, Indian Institute of Business Management, Patna, aknayak@iibm.in

CSI Communications | November 2015 | 4 www.csi-india.org
Dear Members,

Greetings!

It is a pleasure to inform that in the recently held SEARCC International Schools’ Software Competition 2015 at Colombo, a team from Delhi Public School, Dwarka, New Delhi sponsored by CSI won the first prize in the competition. On behalf of CSI, I convey my congratulations to the Principal, Teachers and Winners Mr. Rajat De, Mr. Anubhav Baweja and Mr. Sidhant Bansal. Our staff members at Education Directorate, Chennai deserves complements for successfully organizing Regional Rounds at various chapters and a National Round at Chennai.

It is interesting to note that Global IT leaders have visited India in recent past due to Digital India Initiative of Government of India and business opportunities available. Over last few decades, innovations and industrialised services created a wealth engine in India, resulting into US$ 100 billion plus service industry providing employment to IT talent. It placed our country in the centre of knowledge economy. Thus many opportunities are available to Indian entrepreneurs to become an innovative market leaders using available IT talent.

Recently, Mark Zuckerberg was in Delhi. He said connecting people in India was one of the most important things Facebook could do for the world and today India has second largest Facebook community in the world. He felt that there is a big opportunity to develop the economy in India. He also talked about social tools like safety tracking tools and missing child alert from the Facebook stable. This is good learning for our Indian IT Professionals and Students regarding how a social media tool can change the world, affect the society and contribute in economy.

A debate is on whether digital economy about digitising the real economy, society and governance or it is simply a valuation game? In an article of Economic Times it is mentioned that valuations of start-ups are growing astronomically but not their real user base. What will be the future of Indian e-commerce and digital start-ups? Let us start thinking.

A countdown for CSI–2015, a Golden Jubilee Convention has started. The organizing team of Delhi chapter is geared up for a successful convention. It will be a great opportunity for members to attend this convention and witness the deliberation by distinguished speakers, IT leaders and academicians.

Let me wish you and your family, a Very Happy Diwali and Prosperous New Year. May God fulfill all your wishes in wealth, health and happiness in your life.

With best wishes,

Bipin V. Mehta

Prof. Bipin Mehta, Director, School of Computer Studies, Ahmedabad University, Ahmedabad, president@csi-india.org
1. As I have been stressing upon, CSI need to give more thrust on improving the quality of the Conferences and Seminars that we organize so that these events serve as a good forum for exchange of ideas between researchers, academicians and practitioners. There is a great need for organizing conferences of high quality which researchers from India can afford to attend. Invited Speakers from abroad working on advanced technologies add to value of the conference and we should spend effort in getting them to India. This is not difficult, but we have to approach them well in advance. From my experience of conducting conferences in CSI, I have realized that there is a good number of Professors and Practitioners in US, Europe, Australia, Japan, China etc. who are ready to travel on their own and we may only have to take care of their hospitality. Interaction with well established researchers from abroad helps in improving the quality of research in the country.

Publication of proceedings with reviewed research papers after checking for plagiarism is also another important aspect and I am glad to see some conferences getting their proceedings published by Springer. There are other publishers who may also be interested and we need to try to connect with them.

We should also try to bring some well established International Conferences to India. These conferences which are normally held abroad primarily in US may like to explore moving to India. However, the registration fees of such conferences when held in US are generally very high and may not be affordable to Indian research community. The registration fees of these conferences must be fixed to suit the Indian scientific community.

2. A list of Distinguished Speakers from CSI Members has been prepared by nomination and by selection from the applications and being published Region-wise in the CSI website. These speakers can be requested to share their expertise.

3. Efforts are on to strengthen CSI’s international presence and we are soliciting support from CSI members presently abroad to help in this venture. Although our international fees are low, computer scientists from abroad are not attracted to become our members. We must add value to our events and publications.

4. Members have complimented for making CSI Communications more effective in communicating with our Members. All reports from CSI Student Branches and from Chapters are being included and Dr. Vipin Tyagi is coordinating this.

We are trying to include Call for Papers from across the globe in CSIC to help our members communicate with international conferences.

5. Chapter Elections are to be conducted as per the guidelines sent by Nomination Committee. All NC Members at the Chapter level are requested to adhere to the time schedule and to strictly follow the CSI Byelaws. There have been complaints about elections at the Chapter level and the NC along with Hony. Secretary have been working to ensure elections are held in the right spirit.

6. We would like to strengthen the Special Interest Groups (SIGs) formed few years back but lamenting due to lack of support. For this purpose, SIGs have been aligned to the five Divisions as required as per Byelaws. The SIG Conveners have been told to increase the scope for SIG Membership by adding members throughout India and to send reports for publication in CSI Communications. Unfortunately barring 2-3 SIGs, others continue to be dormant.

7. For filling up the Executive positions which are vacant, advertisement has been released and it is expected that these positions will be filled up by November, 2015.

Best wishes,

Dr. Anirban Basu

Vice President, CSI
CSI (Computer Society of India) in 1965 to share the Knowledge among all, the journey had wonderful twists. Then Computers were used by few big organisations and most of the discussions were on the Hardware and MAIT had a big influence on CSI to get solutions for the day to day interruptions and we were leaders in IT Policy guidelines till 2000.

The usage of Computers in general life started after 1980 and the introduction of PC made a big push for systems to blend with human life, general users started tasting the power of Computers which made life simpler. In the movie 3 Idiots' definition of a machine was said as a device to make any work simpler, similarly, Computers were also used to make routine jobs simpler. This made computers and IT to penetrate in common man's life to bring transparency and made things easier. Reservations in Railway was a big success and many more things followed. Post 2000, after the Y2K turmoil many scholars left their original domains and jumped into IT to convert their domain expertise to automate processes which made systems transparent. Then we had people with rich domain experience who had the attitude to learn the IT platform to develop an application. These applications were revisited many a times to make them powerful without bugs for the future, and the maintenance of these applications moved from the hands of people with rich domain expertise to mere operators to run them just as robots. CSI missed the bus of supporting Software revolution in post 2000.

In the last 50 years, we were able to get these processes automated in the G8 nations who contribute to around 5% of the world population, who had all luxuries at their footsteps and could afford the high costs of IT due to the non-availability of human ware. Time has come for the other part of the world without G8 catering to the 95% of the population to enjoy the benefits of IT which is now affordable. Now time has come for CSI with its vast reach among IT professionals and rich experience of the IT history is the only organisation today to take IT to the remaining world. CSI with its large base of Students Youth with great energies and the Teacher base with abundant knowledge of Languages can guide the students to develop applications assisted by the rich team of Industry Professionals, who can share their experience can convert the IT face of India from providing services mode to G8 countries to product mode for the rest of the world.

CSI can make its team of Students-Teachers and Industrial professionals to make applications for the world at an affordable cost to the world which no one can match.

In the software development life cycle coding takes a small portion while the other parameters contribute to a bigger chunk. Today most companies are spending huge resources only on the coding part and not able to spend their strength ie. Domain Expertise, architecture and implementation. Strength of the Industry is the Rich Domain expertise with abilities to push them to market, while their weakness is to give the Power of IT by doing proper coding to make Ideas implemented. Teachers and Students are strong in Coding and have all infrastructure unused and lack the domain experience is their weakness. Time has come for the other teams join hands where ones Strength is others Weakness by which the Opportunities can be realised eliminating Threats.

CSI is the only organisation in the world which can connect all the flowers like Rich IT Professionals, Great Academicians and Energetic Students as a consortium to give the real flavour of IT to the entire world.

Let all CSians join hands to make this happen, Give IT to the world minus G8 with the slogan of our PM as Make in India and contribute a bigger chunk to the GDP of our country. Make our large base of Students Teachers assist the Industry to make operations simple.

Elevate all Student Branches to Incubation centres and make India as the IT Product destination of the world. Make Digital India the future of the world. Conduct more programs to connect the last mile with our Student Branch Coordinators and make every student branch Vibrant.

Raju L Kanchibhotla
Regional Vice President (Region V)
Dr. Aynur Unal, noted researcher and academician from US and Director and Member of the Executive Team, www.amteus.com, UK has come to India on an assignment in IIT, Guwahati and was in Udaipur to deliver a talk in International Congress on Information and Communication Technology organized by CSI. CSI Vice President, Dr. Anirban Basu and Dr. Durgesh Mishra, Divisional Chair used this opportunity and discussed her views on the state of and future of Indian Software R&D. The summary of the discussions are as follows:

1. **What is the present ITR&D scene in India?**
   Present R&D Scene in India is quite healthy as many IIT’s and other Universities are producing a great number journal articles but what is missing are the patents and new products which can create a lively start-up activity. A shift needs to take place from journal articles to patents and to start ups much like what is happening in Israel. There is a lot of room for e-services, e-learning tools, e-commerce, and cyber security related, India specific new tools. All in all India is still the land of IT/IS in outsourcing for financial services, client relationship services, data centers.

   I would like to see more incubation centers at both universities and private/government initiatives with additional services for the start ups. India can be the hub of the new product testing and provide the much needed third party software testing for Silicon Valley for example.

2. **How do you see Indians contributing in the global IT scenario in the next 5 years?**
   In the next five years India
   - can continue in the outsourced services while adding new services such as SOFTT (Software Testing and Training for global start ups, SME, others...)
   - Develop new approaches and related products for cyber security with partnerships of US, EU resources,
   - Develop Incubation platforms funded by both private and government funds,
   - Create science cities like Tsukuba in Japan for cloud based free internet access for small businesses to start populating Security of cloud systems (most of the on line educational systems can be placed on the cloud systems -city, region based- without any security layers but only privacy constraints and features)
   - Global Economy will require a lot of new processes and new cloud services that Indian small companies can provide and they need to be encouraged to create a dynamic small business internet cluster growth. All internet based processes will be pushed to the cloud systems; India can do this for the rest of the world the way integration is done previously. Policies for free internet access and a healthy band width is a great investment into India’s future, Open Innovation platforms can be placed in the cloud systems in all regions, university parks and techno centers, techno hubs.

3. **How can India improve research and academic environment in academic institutions?**
   Academic institutions need to shift gear and start getting into the cycle of product- start-up-funding- clusters either on their campuses or in private/government incubation platforms (mostly missing in India). Academic Institutions need to admit that interactive and self learning is taking place largely and knowledge acquisition is no longer the issue but what to do with the acquired knowledge will be the new tasks of the professors; a fast transition from active learning to interactive learning will help to establish the start up dynamics on campuses.

4. **Please share your views on PM’s vision of Digital India**
   PM Modi already endorsed the “Open Innovation” which reduces the time and the cost of creating new products and processes for the knowledge economy globally; India can lead this trend. I see India’s leadership in Open Innovation by using mechanisms such as Digital Monozukuri, www.digitalmonozukuri.com

   India can also help with the rest of the South Eastern Asia and actually the rest of the world in the digital economy as the “desk help” of the old times.

   Vocational training programs in software and software testing will enhance all this; such programs can take place at the academic institutions and/or with their partnerships.

   India and Germany (18 MoU’s being signed in between Merkel and Modi - M&M-) can be effective in the market realization of India organic farm produces (organic rice, organic tea, dehydrated organic vegetables, etc.. can be transported with the smart supply chains, logistic chains. Patent Management and new policies can be initiated for future competition.

5. **How can we facilitate more scientific exchanges with US?**
   I have been working on the enhanced global partnerships of India and found that the use of NSF-International is a great way which can be established by individual professors from both side as well as new “sandwich graduate degrees where students are ‘sandwiched” in between Indian and US institutions and hence exposed to advisers from both. Such bridges will enhance the US-India collaborations. Another very important way will be via start-ups formed in India being financed by the US VC’s (of Silicon Valley for example). India based International conferences and professional meetings will help with the connections of the academic worlds.

   There will be more virtual collaborative platforms such as Research Gate (which is a start up company by the way!) and such virtual collaborations will tie up more and more joint projects and proposals.

   In addition to US academic institutions, India needs to partner with Korean, Japanese, Malaysian and Australian institutions for finding solutions of the Far Eastern Economy (an Eastern Cluster in the Global Map.)
GARUDA is India’s first national grid initiative bringing together academic, scientific and research communities for developing their data and compute intensive applications with guaranteed QoS. GARUDA grid is an aggregation of resources comprising of computational nodes, mass storage and scientific instruments distributed across the country.

GARUDA is a SOA based cyber infrastructure connecting computational nodes, mass storage and scientific instruments distributed across the country.

The Department of Information Technology, Government of India, has funded Centre for Development of Advanced Computing (C-DAC) to deploy the nation-wide computational grid “GARUDA” spanning across 17 cities and 45 institutions with an aim to bring Distributed/Grid networked infrastructure to academic labs, research labs and industries in India.

The Proof of Concept (PoC) phase, initiated along with ERNET (Indian Education and Research Network), ended on March 2008, accomplished its deliverables by connecting 17 cities across 45 academic and research institutes country wide along with the required software for managing grid computing applications.

The establishment of Indian Grid Certification Authority (IGCA) for the first time in India by C-DAC in November 2008 has allowed full access to worldwide grids for Indian Researchers and represented a landmark in this domain. The Foundation phase (April 2008 - August 2009) successfully aimed at developing Service oriented Architecture (SOA) framework, improving network stability and upgrading grid resources. The 36 months Operation phase promises (primarily/solely focuses) on the grid enablement of applications of national priority viz. Disaster Management (DMSAR), Bio informatics.

GARUDA will assist to accelerate India’s drive to turn its substantial research investment into tangible economic benefits.

GARUDA Network
The GARUDA network is a Layer 2/3 MPLS Virtual Private Network [VPN] connecting selected institutions at 10/100 Mbps with stringent quality and Service Level Agreements. The network has been contracted as a managed service with a peak capacity of 2.43 Gbps across 17 cities. This network is a pre-cursor to the next generation Gigabit speed nation-wide Wide Area Network with high performance computing resources and scientific instruments for seamless collaborative research and experiments.

GARUDA Network Features:
- Ethernet based High Bandwidth capacity
- Scalable over entire geographic area
- High levels of reliability
- High security
- Effective Network management

GARUDA Services:
- Grid Access and Job Submission Portal
- Program Development Environment - Gridhra
- Grid Monitoring & Mgmt - Paryavekshanam
- PSE & Workflow - PSP, Galaxy, Kepler
- Visualization Environments: GVG hub
- Automatic Grid Service Generator (AGSG)
- Data Grid Solutions: GSRM
- Virtual Organization Management System (VOMS)
- Code Parallelization & Optimization
- Grid Enablement of Applications
- Megha: Cloud Interface to GARUDA
- Data transfer Solutions: GridFTP & Globus Online

GARUDA: The National Grid Computing Initiative of India

Compiled by: Dr. Vipin Tyagi | Jaypee University of Engineering and Technology, Guna - MP, dr.vipin.tyagi@gmail.com
Computational Resources
In this collaborative grid project, various resources such as high performance computing systems (HPC) and satellite based communication systems have been committed by different centers of C-DAC and GARUDA partners. The total computational resources available today on Garuda are approximately 65 Teraflops.

Grid Management and Monitoring
A dedicated Grid monitoring and management centre at C-DAC, Bangalore helps in managing and monitoring all the components in the Grid. State-of-the-art display walls and advanced software like Paryavekshanam developed at C-DAC help in effectively monitoring the health and utilization of various components of the Grid.

Application Profile:
Applications of national importance that require aggregation of geographically distributed resources have been operational on the GARUDA grid. Resource intensive applications from various domains of e-Science such as Bio-informatics, Astrophysics, Computer Aided Engineering, Weather modeling and Seismic data processing - have been provisioned on the operational grid.

GARUDA Partners:
Research and academic centres, centres of C-DAC are participating in GARUDA. Research has been initiated in Semantic Grid Services, Integrated Development Environments, Storage Resource Managers, Network Simulation and Grid File Systems.
C-DAC is also collaborating in the EU - India Grid project which will allow researchers and scientists across Europe and India to conduct simulation experiments on EGEE and GARUDA grids. Efforts are on to integrate the technology components of both the grids, which would enable the users to access the resources and services across the grids in a secure and seamless manner.

To Join GARUDA
To access GARUDA resources:
Institute/Organization to which the user belongs should be a GARUDA partner.
User should apply for IGCA certificate
Institutes can become GARUDA Partners through:
Memorandum of understanding (MoU)
By signing a "Letter of Exchange (LoE)" for a period of six months followed by MoU.

Call for Contributions in CSI Adhyayan
(A National Publication dedicated to IT Education, Research and Student Community)
India’s IT sector continues to a trajectory of high growth since 1990s. Our education system, the prime mover of industrial growth and modern development, has seen a phenomenal growth in terms of quantity and quality - making it the third largest education system in the world after the US and China. With double digit economic growth demanding a sustained supply of knowledge workers, India has emerged as one of the world’s largest consumer of education services.

India has the potential to provide the best education services with strong relationships among education, research and industry sectors.

Today, IT is a trillion dollar opportunity – so is higher education. We can proudly say that both the Indian IT and Indian ‘guru’ are now revered globally. Both have potential and ability to scale up with global mindset. With regard to emerging technologies, they typically follow a strategy ‘Start small, Grow real fast and Attempt to conquer’. In the backdrop of the above and with a view to consolidate the achievements of more than four decades of Computer Society of India (CSI) and new found vitality in education and research community, we have revived our publication of CSI Adhyayan after a gap.

CSI Adhyayan is being positioned as a nation publication dedicated for IT education, research and student community. This quarterly electronic publication performs the functions of a newsletter, a magazine and journal.

We take this opportunity to invite the contributions in this venture. Your invaluable contributions, suggestions and wholehearted support will be highly appreciated. We appeal to all our Chapters, Student Branches and member academic institutions for encouraging and motivating the students in terms of contributing innovative ideas, exploring new vistas of knowledge and new findings through CSI Adhyayan.

We especially invite news and updates from our member institutions and student branches.
Please send your article to csi.adhyayan@csi-india.org.
For any kind of information, contact may be made to Dr. Vipin Tyagi via email id dr.vipin.tyagi@gmail.com.

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Grid Computing

A. R. Revathi
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Introduction

Grid Computing mainly focuses on the individual users to access the computer resources like processors, memory or other resources without the knowledge of where it is located. Then it forms collection of computers from multiple locations to reach common goal. Grid computers have each node set to perform a different task/application. Grid computers have also to be more heterogeneous and geographically dispersed than cluster computers. Distributed computing normally refers to a group of resources like computers and other devices interaction in a network, this can be done by passing messages between them across the network. These devices interact with each other to achieve a common goal.

Grid computing is a collection of machines, sometimes referred to as nodes, resources, donors, clients, hosts, engines and many other such terms. They all contribute any combination of resources to one grid as a whole. Some resources may be used by all users of the grid, while others may have specific restrictions. It will increase the resource utilization in efficient manner. The different kind of resources are,

- Computation
- Storage
- Communications
- Software and Licenses.

Grid Computing Differ from Distributed Computing

Distributed computing generally refers to managing the hundreds or thousands of computer systems which individually are more limited in their memory and processing ability. On other side, Grid computing has the extra characteristics like, in how efficient the resources connected can be utilized. And also it supports heterogeneity resource accessing. Grid computing is focused on the ability to support computation across multiple administrative domains that it differ from common distributed computing Fig. 1.

Grids offers a way of accessing the resources in an optimized manner to access the resources, it involves visualization of computing resources.

Characteristics of Grid Computing

Some of main characteristics may be described as follows

- Large Scale: A grid is able to deal with any number of resources (either system or memory). It can range from few to millions.\(^{(2)}\)
- Global Distribution: Grid computing resources can be in any location in the global, (i.e.) It not necessary for all resources to be located in the same location.\(^{(2)}\)
- Loosely Coupled: Main characteristics of grid computing is loosely coupled architecture. Since, it has been connected globally through internet, it follows a loosely coupled architecture.\(^{(3)}\)
- Distributed Job Management: It has the characteristics to split the job for various resources or computers to avoid the work pending in the queue for long time.\(^{(3)}\)
- Consistent Access: A grid is designed in such a way to give the consistent data and also other resources accessing ability.\(^{(2)}\)
- Resources Coordination: Resources in a grid must be coordinated in such a way to provide cluster computing capabilities.\(^{(2)}\)
- Dependable Access: A grid should assume the quality of service standards in order to provide an assure way of sharing the resources for the requested user.\(^{(2)}\)
- Transparent Access: A grid has a capability to see as a single virtual computer even it has multiple resources across the global.\(^{(2)}\)
- On-Demand Computing: It provides an efficient way to access the resources that cannot be cost-effectively or conveniently located in local area.\(^{(2)}\)
- Heterogeneity: A grid can host both hardware and software that can be varied in data, sensors, devices, networks and so on.\(^{(3)}\)

Grid Architecture

The architecture diagram of grid computing is shown in Fig. 2 and layers are listed as fabric, resource and connectivity protocol, collective services and user applications.

- **Fabric:** It is the lowest layer in Grid Computing. It is accessed by higher layer that is provided by the standard process. The fabric layer is used to make a common interface in all kinds of resources which is available.
- **Resource and Connectivity Protocol:** This layer is used to provide the communication and authentication process in computing that is when the communication process exchange the information between the resources connected with first layer. The Authentication process allows confidential communications to ensure the identity of two partners in the Communication process.
- **Collective Services:** The collective service layer is used to provide the coordination for multiple resources.
available in the grid computing. These resources are accessed only to the underlying protocols and interfaces it cannot access directly.

**User applications:** It is the top most layer of Grid computing Architecture. It consist of user applications and it provides the interface to the users and administrators to interact with the grid.

**Categories of Grid**
Grid can be divided into different categories based on their usage.

a) **Computation Grid** provides a secure way of accessing the resources from a huge collection (pool). This kind of grid is much useful for high throughput applications and computation intensive computing.

b) **Collaboration Grid** with the popularity of Internet, there is a huge demand for better collaboration. Using the grid, advance collaboration is possible.

c) **Utility Grid** is not limited for sharing data and computation cycles but also software and resources can be shared. It provides main services like sharing Software and other special equipment.

d) **Network Grid** provides fault-tolerant and high performance communication services. During communication each grid node act as a data router between two communication points.

E) **Data Grid** provides an environment to support data discovery, data storage, data handling, data publication and data manipulation. It is stored in different types of databases and file systems.

**What are the Benefits of Grid Computing?**
- Exploiting under-utilized resources
- Parallel CPU capacity
- Virtual resources and virtual organizations for collaboration
- Access to additional resources
- Resource balancing
- Reliability
- Management
- Grid computing make more resources available to more people and organizations.

**Challenges**
There are no clear (or) proper standards: Grid computing should have different kind of standards but in grid computing we can’t able to use different OS in same machines at same time.

Limited area and Applications: It is used to solve larger and complex problems in the particular area.

Difficult to Manage and Administration: Grid computing should provide the resources for large geographical environments. So it is different to manage it properly.

Lack of Software: Grid enabled software are limited. So there is a need to develop many Open source software.

**Software Components**
Management Components: Any grid system has the management components need for them. First, it keeps track of the (data) resources available in the grid, second it will calculate the utilization rate at the given time. By making use of once information, resources can be automatically manage many aspects of grid. This is known as automatic computing or recovery oriented computing.

Distributed Grid Management: Every grid in the network may follow different kind of topology for connectivity. It can be implemented based on size of the grid or efficiency of the resources. So, to manage all these grid, (grid) distributed grid management is used.

Donor Software: Each resources or machine in one grid as to be installed with some software that manage the grid’s use of it. This will also verify the confidentially detail about one resources shared.
Submission Software: Each machine needs to submit its job after its completion. To submit its information it has to be installed with submission software. It can be installed on submission nodes or submission clients.[1]

Software Tools
Some of software tools currently available for Grid Computing are
- BOINC
- Digipede Network TM [.Net Grid Computing platform]
- Alchemi [.Net Grid Computing platform]

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Introduction

Distributed computing is an emerging technology nowadays. It is a part of computer science that provides knowledge of distributed systems. Distributed System provides communication & co-ordination with other computers or systems using message passing mechanism.

Grid computing is a kind of distributed computing. In computer science, the word “Grid” is carried out from power system. Moreover, A Grid is a collection of machines, also known as nodes, hosts, resources, clients etc. Why do we need grid computing instead of distributed computing? Distributed system manages computer systems having restricted processing power and storage. This is a vital disadvantage of distributed computing which is overcome in grid computing. Grid computing is a collection of heterogeneous computers or nodes in order to share resources to accomplish a task.

Definition

“A grid computing is a computing environment where sharing of computing power, may be computing cycle, resources, and storage is taken place to accomplish the task efficiently and quickly.”

The main objective of grid computing is to provide efficient utilization pool of resources and workload of different computers associated with network.

Architecture of Grid Computing

The architecture of grid computing is described in brief. The grid computing architecture has following layers.

1. Network Layer
2. Resource Layer
3. Middleware Layer
4. Application & Serviceware Layer

Application & Serviceware Layer: Application Layer is the top most layer of the architecture. This layer is concerned with user applications, development supporting applications, portals, graphic user interfaces. While service layer provides management services such as billing, user account details and much more. In this case, the user directly interacts with this layer.

Middleware: Middleware provides the tools that enable various elements to participate in a unified grid environment. Middleware layer provides management services such as CORBA, Legion and so on.

Resource Layer: Resource Layer is concerned with number of components such as storage system, computers, nodes etc associated with the network to accomplish the goal. Resource Layer comprises of network layer, data link layer and physical layer related with TCP/IP model. The main function of this layer is to provide connectivity of the resources.

The alternative layers of the grid architecture are given below.

1. User Application
2. Collective Services
3. Resources & Connectivity
4. Fabric

User Application: User application layer is top layer in grid layer architecture. It contains user applications that operate in virtual organization. This layer focuses on high level language and frameworks such as CORBA, Legion and so on.

Collective Services: A collective service is concerned with collection of resources instead of concentrate only on single resource. It focuses on interaction of resources. It provides mechanism how to collectively manage resources. It works over directory services, diagnostic services, monitoring services, co-allocating services, broking services and so on.

Resource Layer: Resource Layer is responsible to access & control resources. The main purpose of this layer is to provide protocols such as API, Application Program Interface & SDK, Software Development Kit, for secure operations, sharing and monitoring on single resources. It provides mechanism to share single resource in secure & trusted manners. It works on information protocol.
which provides information about the resources and management protocol which manages resources were shared.

**Connectivity:** Connectivity layer connects resources in fabric layer by the communication and authentication. As name indicates, it provides access to individual resources & services in the fabric layer. It works over communication & authentication protocols which define how to exchange data between resources associated with fabric layer\(^{(5)}\). Furthermore, authentication provides mechanism such as cryptography to verify users & resources identity.

**Fabric Layer:** Fabric Layer provides resources such as storage system, sensor, server, network resources, file system, computers, cluster & so on to allow share access by grid protocols. It focuses on resources which are intended to share.

**Software**

1. **Globus:** It is an open source software toolkit used for establishing grid environment.

2. **glite:** It provides lightweight middleware framework for building grid application.

3. **Legion:** It provides computing in a secure way. It is object and meta based system software \(^{(4)}\).

4. **UNICORE:** Uniform interface to computing resources provide ready grid system including client and server software that offers resources & operations sharing across the network \(^{(4)}\).

**Pros & Cons of Grid Computing**

The benefits of grid computing are given below.

1. Grid computing provides better utilization of resources which are associated with network.

2. Another advantage of grid computing is to provide an environment for easy collaboration with other organization.

3. It is reliable in nature.

4. In such environment, it is easy to handle resources and manage large IT infrastructure \(^{(2)}\). It focuses on better management policies and protocols. It is also modular in nature.

The disadvantages of grid computing are given below.

1. Grid computing requires deep knowledge to get in it.

2. It also needs high-end connectivity for manage interconnection between resources.

**Conclusion**

Grid Computing is an emerging technology. It brings a computing environment to sharing resources which are associated with network efficiently and quickly. In the paper, brief knowledge about grid computing is carried out to the reader. Grid architecture is described in the paper. In the end, it provides better mechanism for utilization of resources, workload, and much more. Moreover, it also gives reliability, parallelism, communication, and authentication. Thus, grid computing provides an environment or computing with such functionality.

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**About the Author**

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Grid computing refers to an interconnection of a number of computing resources, storage, networks, scientific equipments, instruments etc. over a high-speed network that aim to perform large computational tasks. The resources in grid computing may be geographically apart and different in architecture and configuration. Still the security and reliability is taken care of and high quality performance is provided by the grid services. A Grid Middleware Distribution is a software stack or a set of cooperating components, services and protocols that enable the users to access the distributed resources of a grid. There is a number of such middleware designed e.g. Globus toolkit (www.globus.org/toolkit/) by Globus provides resource and data management, security services, monitoring services etc. Advanced Resource Connector (ARC) by NorduGrid (http://nordugrid.org/) provides an interface for submission of computational tasks to different scalable distributed computing systems. gLite (http://glite.cern.ch/) and European Middleware Initiative (www.eu-emi.eu) are designed to support HPC in scientific research. GridWay (http://www.gridway.org/) is an open source meta-scheduler technology that provides a monitoring and scheduling framework for the users and developers. GridWay supports several Grid middlewares. Such open architectures enable the research community to perform high performance computing tasks without setting up large computational facility like supercomputers at one place but instead a large number of resources can be shared across a high performance network as per their availability. The grid can be computational grid, service grid, data grid, knowledge grid or any other application based grid. Computational grid utilizes the network of computers to solve a computationally intense or memory intense problem. Service grid replicates instances across various nodes to provide scalability and reliability and provides functional efficiency. Data grids are designed to provide secure and reliable access to data stored across various nodes of the grid. Knowledge grid is a collaborative grid for sharing, producing and analyzing knowledge to support decision making in various scientific and technical domains. These large volumes of data can be searched for useful patterns and meaningful interpretations to obtain knowledge over the grid[1].

Big Data Mining KDD

Data mining is an important step of knowledge discovery for data stored in databases or various other formats. There are a number of data mining algorithms and methods designed for a particular task that look for certain patterns, associations or predictions. The data to be mined can be in various flat file formats or databases. Big Data refers to large data sets that is difficult to be handled, stored, processed, analyzed and visualized using legacy systems. Big Data is considered to be large in Volume, Variety, Velocity, Variability, Veracity and Complexity[2]. There are a large number of domains that can now produce data and warehouse it in the exabyte –zettabyte scale and further scaling e.g. healthcare, scientific research, simulations, manufacturing, sales, banking, simulations, social media etc. These domains produce huge amount of data that can be structured e.g. relational databases; semi structured e.g. CSV, XML, NoSQL databases or unstructured e.g. images, videos, audios, webpages etc. Further, this data can be shared by a large number of users across various resources. The HACE theorem describes Big Data as the one with large-volume, heterogeneous, autonomous sources having a distributed and decentralized control and seeks to explore complex and evolving relationships among data[3]. For working on Big Data, one can think of a grid computing paradigm where the data is split and shared across various nodes of the grid securely and reliably and subjected to various data mining techniques depending upon the application.

Big Data Mining and KDD Concept Design

The knowledge or data mining grid can be built over the existing grid environments. For this purpose we can make use of the basic Grid services for providing grid middleware like Globus Toolkit etc. that provide resource management, monitoring, job execution planning etc. The Data Grid provides data related services like data access service, data transport mechanisms, data replication features and protocols etc. The basic knowledge Grid services will provide additional query processing and inference engine for deriving knowledge. The advance layer of Knowledge Grid will provide access

![Fig.1: Architecture of KDD and Big Data Mining Grid](image-url)
mechanisms to Big Data, selection of tool for processing Big Data and carrying out different types of analytics and parameter adjustments etc. Also specialized services will be needed to visualize Big Data according to the features selected by the user that interacts with the Grid through the usual User Interface. The Fig. 1 shows a conceptual architecture of such a Knowledge deriving Grid.

Advantages of using Grid Computing

- Grid provides a secure and reliable access to remotely located computational resources across various domains and architectures through a decentralized control.
- The Grid is able to incorporate new architectures, protocols, standards etc. which makes it a good choice for working on heterogeneous unstructured data. An existing resource can be updated to suit new requirements as desired.
- Grid provides an efficient scalable environment that suits the increasing volume of data to be processed over the grid.
- A grid system is inherently designed to be able to handle resource failures and other unexpected problems. The high fault tolerant behavior of grid is a useful feature for handling Big Data that is distributed over the grid.

Requirements for Grid based Data Mining

- A data mining grid should be efficient in terms of cost-performance ratio and provide fast, scalable performance as compared to legacy data mining.
- The grid should support new techniques and programs specifically designed for data mining on a massive scale.
- The grid should be capable of incorporating new resources and technologies without any degradation in performance of the data mining methods or programs running on the grid.
- The data mining grid should be easy to use by the novice users like other computational or service grids. New user friendly methods and interfaces can be designed for the purpose that abstract the architecture of the grid.
- The data mining process has a number of steps that the user wishes to control e.g. criteria for data cleaning and pre-processing, modifying algorithm parameters, assigning weights to features etc. So the grid should provide such control mechanisms to the user through a simple customized interface.
- The grid should be easy and open to integrate with new data mining programs or softwares and resources or devices without any significant modification to the existing ones.

Challenges in Big Data Mining over Grid

- Big Data can be highly heterogeneous, inter-connected or multi-dimentional. There is a significant lack of standardization in unstructured data formats. This type of data is difficult to be cleaned and pre-processed. These heterogeneous nodes over the network then need to be successfully mined and inferred to dig out knowledge.
- The data volume is continuously increasing at the exponential scale. It provides a bottleneck for understanding semantics, performing I/O and transfer over network in grid and inferencing the distributed data for searching patterns and looking for knowledge outcome.
- New data structures and features are being added to the data and database technologies. NoSQL databases are being evolved which are schema free document based databases. Again there is a lack of such database management applications and data access tools over a distributed computing environment.
- There is a need for algorithm development for big data mining in the distributed environment that are able to do data cleaning, pre-processing, mining and inferencing the data in an efficient manner over the grid. The legacy data mining algorithms or approaches may not be parallelizable or scalable for handling big data.
- Efficient utilization of resources and grid management tools is required to support the scalable architecture and algorithms for big data mining and analytics.
- An important component of Big Data is the Streaming data e.g. recommendation systems. Mining of real-time and time series data in non-standard formats and architecture or streaming data processing needs new algorithms and architecture support.
- Big Graph mining for graph databases and mining hierarchical structures of data again provide bottleneck for data modeling and querying processes.
- Big Data visualization is again a field where new techniques, framework or algorithms are required which are enabled to work over the distributed data over the grid.
- The geographically distributed data may result in data replication, integrity and consistency issues. The grid has to ensure fault tolerance, good access control and security and privacy features.

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Introduction

With increasing intensive data in distributed environments that needs sharing of data, requires methods and approaches to increase fast access to data and get it, and that leads to better performance and higher throughput during execution jobs. The grid computing environments are good systems for sharing intensive data and available resources between scientists, engineers, researchers to perform some tasks to increase throughput.

Data Replication in Data Grid Environment (DGE) is the process to allocate similar data on more than one site for easy and fast access to the data, which reduces bandwidth consumption and increase fault tolerance and get rid of centralized data on a single server and increase the performance for the system as a whole.

Although there are some challenges for data replication, such as data consistency and updation of data on Data Grid Environment, also there are other challenge like placement and selection for data replication.

Data Grid Environments

The term Data Grid refers to set of services that gives individuals or groups of users the ability to access, share data files in a coordinated manner and transfer large amounts of data distributed on geographically area for research purposes. Data grids make this possible by a set of middleware applications and services that pull together data and resources from multiple administrative domains and then presented to the user on request.

Common strategy is used in data grids as well as in distributed systems to increase performance and throughput, known as replication. Replication works to reduce latency time, increase bandwidth consumption, where multiple replicas of the data may be distributed throughout the grid outside their original administrative domain and the security restrictions placed on the original data.

Specifically, the middleware of Data Grid handles the integration between users and the data and scheduling for jobs that they request, by controlling access with highest efficiency as possible.

Data Grid Topologies

Data Grid is used for multiple purposes, such as scientific and engineering, medical research, thus varied topologies are used, where each topology is used for specific research purpose. There are four types of architectures of Data Grid, the most commonly used are: 

i. Federation topology: This is a type of topology appropriate for institutions that share the data in the system, where each institution can manage their own data independently and when data is requested to another institution, they allow or block data transfer.

ii. Monadic topology: In this type of computing topology, data is accessed through one central repository data store. There are no replicas in this topology and example of this type is the Network for Earthquake Engineering Simulation (NEES) in the United States of America.

iii. Hierarchical topology: One of the most famous projects for this topology is CERN, which distribute data generated from large Hadron Collider to multiple sites for purpose of study and analysis, where the LHC produces large amounts of data and require interpretation by the organizations involved in this project.

iv. Hybrid topology: A combination of topologies and used in cases where, there is a need to test different results and analyze by researchers in different environments.

Dynamic Data Replication Strategy

The reason for using data replication strategy in Data Grid Environment is an improved data access, increased availability, and high performance. Data replication depends on Data Grid topology mentioned above. For this reason decision
is taken, such as:
- Replica creation
- Replica placement
- Enough data storage space
- The cost of replication

To solve issues above, different strategies have been proposed and developed.

Techniques of data replication are static and dynamic. The first type of data replication that is static, where the data replication should be created and placed statically during grid setup time. This technique is not flexible in Data Grid Environment because the user requests that are constantly changing. But the second type of data replication technique is dynamic that changes with changes based on user requests.

We will illustrate some important aspects for one of this strategy in hierarchical data grid topology:

- Best Client: the record of access history of each node is maintained in this node such as who and number of requests and if the requests exceeds a threshold.
- Plain Caching: The client stores requests locally for future use. If the required files are larger than the storage space of client, then files get replaced quickly in another client.
- Cascading replication: This strategy works on the distribution of the files on the storage space evenly cascading to the lowest level and close to the original replica.
- Fast spread strategy: Fast spread strategy works to replace the old files to new in each node along the path of the best client when the storage space is limited.

Replica Consistency and Update Propagation
Replica consistency means maintaining the similarity of replicas during the execution jobs in data grid environment. When modifying any replica, manage and maintain the consistency of data in this environment are important aspects of the system, particularly in the concurrency and availability issues. When replicas can be modified, we need a mechanism to keep them consistent. Replica consistency problem occurs, when updating replicas and propagate these updates.

There are two types of updates to the replicas: synchronous and asynchronous. In distributed databases, several solutions of replica synchronization already exist by using optimistic consistency protocols, but an asynchronous replication is more suitable for data grid environment, and few studies have been done in this field.

Classical techniques used for update propagation such as radial scheme, where the master node sends the fresh data to all replica sites. But this method may have high cost, like the continuing transmission of the message over the same communication link. The second classical technique is line approach, in which the master replica sends the update to only one site and this site sends the update to one site and so on. In this approach the time of update propagation is more than previous approach.

Replica Consistency Service
One of the most approach used to update propagation is Replica Consistency Service(RCS), which keeps data consistent between replicas.

Consistency service: provides the main entry point for the user via creating the user interfaces in consistency service client, but the actual file update is done by a Local Consistency service where the physical file resides.

Fig. 3: Architecture of consistency service
i. Transaction system: In this system protocols are responsible for update propagation between components.

ii. Local consistency service (LCS): Locks are used to secure distributed data stores so that data is not modified by ordinary users. File lock service is used on all the storage systems which are responsible for holding and releasing of all files local to the storage system.

iii. Replica catalogue: query and know the location of the files in the storage systems through Replica catalogue.

iv. Replica consistency catalogue: is used to maintain file attributes for all meta data stored; that is required for the replica update process, such as master, state of a file, and other information.

v. Replica manager or File copier: Transfer updates that have occurred to files to remote sites.

The action mechanism of this approach is chosen at single master node, where only one replica can be modified by the end users and all others are synchronized (updated) by the RCS.

**Conclusion**

Through what is listed, the replication is very important for increased performance, throughput, increased fault tolerance, and reduced bandwidth consumption. Replication is used in distributed environments, Data Grid is one of them. Data Grid topologies, can be summarized in four major topologies: Federation topology, Monadic topology, Hierarchical topology, and Hybrid topology, where each topology commensurate with the specific field for sharing resources and available data between institutions and research organizations and scientific.

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**Congratulations !!!**

In SEARCC International Schools’ Software Competition 2015 at Colombo, a team (Mr. Rajat De, Mr. Anubhav Baweja and Mr. Sidhant Bansal) from Delhi Public School, Dwarka, New Delhi sponsored by CSI won the first prize.
Planning, Deploying and Maintaining Business Intelligence (BI) Reporting Systems

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Introduction

Business Intelligence Reporting tools (BI Reporting tools in short) are used to analyze and report on the organizational data present in Data Warehouses and Databases and thus use this information for the benefit and growth of the organization. The BI Reporting tool deployments are an integral part of the Information Technology setup of most of the organizations of considerable size. There are a number of BI Reporting tools available in the market. Oracle Business Intelligence Enterprise Edition (OBIEE in short), Business Objects (BO in short), from SAP, Tableau, TIBCO Spotfire, IBM Cognos, QlikView are some of them. For successful deployment of BI Reporting tools, BI Managers and BI Administrators need to have good knowledge of various steps and concepts related to planning, installing and maintaining BI Reporting tools. The objective of this paper is to discuss these steps and concepts without specific reference to any one BI Reporting tool. The points mentioned in this article may or may not be applicable to all BI Reporting tools. Also, it may be noted that this paper does not discuss the deployment of BI Applications since it is an entire topic on its own requiring detailed discussion.

Literature Review

Contemporary organizations are data rich, but information poor. Business Intelligence (BI) helps organizations solve this problem by providing them the capability to do the analysis of collected data to make informed decisions. Business Intelligence consists of tools and technologies to access and analyze enterprise information in a useful way to make better business decisions. Business Intelligence tools provide reporting and analysis capabilities which allow vital organizational information to be presented to the business analysts and users in the form of reports in easily understandable formats like tables and charts. Big data analytics provides the necessary ability to the organizations to make effective and intelligent use of their data to make better business decisions. The increasing amount of data and its interpretation for drawing business benefits is one of the challenges being faced by the enterprises of the day. Business analytics (BA) refers to the skills, technologies, applications and practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning. Business Intelligence and Data Warehouse are a necessity for all businesses of considerable size who aim to understand and grow their business. Also, they have become a necessity to support the day to day business in various verticals and to generate the reports necessary to comply with various Government norms.

Planning and Deploying BI Reporting Systems

Server Environments

BI Reporting tools consist of a server environment where the BI reports and other BI objects are deployed for access by end users usually through a browser. The BI reporting system may also consist of Desktop clients for creating and modifying BI metadata layer and BI reports. Some BI Reporting tools may allow this creation and modification of the BI reports by accessing the server URL through a browser. Multiple server environments need to be setup for various steps in the software development life cycle. The number of environments may differ from organization to organization, but a minimum of three environments are needed in organizations which follow proper software development processes. The three environments are development environment, stage or quality assurance (QA) environment and the production environment. The actual development/coding and unit testing of the BI Reports are done in development environment. This environment is used by the BI developers. The integration testing and user acceptance testing are done in the stage or QA environment. This environment is used by BI developers and testers. The tested and signed-off BI Reports and content are finally deployed in the production environment. The end users access the BI application from this production environment. Depending on the software development process followed by the organization, there may be separate environments setup for integration testing, quality assurance and testing, user acceptance testing and business simulation or stage/pre-production.

The choice of the operating system for the server would depend on the supported operating system corresponding to the chosen BI Reporting tool. Windows and UNIX/Linux are supported by many BI Reporting tools.

The Hardware sizing of the BI server environments would be dependent on the minimum system requirements and the number of expected Concurrent/Active BI users. In absence of accurate estimates with regards to the numbers of Concurrent users, the thumb rule is to consider the number of Concurrent users as 10% of number of active users. The hardware sizing would consist of determining the RAM, number of CPUs, Disk Space, 32-bit or 64-bit in case of Windows operating system. The technical documentation corresponding to the BI Reporting tool containing the Hardware requirements and sizing guidelines, should be referred for this purpose. Also, the licensing model and the respective costs need to be considered while sizing the environment. To arrive at the sizing of the BI Reporting system suitable for the organization, these aspects need to be discussed with...
sales or account manager and consultant corresponding to the BI Reporting tool vendor.

The development environment is usually installed on cheaper hardware and lower hardware sizes, since this is used mainly by smaller number of BI developers for coding and development of the BI reports and content. Also, it needs to be decided if physical server or virtual machine or cloud servers need to be used for installing the BI Reporting tool. This needs to be decided based on considerations related to cost, scalability and the organizational standards.

**Horizontal and Vertical Scaling**

Like any other software system, BI Reporting systems also grow with time if they are successful. More server resources would need to be added over a period of a time to cope-up with this growth. It needs to be planned if Horizontal or Vertical scaling strategy would be adopted for this. Vertical scaling involves adding more resources like CPUs and memory to the existing single node. Horizontal scaling involves adding more nodes to the existing system.

**Load balancing and Fail-over**

Production BI Reporting systems which cater to large number of users usually consist of two or more servers which are clustered. Load balancer software is used to spread load across these multiple servers. Scheduling algorithms like random choice or round robin are used by the load balancer software to route the requests to the servers in the cluster. F5 BIG-IP Local Traffic Manager (LTM), Cisco IOS, Radware AppDirector are examples of some software which provide load balancing capabilities. Load Balancer software is used for achieving horizontal scalability and redundacy in BI Reporting systems.

In BI Reporting systems where high availability and minimal downtime is a requirement, Fail-over clustering needs to be implemented. When this is implemented, the other servers or nodes in the cluster take over the workload if there is a failure in one of the servers or nodes in the cluster.

**Authentication and Authorization**

Authentication is the process by which a user login to the BI Reporting system is validated based on username and password. Different BI Reporting tools support multiple types of authentication. Most of them have their own native authentication, but these are usually used when the number of users is small. Depending on the BI Reporting tool, other types of authentication like Lightweight Directory Access Protocol (LDAP), Windows Active Directory (AD), Windows NT Authentication, Database Authentication, External table Authentication, are supported. In large organizations with many applications, for accessing the BI Reporting System, Single Sign On (SSO) is integrated with the standard Authentication method followed in that organization.

While Authentication validates the user logon, Authorization is used to determine what accesses the user has after logon to the BI Reporting system. This is implemented by the BI Reporting systems by the way of groups and permissions. Groups are created and permissions are granted or denied to these groups to various folders, dashboards, reports, applications in the BI Reporting system. The users are assigned to the groups and thus they inherit the rights of the group to which they belong. This way the users get access to the BI content which they are supposed to see, based on the role they perform in the organization.

**Repository Database**

The BI Reporting tools usually have a repository database associated with them. The repository database is used to store the metadata information related to the BI Reporting installation. This could include information like users, groups, permissions, rights and pointers to the location of the BI reports. The BI Reporting tools do come with a default database for the repository. If required, it may be decided to not chose the default database and instead deploy the repository on the standard database corresponding to the organization. This is to take advantage of the existing setup, backup procedures and support structure available for the standard database product in use in the organization.

**File Repository**

The report templates, the reports with data, the dashboards and other BI objects are usually stored in a standard default folder on the BI server itself. The organizations usually have standard File Server like Network-attached storage (NAS). It may be opted to store the reports and other mentioned files on folder in the File Server instead of on a folder in the BI server. This is to take advantage of the scalability, standard backup strategy, archival strategy and support structure that would already be in place for the organizational standard File servers.

**Assigning Custom Name to BI Reporting Server URL**

BI Reporting systems have a web URL using which the BI content is accessed by the end users. The default URL usually consists of server name and port in the form of http://servername:portname/some_extension

For ease of usage and access, the end users need to be provided with a meaningful name as the URL instead of the server name and port number. This can be done with the help of the IT team of the organization which takes care of the DNS setup.

**SSL encryption of the URL**

The default web URL of the BI Reporting systems use HyperText Transport Protocol (HTTP). HTTP is insecure and vulnerable to eavesdropping and man-in-the-middle attacks. Depending on the kind of data that is accessed through the BI Reporting system, HTTP may not be recommended for the cases where security of data is of paramount importance. In such cases, HTTPS needs to be used. In HTTPS, HTTP is layered on top of SSL/TSL which is a secure protocol and thus allows transfer of information in encrypted format. This configuration is done using a SSL certificate.

**Auditing and tracking of usage**

Many BI Reporting tools provide the functionality to track or audit the usage of the BI Reporting system by the end users. Specifically, in the cases where the end users use more of Adhoc reporting than canned reports, the audit or usage tracking enables the BI designers and owners to analyze and understand the usage of the system. This provides inputs to further enhancing the BI Reporting system. This audit functionality is also useful in trouble shooting when the data or performance issues are reported by the end users of the BI Reporting system. Based on the log level set by the BI administrator,
details like the BI report name, the user by which the report was run, the SQL query corresponding to the report, the date and time at which the query was run, the duration for which the query ran, are logged.

The audit details are usually logged into tables in a separate database that is setup for this purpose. Choosing the database product, setting up and maintaining the audit database should thus be a part of the BI Reporting tool setup plan and maintenance plan. The strategy for backups and archival of the Audit database should also be a part of these plans.

Performance Monitoring
In large enterprises, where the users of the BI Reporting system are spread across various geographical locations, there needs to be process to monitor the performance of the BI Reporting system across locations and alert the concerned team or administrators whenever there is a degradation in the performance below the expected level of service. Automated scripts which simulate the end user are used to capture login times and response times of some key representative reports at regular intervals of time. These captured times are compared against the expected times. Email or SMS alerts are sent out to the administrators when performance issue is noticed.

Various tools from vendors like HP, CA technologies, Oracle are available for this purpose of End-user experience monitoring. This helps in proactive identification of the application performance issues even before the end users can notice and complain about the same. This leads to quicker identification and quicker resolution of problem and lower downtime and thus happier and satisfied end users.

Server Performance Monitoring
The Server on which the BI Reporting tool is installed, the BI server, web server and a number of other related server processes, need to be monitored continuously and the concerned administrator or support team need to be informed by e-mail or SMS in case of any failures or when parameters like memory, space cross or fall below the threshold levels. This is to enable the concerned team to take immediate action and minimize the downtime and to maintain the acceptable performance levels of the BI Reporting applications deployed on the BI server. Various software like HP SiteScope, and Server performance monitoring tools from vendors like AppDynamics, New Relic, Compuware, CA, are available for this purpose.

Disaster Recovery Environment
To mitigate the risk of the main BI Reporting server going down due to a disaster at the location where it is installed, an alternate Disaster recovery environment needs to be planned and set-up. This environment needs to be setup at a location other than the location where the main BI server is located. The applications deployed on the Disaster Recovery environment always need to be maintained in sync with those deployed on the production environment.

Configuring E-mail
E-mails are used in BI Reporting tools for two purposes. One is used at the server level to send out alerts to the administrators of the BI Reporting tools whenever the server is down or in case of other types of system failures.

The other purpose is for sending the BI reports in various formats to the users. Most BI Reporting tools allow scheduling of the BI reports. The scheduling functionality allows the reports to run at the scheduled time and allows the generated reports to be sent out by e-mail to the selected group of users in the requisite formats as available with the BI reporting tool.

For the mentioned purposes, the e-mail needs to be configured by providing details like fully qualified domain, name and port of the Simple Mail Transfer Protocol (SMTP) server. This configuration is done in the administration interface or the configuration files of the respective BI Reporting tool.

Configuration, Tuning, Customization and Integration
When the BI Reporting tool is deployed, it gets installed with the default settings and configuration that come with the product. These may need to be changed to confirm to the requirements and standards of the organization. Also tuning of various BI server parameters needs to be done for optimal performance. Various customizations as requested by the users of the BI Reporting system need to be done. For example, change of Logo and various images and look and feel of the interface may constitute the customization. Also, the BI Reporting system may need to be integrated with existing systems in the organization. For example, it may constitute integrating the BI system with a web portal.

Maintenance of the BI Reporting System
Once the BI Reporting tool is installed on the production servers and various BI applications are deployed on it and the end users start using the BI Reporting system, there is a need to continuously maintain it throughout its lifetime. This is the task of the BI server administrator team. One recurring task that the team has to do is the code move. The code in the BI Reporting systems usually consists of metadata layer (like Universe in case of Business Objects and RPD in case of OBIEE), dashboards, BI reports and the respective folders and other BI content. As a part of BI application development, enhancement and maintenance, the developed and unit tested BI content needs to be moved from development to quality assurance environment for testing. The tested BI content which is accepted and signed-off by the users, needs to be moved to production environment. Off course, there may be further more environments in between the development and production environments as per the processes followed in the organization. Proper software release procedure and release calendar needs to be in place for the release management of the BI content.

The BI Reporting product vendor releases patches and hotfixes for the BI Reporting product from time to time. This is for adding new enhancements and also to fix existing issues in the BI Reporting tool. These patches and hotfixes are tested thoroughly by the BI administrator team in the sandbox environment with help from development and support teams. These are then applied in quality assurance environment and then in production environment after proper testing and confirmation that it does not break anything in the production environment.

The organizations invariably have a maintenance contract with the BI
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Reporting tool vendors so as to get support for any issues faced with the BI Reporting tool. The BI administrator raises tickets or service requests with the vendor support team corresponding to the BI Reporting tool for unresolved issues related to the BI Reporting tool. These issues need to be followed-up with the vendor support team till their resolution and closure.

The BI administrator team needs to be in constant touch with the BI Reporting vendor team to get information such as those related to new version of the BI Reporting tool and the end of support for the currently installed version of the BI Reporting tool. The upgrade of the product version needs to be planned after discussion with all stakeholders. Some upgrades may be relatively easy when there is no big change in the architecture of the BI Reporting tool. But when the version change involves a big change in the product architecture, the upgrade would be as good as a fresh installation and would involve deployment of applications after complete testing and issues fixes in the new version. The Reporting BI tool vendors usually provide tools and wizards to help with the migration. These kind of major upgrades would require extensive planning, testing and issue fixes.

Also, similar planning and exercise may be required when there is an upgrade of the operating system on which the BI Reporting tool is deployed or when there is an upgrade of the standard browser through which the BI Reporting system is accessed.

As with any software system, the users of BI Reporting system face different issues from time to time. The issues may relate to the BI Reporting tool itself or they may be related to the applications deployed on the BI Reporting tool. The issues related to the BI Reporting tool need to be resolved by the BI administrator team and those related to the BI applications need to be resolved by the application support team. Proper procedure in form of a workflow or ticketing system need to be in place for follow-up and resolution of the user issues.

Daily activities as a part of maintenance of the BI Reporting system could include restarting the server and clearing the cache after the daily Extract, Transform and Load (ETL) runs are complete during the off-peak hours.

Other activities could include user, group, rights management. Management of connections of the BI applications to various data sources also is a part of maintenance. The Disaster preparedness also needs to be tested at intervals of time by bringing down the production BI Reporting environment and bringing up the Disaster recovery BI Reporting environment.

Conclusion

BI Reporting Systems are integral part of contemporary organizations. Setting up, maintaining and integrating BI Reporting systems into the existing infrastructure requires knowledge of many areas of Information Technology like servers, databases, operating systems, security, application life cycle management and Tuning. This article is an attempt to list down and give an introduction to these areas. Knowledge of these areas would help the BI Managers and administrators to get the right architecture, sizing and setup of the BI Reporting system so as to cater to needs of the BI user population with the expected performance and without exceeding the budgets.

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Computer Vision - Recent Trends and Challenges

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Introduction

Human visual system including eyes and brain is capable of interpreting images and videos and it can differentiate and point out the subtle differences between almost similar images\(^{[5]}\). But interpreting such scenario are still difficult for a computer system. For example many image retrieval systems will return unsatisfactory results for queries which contain not only objects in a scene but existence of a structured relationship among these objects and their attributes. Computer vision has been considered as one of the most frontier and potentially revolutionary technology in Computer Science. Research in computer vision tries to bring out the semantic relationships among the objects in images and videos. Computer vision can be dened as extraction, analysis and understanding of useful information from images and videos. The goal of computer vision is to increase the perceptual capacity to the computer system to assist the human in a certain way\(^{[4]}\).

Computer vision is still difficult because they are inverse problems. Inverse problems try to identify the unknown parameters from insufficient data to develop a complete solution for a particular problem. i.e. it describes or interprets the scene that we can see in the image or video to reconstruct its properties\(^{[3]}\). Computer vision differs from image processing techniques. While computer vision techniques try to emulate or understand the scene from the image, image processing deals with the transformations on the images. Computer vision gives the knowledge about the scene and image processing gives or outputs the images in some other format.

History

Computer vision research was first addressed by MIT during 1970s with some basic image understanding techniques. Several image processing methods are already developed at that time and these algorithms acted as the building blocks of computer vision. Non polyhedral models are reconstructed using computer vision methods in late 1970s. Many famous algorithms including Kanades edge detection and intensity based optical flow methods were proposed at that time.

Most of the classic algorithms in computer vision and image processing were proposed in 1980s. The concept of image pyramid and scale space representations were the first used techniques in computer vision at that time. Introduction of wavelet transform is one of the most useful inventions in this field and it gradually replaced the image pyramid and scale space techniques. Classic algorithms like Canny edge detector and Kalman Filter tracking were also used. The use of Markov Random Field to most of the vision algorithms into a common mathematical frame was also introduced.

Improvements on basic algorithms were made in 1990s which helps to enhance the performance of the vision systems in a great way. Optical flow methods were improved using graph cut methods. Tracking methods were improved by Lucas Kanade method and particle filters. Recognition and motion estimation were the most crucial problems at that time and these were solved in projective reconstruction. Segmentation and face recognition were first addressed during this time. Segmentation was done using normalized cut and mean shift algorithms and face recognition was solved using eigenvalues. Principal component analysis was also applied.

In 2000s the computer vision problems were advanced to higher level applications. Those problems can be solved either using image based techniques or feature based techniques. The whole image was used to solve the problems in image based techniques. Image stitching, computational photography and tone mapping are some examples. Image features or image representations are used in feature based techniques to solve the problem. These representations are also known as interest points. Feature based methods got more attraction in recent times due to their lower computational complexity. Recognition problems like object recognition and scene understanding can be solved using such methods. Widely used interest point descriptors such as SIFT (Scale Invariant Feature Transform) and SURF (Speedup Robust Features) are also proposed during 2000s.

Need and Scope

Computer vision is a very fast growing research field after 2000. Initially all the researchers are just focused on simple applications like face detection. Later the researchers tried to detect and recognize all the objects appeared in different scenarios using computer vision techniques. Each image has a story behind it and the computer vision techniques try to identify the story behind that image. Computer vision helps the to extract information from a set of images in an easy and versatile way. Computer vision techniques also helps to reduce the cost of image interpretation.

The computer vision is applicable in almost all areas varying from smart phones to space missions. So the scope is very wide and vast. The computer vision can be applicable in areas like Autonomous vehicles, Image search, Optical Character recognition, Face recognition, Remote sensing and robotics, medical imaging, biometrics, object pose estimation, motion estimation and automatic vehicles, e.g. an automatic exploration robots must have the full understanding of the environment of its navigation. Computer vision system embedded in that robot can access these information. In medical imaging computer vision can be applicable in neurology to detect the abnormalities in any organs.

Recent Research Trends

Applications areas vary from basic image processing task to very high complicated things. Computer vision can be used for...
Intelligent Surveillance Systems

Intelligent surveillance system is one of the major research areas in the field of computer vision. Intelligent surveillance systems capture the scene continuously using capturing devices and extract large amount information from the scene. These researches are always related to the physical appearance of the object including color, size and shape of the object present in the scene. Intelligent camera surveillance system is used to interpret the scenes in the videos captured by a surveillance system placed in crowded areas like shopping malls, pilgrimage centres etc. This system automatically collects the large amount of videos from surveillance cameras and detects, tracks and recognizes objects of interest. It also analyses the behaviour of the object of interest to check whether there is an abnormal behaviour. These researches will help us to detect the abnormalities in high density crowds without human aid.

One of the main challenges that researchers face during the development of intelligent surveillance system is the quality of the acquired data. In most of the cases, the visual data collected may be covered, occluded, or partially visible. The illumination changes and noise may also affects the quality of the scene. So developing a noise free and good surveillance system is still a research challenge. Another challenge is the fusing and combining the data from multiple sources. Avoiding uncertainty and inconsistency are very important while fusing the data from more than one source. This is another important challenge in the development of intelligent surveillance system. Predicting unusual events, detecting threats, Application of deep learning, and scalability of the networks are the other research areas in the in the field. In MIT, CSAIL research group, Center for research in computer vision in University of central Florida and Stanford Vision lab made significant progress in this area. UCF recently developed a surveillance system called Knight for Orlando police department. CSAIL recently presented their motion tracking and estimation system to Obama, the president of USA. But these systems are not a fullfledged ones to be implemented in real life situations. So researchers are still trying to develop improved systems and these eorts shows the research importance of this area.

Action or Event Recognition

Humans can easily understand the actions seen in the video, but it is very difficult for a computer system to identify and recognize the human actions. Motion feature detection, Action representation and action classification are the common steps in action recognition. The outcome will be the textual labelling for the events and actions in the image.

Diversity in action is one of the important challenges to develop action recognition system. Uncertainty of the event is another major challenges action recognition problems. Almost similar events like walk and run may conict each other. Good quality images and adequate mechanisms are needed to avoid these uncertainties. Occlusion and illumination changes also affect the recognition system. Number of contextual and philosophical issues are also pose challenges to recognition system. Major research groups in this area include Microsoft research group, Berkeley Vision and Learning Center, Vision and Image Processing (VIP) Lab of University of Waterloo. Now the tracking and motion estimation are possible, but the action recognition is yet to develop.

Autonomous Robots

Autonomous robots augmented with computer vision techniques are useful in exploration of hostile areas. With the help of array of cameras these robots can detect and classify the objects they encounter during the exploration. Quick response and actions taken thereof calls for faster detection of objects and decision making. Research should advance in the field of object and action recognition to build such robots.

Computer vision group of Munich Technical University has developed visual navigation for their flying robots. The Robotics Institute of Carnegie Mellon University also made some significant milestones in autonomous robots research. NASA used computer vision in robots for their space missions.

Autonomous Driving

Autonomous cars are also known as driver less cars which is capable of doing all the work done by a traditional car. These cars try to detect and sense the environment and surroundings with the help of computer vision techniques aided with radar and GPS systems. The main challenge in Autonomous Driving is to handle the new situations come across the vehicle. This also need fast computation and quick responses.

Carnegie Mellon University’s Navlab produced first driverless car in 1980. Google invested lot of money in this research to develop Google car.

Other areas

Research area of computer vision is open to all domains. Image search, image retrieval, image classification, annotation are the application areas that uses image as input. Face recognition and identification can be used for variety of the applications like crime record detection. Traffic applications are there to help the humans through Traffic sign recognition. Computer vision can also applicable in optical character recognition and Intelligent character recognition. These are few areas that use computer vision for the better performance.

Tools

OpenCV and MATLAB are the most widely used programming tools for computer vision. OpenCV is an open source library and MATLAB is a preparatory software.

OpenCV

OpenCV is a library of functions and algorithms that can be used for computer vision applications. It is a crossplatform and free for use under the open-source BSD license. Functions and algorithms are written in C and C++ and initially interface was available in C++ only. Now the interfaces are available in Python, Java, MATLAB and Octave. Wrappers are available in other languages like C#, Perl, and Ruby. GPU computing is also supported by OpenCV. Most of the basic and advanced algorithms used in this field have been contributed by researchers.

MATLAB

MATLAB is one of the most widely used programming tool for computer vision. Computer vision system tool box is available in MATLAB, which contains implemented algorithms and functions for computer vision applications. Tracking algorithms like Lucas Kanade and Kalman
Iter, Feature extraction methods like HOG and SURF, Object detection methods, Face detection, People detection are some of the basic algorithms available in MATLAB.

**Tina**

TINA (TINA Is No Acronym) GNU Lesser General Public License software tool that helps to do image analysis in an easier way. It is very good tool for machine vision and medical imaging.

**CVIPTools**

CVIPTools (Computer Vision and Image Processing Tools) is an Open Source image processing software that can be used in windows. It is developed by Computer Vision and Image Processing Laboratory at Southern Illinois University at Edwardsille. Most of the functions and algorithms useful for computer vision are available in this tool.

**Future**

Though there are lot of advancement made in this field, still computer vision is not considered as a fully developed discipline yet. Many algorithms are yet to be matured to readily use in real world scenarios. Future of computer vision is bright and lot of works are to be completed. All the problems mentioned above are ongoing works in different universities and there exist much research scope. Desktops are already replaced with smart phones and tablets, development of computer vision algorithms which consume less energy and computing power would be a potential research area. More and more Computer Vision based products have been introduced in the market which is an indication of raise in industry interest in this exciting field.

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**Appendix A**

**General Architecture**

![General Architecture of a computer vision system](image)

**Fig. 1: General Architecture of a computer vision system**

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Biological Data Science: Workflow

The concept of big data was developed with the aim of analyzing and processing large and complex data sets, which may be structured, unstructured and intermediary in nature. This relatively new concept has been lauded for its role in futuristic technological measurement as seen from its current usage in business, government, scientific and academic sectors. The theory behind the big data notion lies not only on the inherent size and complexity of large data sets, but also in the data processing and analytics of such information that cannot be handled by conventional tools or processes. The four Vs clearly explain the scope of this concept: Volume (referring to the amount of data), Variety (pertaining to the nature and type of data), Velocity (the speed of data generation and processing) and the most important of all, Veracity to remove errors and maintain the correctness of data.

Big Data in Biological Research

One of the biggest target areas of data science technology is in the life sciences sector. Biologically relevant data is produced at an unbelievable rate from wet labs, literature surveys and clinical trials among others. With the advent of next generation technologies, genomic and molecular data is generated with increased efficiency and accuracy, and advanced bioinformatics techniques are warranted to understand and analyze this information to enable pharmacological implications and assess drug response to diseases. Biological data science involves both clinical and molecular data. In clinical data science, the analyst plans, designs and studies clinical patterns through statistical and computational means and reports the results for improving the effectiveness of clinical trials and other therapeutic approaches. The other kind of biological data science looks at various genomic databases to analyze data pertaining to proteins, DNA and other molecular units. Genomic data science is crucial to make sense of the complex and largely obscure nature of huge amounts of genetic information obtained from different species.

Biological data are heterogeneous and highly complex in nature. Handling this complexity to get useful insights requires multidisciplinary skills like computational expertise to work with large datasets, ability to format the data for mathematical modeling, exploring this information to identify key features to build models, statistical skills to apply and validate the machine learning methods and ability to visualize, interpret, and communicating the resulting insights in an useful way.

Biological Data Science

Data science is a set of basic principles that helps in the extraction of knowledge from data where as Data mining is the extraction of knowledge from the data using methods and techniques that integrate these principles. Data Science encompasses all process starting from data collection; cleaning data; developing hypothesis & making inferences; data visualization; and generating data products. It helps transform data into industrial products, starting with exploration of raw data and ending in implementing models. Data scientist makes use of scientific applications to analyze raw data from the fields of business, marketing, medical, finance and security using techniques like statistics, signal and language processing etc. Biological Data science is a point of convergence of three important disciplines like Biology, Computer Science and Statistics. A data scientist/data practitioner in the life sciences domain should posses a combination of skills from these three domains for Data-driven decision-making. Venn diagram of biological data science is represented in Fig. 1. Data Science is at the middle, combining the skills of computer science, statistics, and life sciences.

Big data research in life sciences focuses on molecular datasets from gene expression, DNA sequences, protein structures, pathways, medical records etc. A systematic approach is necessary for discovering underlying structure, detecting trends and patterns and deriving true actionable insights from these huge dataset. Here we propose a workflow for knowledge extraction which includes different phases like data collection, data preparation, data analysis, data modeling, data visualization and optimization. It is represented in Fig. 2.

1. Data Acquisition - Data collection from multiple sources is the first step. It explains how the data are collected, how the data are represented prior to analysis and presentation, transforming of data, grouping of data.
2. Data preparation/ data wrangling - This step involves cleaning the data, detecting
anomalies and outliers and extracting the core features from many forms of huge dataset using dimension reduction methods.

3. Data Analysis - Exploratory data analysis helps in familiarizing with the data, recognizing the patterns in the data, discovering underlying structure through clustering, conducting correlation analysis etc. The result of EDA forms the basis for Data Modeling.

4. Data Modeling - Create prediction models from the training set and gauging the performance of the models using test/validation datasets.

5. Data Visualization - Creating two and three dimensional charts and graphs for visually inspecting and interacting with processed data set.

6. Optimization - Continuous improvement process by adding new data sources and rebuilding the models based on efficient and better algorithms for improved performance.

**Conclusion**

The improvement of technologies and introduction of microarrays has resulted in the increasing rate of biological data. Data collection and verification, preprocessing, feature selection, analysis, modeling of data, visualization of the results, evaluation of the model are important steps in the data science process. The whole objective of process flow of biological data science ensures that the model built is of value to the data scientist and practitioners to gain new biological insights and increases the efficient of decision making.

**Acknowledgement**

This work is supported by the DST Funded Project, (SR/CSI/81/2011) under Cognitive Science Research Initiative in the Department of Computer Science, Amrita School of Arts and Sciences, Amrita Vishwa Vidyapeetham University, Kochi.

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A nation-wide foresight exercise has been underway for about 5 years now in TIFAC to put together Technology Vision 2035 for the country, and I have been privileged to be in the core team executing this task. A large number of meetings with experts and stakeholders including students and young trainees were organized in the course to evolve the Vision, besides resorting to the conventional foresight tools. During these meetings we expected insightful foresights into the deep future from these stakeholders and did get them, though not in full measures; but one of the common concerns that reverberated all across, was on the lack of intensive Industry-Academia (IA) linkages. Every other expert from industry or academia vociferously spoke about its need, rued about its absence and predictably, blamed the other side! Clearly there was a concern more about the present than the future which we in TIFAC are concerned about; rightfully so, because the future is shaped by what we do today and IA linkages cannot go off the agenda of the immediate future. Let me use a broad-brush to bring forth my reflections, based on my first-hand experiences, on this unsettling issue.

The importance of academia-industry linkages for development of an economy, through innovation and productivity that they infuse into it, is well recognized and has been talked about ad nauseam in the country. For industry, time is the most valuable resource with a demanding customer/client keeping it on its toes and forcing it to marshal all its resources well, to stay competitive in the market. On the other hand, academia needs state-of-the-art infrastructure and funding, to generate new knowledge to fuel innovation, besides sourcing the skilled human resource to the industry. Constrained as it is for time and also not so strong in the basic conceptualization of problems, the industry prefers known solutions and even expects academia to be ready with them, which unfortunately the academia is not always geared for. Academia is creativity-oriented, knowledge intensive and takes an exploratory approach in its operations and therefore, would fail to deliver if it does not enjoy autonomy. Academia manages knowledge and knowledge-products well, but isn’t really good in managing material resources and even valorizing its own knowledge products like the industry. The complementarity of industry and academia becomes more evident from the fact that industry needs innovations as inputs from knowledge-bodies to stay productive as much as academia needs real problems to work on from industry to stay creative. Thus, it is amply clear that while two disparate entities may not stay together due to their contrasting features, they also cannot survive in isolation owing to their being both sink and source to each other and thus, locked in a perpetual cycle.

It is also clear that in the widest perspective, both these entities have an important role to play for us as individuals- who look for a better life, secured livelihood and safe living and also the nations- that look for a robust economy to ensure fulfillment of all the entitlements due to their citizens. Therefore, an interaction between the two assumes importance in fulfilling the socioeconomic imperatives besides their existence for each other. A macro-perspective from the prism of interactions between the two entities suggests that the developed economies are characterized by strong linkages between industry and academia, the under-developed by the absence of it and developing ones by ‘make and break’ of it!

Realizing the importance of this complementing relationship, several initiatives have been taken world over to promote linkages between industry and academia and fuel the economy. Some of the prominent ones catering to diverse needs of the two include Calit2 (California Institute for Telecommunications and Information Technology) in USA, Magnet & Magneton program (Israel), Fraunhofer Society (Germany), European Framework Programs, Industry Research Centers & Hsinchu Science Park (Taiwan) etc. Some of them involving the academia directly include: Microsoft- Cisco- Intel- University of Melbourne, BP’s Energy Biosciences Institute- University of California Berkeley, Audi’s Ingolstadt Institute of TU Munich, IBM- ETH Zurich, SKF- Imperial College London, IBM- Imperial College London, GE Global Research Munich, Siemens- TU Berlin- MIT, Nokia- Aalto University. These stand out as notable examples of I-A interactions. Yet another example of such an interaction with sharp focus on innovation is Demola, which is an international organization that facilitates co-creation projects between university students and companies, either locally or internationally. The trends from these countries suggest that I-A linkages are focused sharply on innovation, innovation systems and entrepreneurship. This is in contrast with the developing economies where they struggle to bring industry and academia face-to-face.

Let’s turn inwards and one finds that in India too, several initiatives pivoted around academia-industry linkages have been taken, mediated by the government in the past; like NMITLI (New Millennium Indian Technology Leadership Initiative) and SBIRI (Small Business Innovation Research Initiative) basically for technology development/pre-commercial R&D; HGT (Home Grown Technology) and PATSER (Programme aimed at Technological Self Reliance) aimed at technology transfer and upscaling (Early Stage); and technology incubation in academic institutions (STP, TBIs) and TDB (Technology Development Board) with an eye on technology commercialization; besides several initiatives from DST, DBT, DSIR etc. or their autonomous bodies in the recent years. Then, there are likes of IIPC (Industry-Institute Partnership Cells) and NAFETIC (National Facilities
In Engineering & Technology with Industrial Collaboration) of AICTE and Mission REACH of TIFAC- focusing on improving the quality of education by involving industry.

Most initiatives are modeled, with government serving as third- strand in the triple-helix (of Industry- Academia- Government) not only to prevent the industry and academia linkages from cracking but also liquidate the trust deficit. These initiatives have been taken to stir-up and intensify interactions between industry and academia, keeping in view long-term interests, to enhance their role and contribution to the economy of country. Varying degrees of successes have been reported under these programmes, pointing towards gaps or shortfalls. Some of these programmes have been withdrawn, some recast but the successful ones hardly scaled-up. Clearly, there are some problems that fail the trio and need to be fixed, but starting from the roots.

At least in the Indian context, one finds reluctance in industry and academia to step into each other’s turf as the biggest stumbling block and usually it requires a third agency to bring them closer. But the alliance often remain unsealed, because of the two different languages they speak and are unintelligible to each other. Even if they get engaged formally, in most cases the collapse of alliance is imminent and gets hastened because the contact is usually at one level. The collaboration remains only in mind and at best in papers- in the absence of a permanent structure and no follow-ups. A look into most failed linkages, would indicate that resources invested- time, funds and people were sub-critical and also the reasons were never documented as ‘lessons learnt’, out of fear of audits. Even the personal visits and correspondence remain inadequate to keep the ties aloft. In the post project evaluations, the failure in IA linkages is generally attributed to a technical point, but if carefully analyzed it would either be poor management of the affairs or inadequacy of resources- both non-technical and hence, not insoluble! In the absence of any tangible incentives for getting out of their comfort-zones and grab industry’s confidence, the faculty allow their own potential to be under-exploited. Alas! The two sides, let the bridge burn and watch the camaraderie go up in smoke; only to whimper in some industry- academia conclave. Unfortunately, even the government mediated initiatives in most cases fail to generate an impact that is envisaged before their launch. It needs to be understood and appreciated that success or failure of such programmes cannot be measured at the end of project duration- typically of three years. A broader vision of overall programme and its objectives would point out that even the failures in projects (which could be due to technology, people involved, policy framework or management, etc.) contribute to its success, but only if they are not seen from the prisms of accountant. Therefore, the evaluation of both- proposals (before onset) and projects (after completion) need different yardstick, as public-private partnerships are a different ball game altogether and need a different set of rules; persisting with old set of rules on a new board will continue failing the players.

On a practical note, we need to have a ‘sustainable relationship’ between the two sides; elements of which cannot be identified and appreciated by entities other than these two. For this, it is necessary that two sides value each other’s importance and/ strength, understand each other’s needs, give space to each other and to top it all, start believing in each other. The alliance should not be just for mutual convenience, but also be mutually obligatory i.e. synallagmatic, so that there is a ‘purpose’ for staying together. The relationship should lead to a win-win situation for both and this should also be a reason for them to sustain the relationship. Anything that can be a cause of loss should be promptly eliminated lest it affect the relationship. And yes, success of such relationships largely depends on the attitude and mindset of people who make and mind them. Industry and academia should be careful in choosing or appropriately grooming them. They must have powerful vision and this should be non-negotiable. It is important that ‘what do I get’ relegates to the back, paving way for ‘what does my organization get’ to come in front.

Lastly, forging and fostering industry-academia linkages should not be seen as a project- starting with a proposal and closing with Fund Utilization Certificate but as ‘management of change’ with hand-holding of industry and academia stretching well past the high-point in their interaction and right up to celebrations. The mediating, if any, entity has to be more patient, accommodating, far-sighted and progressive; more so if it is government because its stakes are the highest- “making investment on behalf of the people”, as late Prof. R.V. Indiresan, Ex-Director IIT-Madras often said while speaking on this topic.

(Views are personal)

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As a part of the team implementing projects emerging out of Technology Vision 2020 (released by TIFAC in 1996), till mid-2010 Dr. Saxena piloted the activities of Mission REACH (Relevance & Excellence in ACHeiving new heights in educational institutions), a major initiative to reorient the higher science & technical education and make it ’relevant’ to industries. He was instrumental in establishment of 35 TIFAC-Centres Of Relevance & Excellence (COREs) ever since this Mission got underway on October 4, 2000. He can be reached at nrjsaxena@gmail.com
Image and Video Processing - Effects on the Psychological Well-being of Humans

Hima Bindu Maringanti
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Semiotics is a science of signs which convey a meaning for just understanding or that would trigger an action; the former analogous to a compilation process and the latter, to an interpretation and subsequent execution process of a Computer System. Signs are of three types: verbal, iconic and indicative (or index). Natural language words to represent objects, concepts and actions are an example of verbal symbols. Symbols that convey the intended functionality of an object are represented by means of icons, for example, floppy icon for saving, printer icon for printing, scissors for cutting, glue for pasting etc. used in Windows OS. The indicative symbols are a smoke indicating fire, an alarm indicating the presence of a stranger and clouds/dragon-flies indicating the onset of rain etc.

Considering images, they are drawn, painted or graphically designed with an intention or a goal in mind, to convey something to the viewer. For this, the creator needs to focus on the colors: background and foreground, contrasting, light/dark; base material: paper, LCD screen, canvas, cloth, palm leave, stone etc.; tools for creation viz, a pencil, crayons, oil paints, sketches, fabric paints, beads, colored thread, wool, paper, pieces of cloth(appliqué), glitter, crochet etc. The computer designed raster images or graphics have more advantages in terms of the special effects that they can produce like 2-D, 3-D, blurring, shading, mirrored and optical illusions and real & living. Each of these create an impression on the mind of the viewer, positive or negative, negative or positive, exciting or calm, erotic or spiritual, passion or dispassion, anger or love, sadness or joy as a whole, a conglomerate. Even the analog/digital photographs taken by different people have different psychological effects on the viewer, depending upon the snap’s content and its constituent features, as discussed above. Not only is the photographer responsible for this cognitive state of the viewer, but the current state of the person who is looking at the snaps also has an effect on how he/she would react/respond, e.g. the same photograph of her parents’ wedding, which was very much admired by all, creates a mental turmoil in her while viewed at the time of death of one of the parents. So, it all depends on what, when, where and how we perceive (not see) things. While seeing is physical capture; perceiving involves, filtration for the sake of focus, understanding and interest/attachment to the object in the image.

Also, considering videos, which are timed sequences of image frames that produce an effect of moving, have almost the same and more escalated effects on the viewer; the reason being that a video contains both image and speech and at times, text. Almost all the parameters mentioned above would have an effect and as it is moving and continuous, it seems that is real life and so the watcher gets deeply engrossed in the characters playing the movie and emulate the emotions and situations being shown on screen. Hence for a short time, usually 2-3 hours, the viewer tends to believe the real life as real life and lives the life of the character that he/she empathizes with. So, it is the intelligence and knack of the movie making team that could be assessed by the amount of time one gets fully involved during video watching and sometimes, even after, when people tend to discuss the movie as a whole or the characters in particular. Almost all movies/videos evoke, one emotion or the other, or a combination and labeled as a comedy, romantic, tragedy, boring, stereotype, soap, action movie, adult/porn depending upon the mostly aroused emotion during the movie-watching act. Speech present in a video has its own wondrous effect on the human psyche, in the sense that it’s properties and characteristics express explicit emotions. The physical properties of speech/music like pitch, amplitude, volume, bass and frequency play the basic role in a speech act and modulation (both digital & personal or analog), voice intonation and prosody play a major role in producing the intended and/or unwanted effects on the listener. This finds proof in the effects the high intensity genre music and the classical or the spiritual genre music produces on individuals or groups of people, as a major validation of the so called terrifying / soothing music. From olden times, bhakti/spiritual music, bhajans were encouraged to keep the domestic environment cool and calm. Metallica kind of music is supposed/found to be exciting the human mind, away from depression. Classical and rhythmic & repeated music is found to calm an otherwise aggrivated/excited personality. Music is also a way of expression; a way of bringing out the innate, latent, dormant emotions and feelings that is supposed to be (general or days) proved to be therapeutic; those that could not be verbalized and vocalized due to various factors like society, culture, situations & surroundings etc. Non-invasive techniques like functional Magnetic Resonance Imaging (fMRI) and Electro Encephalo Graph (EEG) could be used for studying and validating the hypothesis of music being the therapeutic tool. American Music and Dance Therapy has already been researched and proved they are therapeutic. The American Music Therapy Association designs interventions to promote wellbeing, reduce stress, alleviate pain in the case physical ailments, express & communicate better and also enhance memory.

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Feeling the Real World: Limbic Response to Music Depends on Related Content, Eran Eldar1,2, Ori Ganor1,2, Roee Admon1,2, Avraham Bleich2,4 And Talma Hendler1,2,3 1 Wohl Institute For Advanced Imaging, Tel-Aviv Sourasky Medical Center.

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CSI Student Branch was inaugurated in School of Computer Applications (SOCA), ITM University Gwalior on Saturday 24th October 2015 by Prof. Vinip Tyagi, Vice President, Computer Society of India Region III and Prof. J. P. Verma, Chairman, CSI Gwalior Chapter. During the welcome address Dr. Sanjay Jain, State Student Coordinator - CSI, HoD & Convener, ITM University Gwalior highlighted importance of CSI and its benefits. Prof. Vandana Kushner, Hon’ble Vice Chancellor, ITM University Gwalior addressed the audience. She told that how one can take membership as individual as well as student member. She also discussed several benefits to join CSI. Prof. Vinip Tyagi, told that Computer Society of India is the first and largest body of computer professionals in India. It was started on 6 March 1965 by a few computer professionals and has now grown to be the national body representing computer professionals. In the opening ceremony session, Prof. Vinip Tyagi officially announced the School of Computer Applications, ITM University Gwalior as CSI Student Branch. On this occasion, he presented institutional membership shield to Dr. Sanjay Jain, HoD - SOCA & State Student Coordinator; he presented institutional membership certificate to Dr. Kapil Govil, Organizing Secretary & Student Branch Counselor. On this occasion, Prof. Vinip Tyagi, Prof. J. P. Verma issued student volunteer membership cards to 86 registered students. Prof. Tyagi nominated Mr. Faizan Ali Zaidi as President; Mr. Aditya Sharma as Vice President, Mr. Abhijeet Mittra as Secretary and Ms. Shweta Bhardwaj as Treasurer for CSI Student Branch. The event witnessed presence of 180 participants that included experts and speakers of repute.

Dr. Kapil Govil, Organizing Secretary delivered the vote of thanks. Dr. Sanjay Jain honored Prof. Vinip Tyagi with a memento of event.
Introduction to Medical Image Segmentation

Current technological progress in imaging and vision has brought so many changes in the medical diagnosis. Medical imaging is the technique to create internal images of the human body for clinical or medical purpose. Medical imaging is an interdisciplinary research area, which has dramatically grown in recent decades. This field of researchsums up the expertise from different disciplines like Medicine, Computer Science, Physics and Mathematics. Medical imaging includes several processing and analysis methods applied to a number of different imaging modalities. Different modalities include: Ultrasound, X-ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and Positron Emission Tomography (PET).

In medical imaging, segmentation plays a key role. Segmentation is a process of subdividing an image into its constituent parts or objects in the image, i.e. set of pixels, the pixels in a region are similar according to some homogeneity criteria such as color, intensity or texture so as to locate and identify boundaries in an image. Segmentation is a key task in all kinds of image analysis problems. Since, the aim is to localize the organs, the segmentation has a great clinical value in medical imaging.

Fig. 1 shows the block diagram of Medical Image Segmentation. Input image may be image from different modalities. The pre-processing step includes the noise removal, intensity normalization, filtering of artifacts, enhancement. The feature extraction step includes extraction of features like intensities, color, and texture from pre-processed image. In the segmentation step, segmentation method is applied on the extracted features. The post-processing step includes classification, visualization and interpretation.

Importance of Segmentation in Medical Imaging

Applications of segmentation in medical image processing are to Locate tumors and other pathologies, Measure tissue volumes, Computer guided surgery, Diagnosis, Treatment planning, Study of anatomical structures etc. Segmentation has following advantages in medical imaging:

1. It makes the physician task easier in diagnosing the problem with less mental risk.
2. It reduces time spent by specialists
3. It decreases the intra and inter observer differences.

Challenges of Medical Image Segmentation

Segmentation of medical images is a difficult task due to complex nature. The output of the segmentation is affected due to:

1. Characteristics of imaging modality
2. Geometry of anatomy
3. Partial volume effect
4. Presence of artifacts
5. Noise

Existing Solutions for Medical Image Segmentation

The medical image segmentation methods can be classified into three categories:

1. Traditional methods
2. Deformable models
3. Computational Intelligence (CI) based methods.

Traditional methods are based on pixel attributes and include methods like: Threshold based\(^1\), Region based\(^3\), and Edge based\(^2\) techniques. However, these techniques lead to inaccuracy with segmentation because medical images have poor contrast, limited spatial resolution, non uniform intensity variation and noise. Deformable models represent the shape of objects as a flexible 2D curve or a 3D surface that can be deformed to match a particular instance of that object class. Deformable models like active contour, level set methods are used in medical image segmentation\(^4\). Even though, Level set and active contours are shown tremendous result in the segmentation of medical images, these techniques suffer from high computation time and parameter initialization problems.

The Computational Intelligence (CI) method includes the paradigms like Artificial Neural Network, Fuzzy Systems, Genetic Algorithm, and Swarm Optimization\(^5\). In literature, many researchers applied these CI techniques to solve medical image segmentation problems.
problems. In medical imaging, the object definition is not always crisp and knowledge about the objects in the image may be vague. Fuzzy logic and fuzzy theory are ideally suited to deal with such uncertainties. Fuzzy c-means (FCM) and its variants are widely applied to solve medical segmentation problem. The main drawback of traditional FCM is not using spatial information. To overcome this problem a Robust Spatial Kernel FCM (RSKFCM) method has been proposed[6]. RSKFCM is based on clustering algorithm, which uses spatial information and kernel distance metric.

Medical image segmentation is a complex problem where the known information is not sufficient to allow the identification of unique solution. The main challenges of medical image segmentation are selecting a best mathematical model, selecting best algorithm and selecting best parameter values which can produce the best result that can be accepted by one or more experts. Medical image segmentation is an open area of research in which continued development of methods can be expected until the goal of accurate, fully automatic segmentation has been achieved.

**Standard Tools available for Medical Image Segmentation**

1. BIC software toolbox[8]: The McConnell Brain Imaging Centre (BIC) of the Montreal Neurological Institute (MNI) at McGill University developed different medical image analysis software’s. This software toolbox includes tools for automatic registration, segmentation, intensity non-uniformity correction, and cortex extraction.

2. Brain Suite software[9]: This is the collection of software tools, which enables processing of the MRI images of the human brain. The major functionality of Brain Suite tools is to extract and parameterize the inner and outer surfaces of the cerebral cortex and to segment and label gray and white matter structures.

3. ITK-SNAP[10]: ITK-SNAP is an open-source image analysis tool, which mainly focus on the problem of image segmentation. This tool provides semi-automatic segmentation using active contour methods, as well as manual delineation and image navigation.

4. 3D Slicer[11]: This is an open source, freely-available software developed by the MIT Artificial Intelligence Lab and the Surgical Planning Lab. 3D slicer includes different segmentation methods like level set, atlas based, semiautomatic tools and statistical clustering algorithms.

5. Medical Image Processing, Analysis, and Visualization (MIPAV)[12]: The MIPAV application enables quantitative analysis and visualization of medical images from different modalities. This tool includes different computational methods like atlas based, FCM based, deformable based segmentation methods.

6. NiftySeg[13]: This project developed at University College London. It contains programs to perform Expectation Maximization (EM) based segmentation.

**References**


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**About the Authors**

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How to Create a Basic Cloud Computing Environment in Java using CloudSim 3.0.3

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**PROGRAM**

```java
import java.text.DecimalFormat;
import org.cloudbus.cloudsim.core.CloudSim;
import java.util.*;
import org.cloudbus.cloudsim.*;
import org.cloudbus.cloudsim.provisioners.*;

public class SimpleCloudSimExample{
    private static List<Cloudlet> CloudletSet;
    private static List<Vm> VirtualMchnSet;
    public static void main(String[] args){
        try {
            CloudSim.init(1, Calendar.getInstance(), false);
            Datacenter MyDataCenter = createDatacenter("My_DC");
            DatacenterBroker DCBroker = new DatacenterBroker("DC_Broker");
            int DCBrokerId = DCBroker.getId();
            int numberOfPEs=1,
            ramSize=1024, VM_id=1, Mips=500;
            long strgSize = 10000, bw = 1500;
            String vmmntr = "Xen";
            VirtualMchnSet = new ArrayList<Vm>();
            CloudletSchedulerTimeShared CloudletSchdlr = new CloudletSchedulerTimeShared();
            Vm VirtualMchn1 = new Vm(VM_id, DCBrokerId, Mips, numberOfPEs, ramSize, bw, strgSize, vmmntr, CloudletSchdlr);
            VirtualMchnSet.add(VirtualMchn1);
            DCBroker.submitVmList(VirtualMchnSet);
            CloudletSet = new ArrayList<Cloudlet>();
            int id1=1, id2 = 2;
            long Cldltlength_MI = 1500000, fileSize = 300, outputSize = 300;
            UtilizationModel MyModel = new UtilizationModelFull();
            Cloudlet Cloudlet1 = new Cloudlet(id1, Cldltlength_MI, numberOfPEs, fileSize, outputSize, MyModel, MyModel, MyModel);
            Cloudlet1.setVmId(DCBrokerId);
            CloudletSet.add(Cloudlet1);
            Cloudlet Cloudlet2 = new Cloudlet(id2, Cldltlength_MI, numberOfPEs, fileSize, outputSize, MyModel, MyModel, MyModel);
            Cloudlet2.setVmId(DCBrokerId);
            CloudletSet.add(Cloudlet2);
            DCBroker.submitCloudletList(CloudletSet);
            CloudSim.startSimulation();
            CloudSim.stopSimulation();
            List<Cloudlet> FinalCloudletList = DCBroker.getCloudletReceivedList();
            printSimulationOutput(FinalCloudletList);
        }
        catch (Exception e){
            e.printStackTrace();
        }
    }
    private static Datacenter createDatacenter(String name){
        List<Host> HostSet = new ArrayList<Host>();
        List<Pe> PESet = new ArrayList<Pe>();
        int hostId = 1, ram = 4096, bw = 15000, mips = 2000;
        long storage = 2000000;
        PeProvisionerSimple PEProv = new PeProvisionerSimple(mips);
        Pe ProcessingElement = new Pe(0, PEProv);
        PESet.add(ProcessingElement);
        RamProvisionerSimple RamProv = new RamProvisionerSimple(ram);
        BwProvisionerSimple BWProv = new BwProvisionerSimple(bw);
        VmSchedulerTimeShared VMSchedlr = new VmSchedulerTimeShared($('PESet',)
        Host MyHost = new Host(hostId,RamProv,BWProv,storage,PESet,VMSchedlr);
        HostSet.add(MyHost);
        String architecture = "x86", os = "Windows", vmmntr = "Xen";
        double timeZn = 10.0, costPerSec = 2.0, costPerMem = 0.02, costPerStrg = 0.005,
        linkedList<Storage> StorageSet = new LinkedList<Storage>();
        DatacenterCharacteristics DC_Charac = new DatacenterCharacteristics(architecture, os, vmmntr, MyHost, timeZn, costPerSec,
```

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try {
    Datacenter DtCntrObj = new Datacenter(name, DC_Charac, new VmAllocationPolicySimple(HostSet), StorageSet, 0);
    return DtCntrObj;
} catch (Exception e) {e.printStackTrace();
    return null;
}

private static void printSimulationOutput(List<Cloudlet>ListOfCloudlets) {
    Cloudlet cloudlet;
    Log.println("Simulation Output:");
    for (int i = 0; i < ListOfCloudlets.size(); i++) {
        cloudlet = ListOfCloudlets.get(i);
        Log.println("\nCloudlet ID:" + cloudlet.getCloudletId());
        if (cloudlet.getCloudletStatus() == Cloudlet.SUCCESS){
            Log.println("Cloudlet Execution Status: Successful");
            Log.println("Datacenter-ID: " + cloudlet.getResourceId());
            Log.println("VM-ID: " + cloudlet.getVmId());
            Log.println("Time Taken: " + new DecimalFormat("#####.##").format(cloudlet.getActualCPUTime()));
        } else{
            Log.println("Cloudlet Execution Status: Unsuccessful");
        }
    }
}

Description
We have presented a fundamental program on how to create a basic cloud computing environment in Java using CloudSim3.0.3, which is a widely used framework for modeling and simulation of cloud computing infrastructures and services. In this tutorial, we assume that the reader bears preliminary knowledge of cloud computing and knows how to use external frameworks/libraries in a Java project.

Due to direct involvement of various classes, even a basic CloudSim simulation program contains a protracted list of import statements; this is why we have imported entire packages wherever possible instead of importing individual classes. In CloudSim, the process of modeling a cloud simulation environment consists of following phases:

1. Initialize CloudSim by invoking the static init method of org.cloudbus.cloudsim.core.CloudSim class. The framework recommends that this method should be invoked before creating any other entity.
2. Create datacenter(s); at least one datacenter is required to run the simulation. We have created single datacenter denoted by MyDataCenter.
3. Create datacenter broker, which acts on behalf of a user, and hides VM management related details such as VM creation, submission of cloudlets to VMs, and destruction of VMs. We have created a broker named DCBroker.
4. Create VM(s) and add all of them into a set of VMs. We have created the VirtualMchnSet that contains single virtual machine VirtualMchn1.
5. Submit the set of virtual machines (VirtualMchnSet) to datacenter broker (DCBroker).
6. Create Cloudlets and add all of them into a set of cloudlets. We have created two identical cloudlets Cloudlet1 and Cloudlet2 that were submitted to the set of cloudlets denoted by CloudletSet.
7. Submit the set of cloudlets (CloudletSet) to datacenter broker (DCBroker).
8. Start the simulation by invoking static startSimulation method of org.cloudbus.cloudsim.core.CloudSim class.
9. Stop the simulation by invoking static stopSimulation method of org.cloudbus.cloudsim.core.CloudSim class.
10. Gather simulation statistics and print them. We have defined the printSimulationOutput method that performs this activity.

We have used NetBeans IDE 8.0 to run our sample program and its partial output would look like this:

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Effective Secret Communication using Scrambling Techniques

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The world has become a global village due to advances in internet and communication technology. The billions of bits of information are created, copied and transmitted via internet or mobile phones at every fraction of second. Hence, cryptography, steganography and watermarking techniques are in great demand in digital era. Scrambling methods transform meaningful information into disorder and unsystematic patterns. In case if attacker extracts the hidden message, the meaningful order of patterns remains undetected.

Sample Code for Image Scrambling

The variety of methods can be used for scrambling for secure communication. Arnold transform, modified Arnold transform, Fibonacci transform, Fibonacci Q transform, Fass Curve, Gray Code, Magic square, affine transform and Fibonacci-Lucas transform can be effectively used for image scrambling. This article demonstrates how image scrambling can be implemented using MATLAB. The article further focuses how scrambling techniques can be effectively used in secret communication.

Fig. 1 shows MATLAB code for scrambling image data. The scrambling method generates the ‘Scrambled Image’ which is in the form of disorder and unsystematic patterns. Fig. 2 shows MATLAB code for descrambling image data. The descrambling process decodes ‘Scrambled Image’ into ‘Recovered Image’. Here, the function shown in Fig. 2 is called in the MATLAB program shown in Fig. 1. The normalized correlation determines similarity between ‘Original Image’ and ‘Recovered Image’.

Output of Program

Fig. 3 shows original image, Fig. 4 shows scrambled image while Fig. 5 shows recovered image after applying descrambling. The normalized correlation as 1 proves that ‘Original Image’ is exactly same as ‘Recovered Image’.

Normalized Correlation: 1.0000
How Scrambling can be used in Secret Communication?

The steps given below show how scrambling can be used for secret communication using image watermarking.

The work flow of this application is shown in Fig. 6.

Application areas where Scrambling is used

The secured communication with effective scrambling can be used in many applications. The candidate applications include Image copyright communication for digital rights management, multimedia message service, central bureau investigations and other crime investigation agencies where image transmission happens via internet or mobile phones. The ‘secured e-voting systems’ and nationwide, worldwide distance education systems exchanges vast amount of image data where security is critical issue. The mobile based image data transmission also demands security. The health and car insurance companies exchange image data for decision making about accidental and damaged vehicles. The banking services including multinational companies require to maintain secure image databases. The passport identification cards require secured authentication for customer-image data during transmission between their offices and central administrative offices. The healthcare applications like teleradiology, telepathy, telecare, telesurgery, teleneurology medical images require safety and confidentiality because critical diagnosis is done by specialists based on information provided by medical images. The scrambling methods can be directly used during data transmission in all these applications or can be used with steganographic and watermarking techniques.

References


At sender side:

Step-1: Read Cover_Image and Original_Image.
Step-2: Scramble Original_Image using scrambling technique to get Scrambled_Image.
Step-3: Embed this Scrambled_Image into Cover_Image to get Watermarked_Image.
Step-4: This Watermarked_Image is then transmitted through communication channel to the receiving end.

At Receiver side:

Step-5: The extraction process at receiver extracts the Scrambled_Image from Watermarked_Image.
Step-6: The descrambling process is applied to get Recovered_Image from Scrambled_Image.

About the Authors

Dr. Baisa L. Gunjal [CSI-N1111399] is working as Associate Professor, Amrutvahini College of Engineering Sangamner, A’Nagar, MS, India. She is recipient of ‘Best Teacher Award-2013’ from ‘Switribai Phule Pune University’, ‘Lady Engineer Award-2012’ from ‘Institution of Engineers’ and “Active Faculty Award-2012” from ‘Computer Society of India’. Her areas of interest are image processing, networking and advanced databases. She can be reached at hello_baisa@yahoo.com.

Dr. Suresh N. Mali is working as Principal, Sinhgad Institute of Technology and Science, Narhe, Pune, India. He has written 3 technical books and has more than 40 international journals and conference publications including SpringerPlus, IEEE Computer society, ACM digital library, IET digital library, CSI Communications, WASET. His research interests are information security, data hiding, signal processing, digital multimedia communications and Steganography. He can be reached at snmail@rediffmail.com.
BRAIN TEASER

Dr. Durgesh Kumar Mishra, Chairman, CSI Division IV Communications, Professor (CSE) and Director Microsoft Innovation Center, Sri Aurobindo Institute of Technology, Indore, ddrugeshmishra@gmail.com

Crossword »

Test your knowledge on Grid Computing

Solution to the crossword with name of first all correct solution provider(s) will appear in the next issue. Send your answer to CSI Communications at email address csic@csi-india.org with subject: Crossword Solution – CSIC November Issue.

CLUES

ACROSS
1. Combining several resources as a single logical group for provisioning
5. A high performance communication standard
6. A job scheduler
7. Collection of interconnected nodes for uniform computing
8. An authentication standard for distributed system
12. A logical grid within an organisation
15. A government of India project for grid computing
16. An open source toolkit for grid computing
17. A network processing location
18. A workload management system that matches the user requirement with the available resources

DOWN
2. Standard system of coordinated resources
3. A software stack for accessing grid
4. A software, hardware, or firmware that runs virtual machines
9. Capacity to handle growing amount of work
10. Endpoint defined as a combination of a binding and a network address
11. A concrete protocol and data format specification of a particular port type
13. An abstract, typed definition of data being communicated
14. A set of computers working as a single system

Building Smart City over Smart Grid

Smart grid is a novel electricity distribution model consisting of controllers, computers, automatic switches, and new technology equipment which are capable of using information and communications technology. This model enables reduction of losses, improve quality of power, and manage outages in real time. The smart grid allows electricity consumers to choose a tariff as per their need and in real time they can get their balance recharged. Every point of generation, transmission, and distribution is controllable. Ministry of power (MoP), government of India started National Smart Grid Mission (NSGM) under which a budget of Rs. 980 Crores has been allocated in 12th five year plan to establish Smart Grids in Smart Cities of India. MoP started many pilot projects throughout India for establishing smart grids. For more information about status of Smart Grids in India please visit www.indiasmartgrid.com.

Rashid Sheikh
Associate Professor, Sri Aurobindo Institute of Technology
Indore

We are overwhelmed by the response and solutions received from our enthusiastic readers

Congratulations!

All nearby Correct answers to October 2015 month’s crossword received from the following readers:

Dr. Samiksha Shukla Christ University, Bangalore
Mr. Shubham Joshi MIT Pune
Book Review »

Discrete Mathematics

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<tr>
<td>Author</td>
<td>R.K. Bisht and H.S. Dhami</td>
</tr>
<tr>
<td>Price</td>
<td>Rs. 495/-</td>
</tr>
<tr>
<td>Publisher</td>
<td>Oxford University Press</td>
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The book contains 14 chapters in total along with a link for on-line availability of the book, where there are two sections; one for the Teachers and other for the students. The section for instructors has two resources–power point slides and solution manual. Some key features of the book are given at the beginning of the book which will be very useful for the new reader.

First Chapter contains Basic concepts of Logic. Various connectives, tautology, contraddiction of logical equivalence have been discussed. Predicate & inference theory and different methods of proofs have been narrated lucidly. Second chapter demonstrated the basics of set theory. Fuzzy sets & its uses in decision making has been shown. Different type relations, its matrix representation & closure of relations are defined in 3rd chapter. It includes Warsha’s algorithm & the n-ary relations with some examples. Concept of a function & various type of functions are discussed in chapter 4. Further its uses in hashing techniques, collision resolution and in Computer Science are discussed here.

In Chapter 5, properties of integers have been discussed. Well ordering Principle, divisible properties of integer, gcd, lcm, relatively prime numbers, solution of linear Diophantine equations have been explained nicely. At the ending of this Chapter, congruence relation, residue classes, linear congruence are given with suitable examples.

Counting techniques are explain in next chapter, which includes pigeon hole principle, Pascal identity and binomial theorem. Fundamentals of probability are introduced in chapter-7. Baye’s Theorem and discrete probability distribution have been discussed. Application of probability in Information retrieval and spelling correction has been introduced.

Generating function and its uses in combinatorial problems has been discussed. The discrete numeric function and modelling of some real life problems through it has been shown clearly with standard examples. Recurrence relations and its solving are illustrated properly. The two approaches of solving recurrence relation i.e. iterative method and recursive method have been outlined.

Algebraic structures like groups, rings, integral domains, fields, etc. have been discussed in chapter 10. Various related concepts and theorems are also focused in this chapter. The poset and its extension are given in the chapter 11. Lattice, its properties, special type of lattices, product of lattices are the part of this chapter. Finally an introduction to Stone’s representation theorem has been introduced. The concept of formal languages with finite state machines are given in chapter 12. Deterministic and non-deterministic finite automata, Mealy, Moore machines and their conversion have discussed in the chapter. This chapter discusses Chomsky hierarchy and introduction to other machines. Graph theory are in chapter 13. Various terminologies in graph theory, concept of tree and algorithm for minimal spanning tree have been elaborated. Graph colouring, matching, traversal of graphs. Matrix representation of graphs are also part of this chapters.

Application of discrete mathematics in the area of computer science are given in the last chapter. It has three parts, i. Analysis of algorithms which includes searching and sorting algorithms. ii. Boolean algebra and logical gates. iii. Information and coding theory. The error correcting and error detecting codes and other coding schemes have been shown.

Mathematical proof, formulas, review questions are there. Brief history of each topic in each section has been associated with good manner. Application of Fuzzy sets, lattices and Hasse diagram are not part of the book. Answer and hints in exercise problems are not given. Multinomial theorem and program correctness are absent from the book.

Review by: Prof. (Dr.) Rabinarayan Satpathy, Principal-Cum-Director, HI-Tech Institute of Technology, Industrial Estate, Khurda, Bhubaneswar

Obituary

A condolence meeting was organised at the office of CSI Kolkata Chapter on 8th October 2015 due to the sudden demise of Dr. Subir Roy, a senior Life Member of CSI and Director, NIC. He was ailing for sometime and passed away on 29th August 2015. Mr. Subir Lahiri, Secretary of the Chapter, made the initial remarks. Mr. Devaprasanna Sinha, RVP-II and Fellow of CSI, reminisced his close association and interactions with Dr. Subir Roy since his college days. Born in 1950, Dr. Roy was instrumental in the implementation and related training of many IT-based government projects in different parts of India, particularly in Gujarat, and West Bengal. He was also Director of RCC, Kolkata. Mr. Gurudas Nag, a colleague of his, said some incidents and stories about the style of functioning of Dr. Roy, both at NIC and RCC, Kolkata. Mr. Subimal Kundu and Mr. Sib Daspal, two senior Fellows of CSI, also talked about their interactions with Dr. Roy. Members presented expressed their bereavement at the passing away of Dr. Subir Roy. The meeting was attended by Dr. Pinalkpani Pal, Chairman, CSI Kolkata Chapter and others.
Bhopal Chapter

Computer Society of India-Region 3 and CSI Bhopal Chapter organized the one day seminar on "Back to the Future" at Sagar Group of Institutions. Mr. Yashant Kanetkar (Famous author and Corporate Trainer) was the key note speaker for this seminar. He discussed various features like pointers, arrays (1D, 2D and Multidimensional) of the 'C' language in detail. In the second session he discussed about the selection criteria of different companies and importance of programming languages in the selection process.

On this occasion Er. Sanjeev Agrawal (Chairman, SGI) emphasized the importance of such programs in the field of engineering education. He also congratulated and motivated the organizers and the participants. Prof. Rajesh K. Shukla, Secretary CSI Bhopal Chapter and Convener of the program proposed the vote of thanks.

Gwalior Chapter

A seminar on e-governance was organized at Vikrant Institute of Technology and Management, Gwalior under a plan to open a CSI Student chapter in the Institute. The guest speaker Mr. Sanjay Pandey of NIC Gwalior explained in details all the aspects of e-governance. Mr. Rathore Director of VITM and Mrs. Richa Verma, Registrar were present during the event. CSI Gwalior chapter Past Chairman Mr. Jayant Bhide VU2JAU asked students to join CSI Student chapter so that more activities will be started. Mr. Jayant Bhide Past Chairman CSI Gwalior in coordination with Dr. Vipin Tyagi, Reg. Vice President III, provided all the information needed.

A meeting of Gwalior chapter OBS was held on 24 October 2015 at ITM University Gwalior. Dr. Vipin Tyagi, RVP-3, Prof. J. P. Verma, Chairman, Gwalior Chapter, Dr. Shailendra Satyarthi, Secretary, Gwalior Chapter and Mr. Dilip Haryan, Treasurer, Gwalior chapter, Dr. Sanjay Jain, SSC-MP and Dr. Kapil Govil, Coordinator- Student branch-ITM university attended the meeting. Prof. J. P. Verma briefed about the activities planned under the chapter. He informed that the CSI Gwalior Chapter is planning to start a series of lectures in various emerging areas.

Nashik Chapter

The Department of Computer Engineering of Sandip Institute of Technology & Research Center, Nashik Organized Two Week State Levels STTP on “Big Data and Cloud Computing” from 23rd Oct to 1st Nov-2015 in association with CSI- Nashik Chapter and CSI student branch. For the Inaugural Ceremony, Dr. S. S. Sane (RVP CSI (Region VI)), Prof. Sandip Karkhanis (Hon. Secretary CSI, Nashik Chapter), Dr. S. T. Gandhe (Principal, SITRC) and Prof. Amol D. Potgantwar (HOD, Computer/IT department) were present. For delivering sessions Mr. Sachin Jadhav & Mr. Ganesh Bhosle from Pyrgma Information solution, Pune were invited. This STTP provided opportunity to faculty and PhD/PG scholars of Engineering/ Polytechnic Colleges for improving their technical skills and knowledge. This also gives an opportunity for interaction and mutual exchanges of ideas between interested participants and trainer working in particular areas of specialization.

PATNA CHAPTER

One Day State Level Seminar on “Software Requirement Specification : IEEE 830 & Professional skill development” was organized by CSI Patna Chapter & IGNOU, St. Xavier Centre Patna on 19th Sept. 2015. The Seminar was inaugurated by Prof. A. K. Nayak, Chairman, Publication Committee of CSI and Director IIBM, Patna in the presence of Fr. Jacob, Principal, St. Xavier’s, Patna, Prof. Shams Raza, Ex-Chairman CSI Patna Chapter and other invited speakers Prof. Malay Bhattacharya, Prof. B.K. Prasad, Mr. Rishikesh, Mr. Ujwal Kumar and Mr. Ranjit Kumar. In his inaugural address Prof. A. K. Nayak introduced the CSI and its activities to the delegates and invited the students to become the member of CSI. Md. Shams Raza has delivered the
keynote address in the seminar by covering all the aspects of software requirement specification. Fr. Jacob, Principal St. Xavier's Patna advised the audience to participate in different CSI activities conducted by the Patna Chapter. Prof. Malay Bhattacharya and Prof. B.K. Prasad outlined about the technical and professional importance of software projects where as Mr. Ujwal Kumar gave tips on professional skill development related to IT industry. The function was coordinated by Mr. Purnendu Narayan, Hony. Secretary of CSI Patna Chapter.

Rajkot Chapter

CSI - Rajkot Chapter organized an event Basic 3-Tier Web App. with Domain Registration & Uploading using PHP by an expert Prof. Nilesh Advani, Assistant Professor, Marwadi Education Foundation, Rajkot on 29 Oct. 2015. The event was basically to target educational institutes and research scholars who would be carrying out an extensive work on MVC architecture. Top level executives of educational institutes, like R.K. University, Atmiya, Sunshine, V.V. P as well as post graduate students have attended the session.

Ms. Khyati Joshi, Teaching Assistant, FCA, MEFGI welcomed all the dignitaries. A key note address to the members was delivered by the Founder Chairman, CSI Rajkot chapter Dr. R. Sridaran. A vote of thanks was delivered by Prof. Sunil Bajeja, Chairman, CSI, Rajkot Chapter.

Trivandrum Chapter

CSI student branch at LBS Institute of Technology for Women, Thiruvananthapuram was inaugurated on 21st August 2015 by Mr. Satish Babu, Director, International Centre for Free and Open Source Software (ICFOSS) & Past President CSI. Mr. Satish Babu delivered the key note address followed by a talk on Internet of Things. The ceremony was presided by the principal of LBSITW, Prof. Dr. K.C Raveendranathan. Prof.K.Babu Vice Chairman of CSI, Trivandrum Chapter delivered the Special Address. The Secretary of CSI, Trivandrum chapter, Mr. Vishnukumar S, addressed the gathering and also summarized the activities of CSI chapter. The HODs of all the departments of the college, faculty members along with the CSI student members as well as the other students participated in the ceremony.

The ceremony started off with a prayer which was followed by a tribute to late Dr. A.P.J. Abdul Kalam. The Chairperson of the student branch, Suma P, delivered the welcome speech, after which the traditional Lamp lighting Ceremony was being done. The Presidential Address was given by the Principal. The HODs of the respective departments addressed the gathering, followed by a felicitation by the HOD of ECE department, Prof. P.C. Mohandas. The ceremony came to an end with vote of thanks by Anupama M, Student Branch Secretary of CSI, LBSITW.

• Chapter in association with TiltLabs organized training program on .NET at Envestnet from 14 September to October 1, 2015. The sessions were handled by Mr. Nikhil Chandran, Systems Architect and assisted by Ms. Arunima and Ms. Madonna.

• Chapter organised a Technical talk on the topic ‘First Time Manager’ by Mr. Gopakumar R.C., Associate Manager, Envestnet, Thiruvananthapuram.

• Chapter organised a Technical talk on the topic ‘Emotional Intelligence’ by Ms. Raji Gopinath, Coordinator, ECD, Envestnet, Thiruvananthapuram.

Vellore Chapter

CSI Vellore Chapter organized a one day workshop on “Data Analytics” on 26-09-2015 at VIT University. Mr. Nikhil Dokania, Senior Business Analyst from Mu Sigma Business Solutions, Bangalore covered Introduction to data analytics and shared his experience on different verticals like healthcare, retail, insurance and supply chain management. He demonstrated all the verticals using business intelligence tools to extract the business data. Around 80 participants attended the workshop and organized by Prof. G. Jagadeesh and Prof. K.Govinda.

CSI Vellore Chapter organized a one day workshop in view of youth innovation day as a mark of 84th birth anniversary Dr. A. P. J. Abdul Kalam on “Latest Trends in Technology” on 15-10-2015 at VIT University. Mr. G.G. Prasad, Software Engineer, Accenture, Bangalore explained the latest trend curve in information technology form standalone PC to IOT covering different verticals in internet of things and shared his experience working on IOT project and explained some tools available in market for doing IOT projects for students and researchers, around 80 participants attended the workshop. Organized by Prof. G. Jagadeesh and Prof. K.Govinda.
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CSI Education Directorate

Report about Workshop on Embedded System Design using ARDUINO

CSI Education Directorate jointly with National Institute of Electronics & Information Technology, (NIELIT), Govt of India has conducted a two days hands-on workshop on Embedded System Design using ARDUINO on 9th & 10th October 2015 at CSIED, Chennai. Mr. Sampath & Mr. Bhaghath, NIELIT Chennai were the Resource Persons. The two days workshop was conducted as an introduction to embedded systems design and development, using ARDUINO platform to allow for easy and fast prototyping. Being able to just hook up I/O peripherals on it in a matter of minutes, instead of hours, is just amazingly powerful and convenient when there is an idea and just want to see if it works. Arduino platform gives a lot of pre-wiring and free code libraries that will allow to concentrate on testing idea instead of spending time building supporting circuitry or writing tons of low level code. On top of the hardware and software advantages, Arduino has a great community of users that can help a lot to testify the ideas.

Key Points of workshop: Introduces the use of open source ARDUINO IDE and freely supported libraries; Dealt elaborately the architecture of platform; Provided coverage of embedded systems, with an emphasis on the practical use of ARDUINO platform; Covered embedded software fundamentals, including software planning, and ARDUINO C-language program development; Included detailed treatment of embedded hardware fundamentals, discussing structure, interfacing and configuration of hardware building blocks; Emphasised examples and exercises that reflect real applications for embedded systems design.

M. Gnanasekaran
Manager (Administration)

29th CSI Karnataka Students Annual Convention – A Brief Report

The 29th CSI Karnataka students convention with the Theme “Digital India - Technological Innovations & Challenges” was conducted by GSSSI Institute of Engineering & Technology for Women, Mysuru on 11th & 12th September 2015 in association with CSI Bangalore & Mysuru Chapter.

The convention inauguration was started with an invocation by Ms. Sangeeth R. Prakash & Abhaya (7th sem ISE) in Govinda Rao Memorial Auditorium at 9.15 am on Friday, 11-09-2015. Ms. Deeksha C. G. welcomed all the dignitaries for this convention. Dr. K. A. Sumithra Devi – Principal, GSSSIETW greeted all the dignitaries with a flower bouquet. The chief guests & other dignitaries joined to light the lamp to mark as a good beginning. Mrs. Bhanumathi K. S. – Chairperson CSI-BC told about CSI & academia association. Bhanumathi explained various activities planned & organized by CSI-BC and requested the students to participate in such activities. Dr. Shantharam Nayak briefed about the CSI student convention and history. Dr. Nayak informed that the tradition of conducting the students convention continued all these years. Ms. Tanusree Deb Barma – Director IT & BT, GOK was the chief guest. She advised the participants to compete with rest of the world in this digital era. She shared her experience of graduate studies and told the participants to strengthen the confidence level before entering the professional world. Mr. E. S. Chakravarthy – Center head TCS gave inaugural address. He requested the young minds to meet the outcomes of engineering education. Smt. Vanaja B Pandit, Secretary, GSSS delivered presidential address. She thanked CSI for its kind gesture of opportunity given to GSSSIETW.

The invited talks were: i) Public key infrastructure & Digital Signature by Mrs. Sushma Verma – Scientist E, SAG, DRDO Delhi.
ii) Self - The evolution of U as U" by Jasmine Mary John – Research scholar, NIMHANS. A panel discussion on the theme was arranged.

The panel represented by: T Sabapathy – VP NineStras, Dr. Sunderesan Krishnan Iyer-PTA Infosys, Vinoo Thimmaiah – MD NiMue Mfg solutions, Dr. Dayananda R. B. – Associate Professor GSSSIETW, Ms. Pushpinder Kaur – Student RVCE, Dr. Shantharam Nayak, Professor-RVCE as coordinator. It was opined that each one of us have great responsibility in succeeding while making Digital India.

On Saturday, 12-09-2015 during Valedictory Mr. Chandar P Mannar (Immediate past chairman, CSI-BC) presented the summary of the convention and thanked all concerned. Few participants gave good feedback about the event. Later Dr. Nayak announced the winners of Paper & Poster presentation. All the winners were honored with Prizes & awards by the dignitaries. More than 700 student delegates actively participated and benefited from this convention. The convention was concluded with National Anthem at 5.00 pm.

www.csi-india.org
### FROM STUDENT BRANCHES

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<td>11-9-2015 - during the event on Eco Friendly Ganeshji Making Competition</td>
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<td>10-10-2015 – Dr. Anirban Basu, VP, CSI with Winner &amp; Runner up Teams during State level Intercollegiate technical Quiz competition on C Programming</td>
<td>11 &amp; 12-9-2015 – during two days Workshop on Big Data using Hadoop</td>
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<td>5-10-2015 – during an Expert Talk on the topic Digital Transformation and Data Analytics</td>
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<td>10-10-2015 – Mr. Vittal during the Seminar on Internet of Things</td>
<td>26-9-2015 - Mr. Rameez Raja, Dr. Nageswara Rao, &amp; Dr. Prem Kumar during CSI Student Branch Inauguration</td>
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9-10-2015 – Students are learning the hardware assembly from the trainer during one day training program on Hardware Assembling and Configuration Management

9-10-2015 – Prof. Nataraja Suresh HOD-CSE & Dr. Maruthuperumal, SBC are Interacting with the participants during the workshop on Android Application Development

10-10-2015 – Principal Felicitating the Chief Guest during Motivational Seminar on Unlock Your Potentials

6-10-2015 – during a Technical Talk on What Exactly Industry is looking in Fresh Engineers


29 to 31-7-2015 - Mrs. Yamini Mathur during the Workshop on Soft Skill Development

10-8-2015 – Mr. Kshirsagar addressing the students during one day hands-on session on Raspberry Pi

25-9-2015 – during one day workshop on Linux Administration
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<td>21-9-2015 - Mr. Pratmesh Karmalkar, Prof. Sane RVP, Region-VI, Prof. Shahane, Prof. Gondhalekar, Staff &amp; students during Expert talk on data sciences</td>
<td>5-10-2015 – Prof. Sane RVP, Region-VI, Prof. Nandurkar, Prof. Agashe &amp; Prof. Kharat during inaugural function of the Workshop on Virtual Lab</td>
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<td>4-9-2015 – during One day Workshop on PCB Design</td>
<td>27-8-2015 - during one day workshop on Ubuntu</td>
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<td>27-9-2015 – during one day workshop on Genetic Algorithms</td>
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<td>9 &amp; 10-10-2015 - The students of Srimad Andavan College of Arts &amp; Science receiving the overall championship from Dr. Khaja Nazeemudeen during Inter-Collegiate Technical Symposium</td>
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<td>26-9-2015 – Prof Ezhilvanan, Mr Muthukrishnan, Mr. Bharathi Raja, Mr. Chinna Raja, Dr. Ramar, &amp; Mr. Siva Ganesh during Technical Symposium on SMART EINSTEIN 2015</td>
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<td>25-9-2015 – Mr. Ramasamy, Past RVP-VII as Chief Guest during Student Branch Inauguration</td>
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<td>NANDHA COLLEGE OF TECHNOLOGY, ERODE</td>
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<td>30-9-2015 – during Academic Seminar on Theory of Computation</td>
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<td>J P COLLEGE OF ENGINEERING, TENKASI</td>
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<td>NANDHA COLLEGE OF TECHNOLOGY, ERODE</td>
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<tr>
<td>19-9-2015 – during 6th National level Symposium</td>
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### REGION-VII

**SRM VALLIAMMAI ENGINEERING COLLEGE, CHENNAI**

- **4-9-2015** – during one day Mini Project Expo2015
- **12-9-2015** – during a National Level Technical Symposium XPLOITS 2K15 VER2.0 & Colossium '15

**KPR INSTITUTE OF ENGINEERING AND TECHNOLOGY, COIMBATORE**

- **18 & 19-9-2015** – during two days National workshop on Big Data Using R Programming
- **11 & 12-9-2015** – Mr. Chirag Tank, Dr. Suguna & Mr. Rathish Babu during Two-day Training Programme on 3D Game Developing

**L B S INSTITUTE OF TECHNOLOGY FOR WOMEN, TRIVANDRUM**

- **14-8-2015** – during a talk on Internet Security

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**Congratulations !!!**

Brig. S. V. S. Chowdhry (Retd.), Past President - CSI [1992-94] was conferred the Lifetime Achievement Award by the Institution of Electronics and Telecommunication Engineers (IETE) during its Annual Technical Convention at Kolkata on 26-27 September 2015. Brig. Chowdhry was President of the IETE during 1994-96 and is a Distinguished Fellow of this Institution.

Brig. Chowdhry was President of the CSI during 1992-94 and received the Fellowship Award earlier in 1990. He was also conferred the Lifetime Achievement Award by theCSI during the Annual Convention at Hyderabad in December 2014. He had a long association with the South East Asia Regional Computer Confederation (SEARCC) and participated in SEARCC Conferences / Council meetings in several countries. He has also represented the CSI in the International Federation for Information Processing (IFIP).

Brig. Chowdhry was President of the Computer Sciences Section of the Indian Science Congress and a member of the ISCA Council during 1997-98. He was also Advisor, Centre for Development of Advanced Computing (C-DAC), Noida for ten years (1996-2006).
Rules / Procedure for Approval of Technical Collaborations, for Technical Events Organized by the Non-CSI Entities like Organizations / Institutions / Universities, etc., by CSI Chapters / Regions / Divisions, without any Financial liability to CSI

Technical sponsorship / collaborations to good quality technical events, without any financial liability, subject to the following conditions, can be approved, on case to case basis:-

1. The concerned Organization / Institution must be a valid Institutional member of Computer Society of India (CSI). If they are obtaining fresh membership, they should be encouraged to take membership for longer duration like 10 / 20 years.

2. As part of this Technical Sponsorship, at least one Life Member or 05 individual annual professional members must be generated, out of this event. For this, a copy of CSI Life Membership Form should be distributed, in the registration kit, to all the non-CSI Member delegates and arrangements should be made to collect the filed in membership form, payment details (Bank counter folio after depositing the payment in the bank or cheque, payable at par, in favour of Computer Society of India) of the interested delegates, on the spot. This can be done through keeping a counter of CSI having copies of CSI forms and other related information through a person deputed there by the organizers, on the venue of the event.

3. In order to justify the CSI Technical Sponsorship and also to motivate the delegates / participants to obtain the CSI Membership, delegates / participants must be given at least 20% discount in registration fee, to existing CSI Members or would be CSI members (if they deposit the fee and CSI membership form on the spot).

4. If the Institution does not have the CSI Students’ Branch, at least after the event is over, they should work hard to establish the Students’ Branch. This will be a compulsory condition for their 2nd event to be approved for technical sponsorship.

5. Quality of papers, technical materials and publications should be of high standard and be checked thoroughly by Turnitin or any other licensed antiplagiarism / cross check / similarity index softwares to avoid embarrassment to the society, at later stage. Open source softwares, for antiplagiarism checking, are not recommended, as their database is very limited and the reports are not authentic.

6. OBs and few related ExecCom members, with the consent of the sponsoring heads, be involved in the Advisory Committee or Steering Committee of the event.

7. Two delegates, based on the recommendation of the sponsoring / collaborating head, be given complimentary registration. They will be monitoring the execution / conduct of the event and submit a brief report, after the event, to the respective sponsoring / collaborating head.

8. After the event is over, a DVD having copies of the related presentations / papers / other technical materials be submitted to CSI for uploading them on CSI Digital Library (DL).

9. After the event is over, a post event report with few good quality photographs having CSI logo be submitted to the CSI HQ for its record and publication in CSI Communications.

10. The event must be planned in advance and be included, through the sponsoring / collaborating head, in the event calendar published in the CSI Communications.

11. The CSI logo, including the Golden Jubilee logo (till December, 2015), as available at CSI website www.csi-india.org and also available on the header line of this document be included at prominent places of all the flyers, backdrops, banners, publications, and other printed materials, under the head; Technical Sponsor, if there is only one sponsor, otherwise, as Technical Co-Sponsor.

A proposal giving details of the programme may be submitted to corresponding chapter/ region/division, at least 06 months in advance.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Details &amp; Contact Information</th>
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</table>
              **Contact:** Mr. Shashikant Gupta shashikantgupta@itmuniversity.ac.in, Deepak Motwani deepakmotwani@itmuniversity.ac.in |
| 25 Nov 2015   | **CSI Golden Jubilee e-Governance Awards, Kerala held** at Vivanta, Thiruvananthapuram at 5:00 pm by CSI, Trivendrum in association with Valiant Technologies, ICSOSS and KSUM. www.csi.tvm.org  
              **Contact:** info@csitvm.org, Mobile: +91 9400796741 |
| 28-29 Nov 2015| **International Conference on Information and Communication Technology for Intelligent Systems - ICTIS 2015,**  
              **http://ictis.in/**  
              **Contact:** Mr. Mihir Chauhan, ictis2015@gmail.com, +91 9429209111 |
              **Contact:** Prof. Shishir Kumar dr.shishir@yahoo.com |
| 12-14 Dec 2015| **International Conference on Computational Intelligence and Communication Networks (CICN 2015)**  
              **www.cicn2015.info**  
              **Contact:** Dr. Santosh Vishwakarma santoshscholar@gmail.com |
              **Contact:** Email id comnet2015@csiahd.org |
| 8-9 Jan 2016  | **Third International Conference on Information systems Design and Intelligent Applications (INDIA 2016)** at Anil Neerukonda Institute of Technology and Sciences (ANITS), Vishakapatnam, Andhra Pradesh in association with CSI Div-V and Proceedings Support from Springer AISC.  
              **http://www.confnet.in/india2016**  
              **Contact:** Prof. Pritee Parwekar, ANITS pritee2000@gmail.com; Prof S C Satapathy, ANITS sureshsatapathy@ieee.org |
| 4-5 March 2016 | **Second International Conference on ICT for Competitive Strategies (ICTCS-2016)** at Udaipur. (Organized by ACM Udaipur Chapter, in association with CSI Udaipur Chapter)  
              **www.csi-udaipur.org/ictcs-2016**  
              **Contact:** Mr. Amit Joshi amitjoshiudr@gmail.com |
              **www.bvicam.ac.in/indiacom**  
              **Contact:** Prof. M N Hoda, Conference@bvicam.ac.in, indiacom2016@gmail.com |

**Kind Attention: Prospective Contributors of CSI Communications**

Please note that Cover Themes for forthcoming issues are planned as follows:

- **December 2015 - ICT Applications**  
- **January 2016 - Open Source Software**  
- **February 2016 - Computer Networks**  
- **March 2016 - Digital Forensics**

Articles may be submitted in the categories such as: **Cover Story, Research Front, Technical Trends and Article.** Please send your contributions **before 20th Nov. 2015** for December issue. The articles may be long (2500-3000 words maximum) or short (1000-1500 words) and authored in as original text. Plagiarism is strictly prohibited.

Please note that CSI Communications is a magazine for members at large and not a research journal for publishing full-fledged research papers. Therefore, we expect articles written at the level of general audience of varied member categories. Equations and mathematical expressions within articles are not recommended and, if absolutely necessary, should be minimum. Include a brief biography of four to six lines, indicating CSI Membership no., for each author with high resolution author photograph.

Please send your article in MS-Word and/or PDF format to **Dr. Vipin Tyagi**, Guest Editor, via email id** dr.vipin.tyagi@gmail.com** with a copy to **csic@csi-india.org**.

(Issued on the behalf of Editorial Board CSI Communications)

Prof. A. K. Nayak  
Chief Editor
CSI-2015
50th Golden Jubilee Annual Convention
on
Digital Life
(02nd – 05th December, 2015)
Hosted by: Computer Society of India (CSI), Delhi and NCR Chapters
Convention Website: http://www.csi-2015.org/

Announcement and Call for Registration and Participation
On the sound foundation of previous 49 editions of CSI Annual Conventions, held regularly every year, in different cities of the country, Computer Society of India (CSI), takes pride in announcing its 50th Golden Jubilee Annual Convention; CSI-2015 to be held at New Delhi, the national capital of the country. CSI-2015 will be an amalgamation of the following ten different tracks organized parallel to each other, in addition to few theme based Special Sessions:-

- **Track # 1: ICT Based Innovation**
- **Track # 2: Next Generation Networks**
- **Track # 3: Nature Inspired Computing**
- **Track # 4: Speech and Language Processing for Human-Machine Communications**
- **Track # 5: Sensors**
- **Track # 6: Big Data Analytics**
- **Track # 7: System and Architecture**
- **Track # 8: Cyber Security**
- **Track # 9: Software Engineering**
- **Track # 10: 3-D Silicon Photonics & High Performance Computing**

CSI-2015 will be held at India International Centre (IIC), Lodhi Road, New Delhi (INDIA). The convention will provide a platform for technical exchanges amongst scientists, teachers, scholars, engineers and research students from all around the world and will encompass regular paper presentation sessions, invited talks, key note addresses, panel discussions and poster exhibitions.

Over 1300 papers, from all across the country and abroad, have already been received. Paper submission process has been closed on 17th August, 2015, strictly as per the last date announced. Accepted papers shall be published by Springer in AISC series, which is indexed with world’s leading Abstracting & Indexing (A&I) databases, including ISI, SCOPUS, DBLP, EI-Compendex, Google Scholar, etc. in the form of Convention Proceedings, both, Soft Copy as well as Hard Copy. Over two dozens of leading experts, in their respective field have already confirmed to be the Speakers during the convention. Over 2000 delegates, from all walks of life, including top researchers, teachers, Govt. Officers, technocrats, industry leaders, representatives of the regulatory agencies and other stake holders are expected to attend the convention. Convention is fortunate to have the blessings of the following top visionaries, in their respective field.

<table>
<thead>
<tr>
<th>Chief Patron</th>
<th>Patrons</th>
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<tr>
<td><strong>Padmashree Dr. R. Chidambaram</strong>&lt;br&gt;Principal Scientific Advisor (PSA), Govt. of India</td>
<td><strong>Prof. S. V. Raghavan</strong>&lt;br&gt;Scientific Secretary, Office of the PSA, Govt. of India</td>
</tr>
<tr>
<td><strong>Chair, Programme Committee</strong></td>
<td><strong>Chair, Organizing Committee</strong></td>
</tr>
<tr>
<td><strong>Prof. K. K. Aggarwal</strong>&lt;br&gt;Chancellor, KRM University, Gurgaon and Former Founder Vice Chancellor, GGSIP University, New Delhi</td>
<td><strong>Dr. Gulshan Rai</strong>&lt;br&gt;National Cyber Security Co-ordinator, Govt. of India</td>
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<td><strong>Dr. G. Satheesh Reddy</strong>&lt;br&gt;Scientific Advisor to Defence Minister, Govt. of India</td>
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<td><strong>Chair, Finance Committee</strong></td>
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<td><strong>Mr. Satish Khosla</strong>&lt;br&gt;Managing Director, Cognilytics Software and Consulting Pvt Ltd.</td>
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Registration Fee Details and Sponsorship Opportunities
Available at Page no. 13


All correspondences, related to **CSI-2015** must be addressed to

**Prof. M. N. Hoda**
Secretary, Programme Committee (PC), **CSI – 2015**
Director, Bharati Vidyapeeth’s Institute of Computer Applications and Management (BVICAM)
A-4, Paschim Vihar, Rohakt Road, New Delhi – 110063 (INDIA)

**Tel:** +91–11–25275055  **Fax:** +91–11–2525056  **Mobile:** +91–921022066

**E-Mail IDs:** meca@bvicam.ac.in; csi2015.delhi@gmail.com; Visit us at [http://www.csi-2015.org/](http://www.csi-2015.org/)