LECTURE WORKSHOP ON
RESEARCH PARADIGMS IN COMMUNICATION AND DATA ENGINEERING
18th & 19th March 2010

Overall Report:

The School of IT and Science of Dr. G R Damodaran college of Science organized Joint Science Education Programme sponsored by Indian Academy of Sciences - Bangalore, Indian National Science Academy - New Delhi, The National Academy of Sciences – Allahabad. The school conducted a two Day Lecture Workshop On Research Paradigms In Communication And Data Engineering on 18th and 19th March 2010. The Lecture Workshop was chaired by Eminent professors from IIT, IISC and reputed institutions. Dr Madhukar Viswanath Pitke, Founder Director CDOT & Former Professor, Tata Institute of Fundamental Research inaugurated the workshop on 18th March in the presence of the Secretary Mrs. Geetha Padmanaban, Advisor Prof. A.N. Lakshmanan and the Head of the Department Mrs. T. Santha. The faculty members and research scholars of various colleges in and around Coimbatore were the participants of the workshop. In his inaugural address Dr. Pitke addressed about the next generation research issues related to network. In his talk he highlighted that the negligence of the basic sciences was the reason for poor research quality. The next session was chaired by Dr. T. Devi, Reader, Department of CSE Bharathiar University, Coimbatore who emphasized on the Research issues in Data Engineering. She also addressed the queries related to research raised by the research scholars of the department. Dr. V.S.Patwardhan, Opsim Software, Pune was the resource person in the afternoon session focusing his talk on Design and Development of Process Simulators and enlightening the participants. The day ended with the invited talk by Dr. V. Saravanan, Director, Department of Computer Applications, Dr NGP Institute of Technology, Coimbatore. He shared his expertise with the audience on the topic Inclusive Computing using Data Mining. His talk left a spark on the mind of the researchers contributing to the untouched areas.

The second day started with the area of Wireless Broadband Networks with Dr. K. Giridhar emphasizing the need of the Wireless Broadband Networks. Prof.K.Giridhar, Department of EE, IIT, Madras highlighted the usage of the Internet bandwidth and hence justified the need of broadband services changing into Wireless Broadband services. The next session was chaired by Dr. D. S. Nagaraj, Professor, Institute of Mathematics, Chennai. He highlighted the contribution of mathematics towards the various domains of research. The main focus of his talk was on Computational Modelling. The next two sessions were hands on training session were the participants were insight into NS2 and MATLAB. Mr. T. Senthilkumar, Assistant Professor(SG), Dept. of CSE, Amrita School of Engineering, Coimbatore was the resource person who imparted the training for the participants in NS2, a simulation language used in network communication and other network related modeling. The two day lecture education programme ended with the last session by Mrs.V.Thavavel, Assistant Professor(SG), Karunya University, Coimbatore who imparted hands on training in MATLAB & Polyanalyst and the use of these software’s in field of Data Mining. The participants
were highly motivated and benefited by the lectures and the hands on training in the latest and the needed topics in the research field.

**Session wise Reports:**

**Session I:**

**Resource person:**

Dr. Pitke Madhukar Viswanath,
Founder Director CDOT & Former Professor,
Tata Institute of Fundamental Research.

**Topic:**

NEXT GENERATION NETWORK RESEARCH ISSUES.

Prof Pitke explained few interesting possibilities in the next generation networks and the key technologies which include Internet - Packet Communication, Wireless, Digital Signal Processing (DSP), Antennas, Fibre Optics, and Solid State Electronics. He also briefly described the current generation of networks, the influence the network organization and the problems, advantages and opportunities in the same. He shortly describe the wireless technology and its new services and explained how to change the network architecture that embrace Multiplicity of Services, Multiplicity of Technologies, Multiplicity of Service Providers, Current Network-Centric Multi-Service world, Move to Service-Centric Multi-Service world. He discussed about WiFi, WiLan, 802.11a, 802.11b, 802.16. He elucidate Antenna Technology and OFDM (Orthogonal Frequency Division Multiplexing). Later he moved to the types of networks with the inclusion of Mesh Networks, Ad-hoc Networks, Sensor Networks, Cognitive Networks and its communication. He also shared his experience on C-DoT by giving few innovating real time examples. He concluded his talk with the current scenario of India and the future scope with the inclusion of Larger and larger bandwidths 100 Mbps, Ultra wideband in-house networks, more bits per Hz of bandwidth, Move to higher bands, possibly Terahertz band, A Global 2D (Mesh) Network.

**Session II:**

**Resource person:**

Dr. T. Devi
Reader
Department of CSE
Bharathiar University,
Coimbatore.

**Topic:**

RESEARCH ISSUES IN DATA ENGINEERING

The presentation dealt with the research issues in various fields of data engineering such as data modeling, triggers, data mining and data security. She began with the very
basics of what is a data, its source and about data engineering and the current scenario at the research level.

Dr. T. Devi used very simple, real life example to talk on her presentation. She begin every topic with basics and followed by a detailed explanation. She also spoke on concurrent engineering which is a systematic approach to integrated product development and customer relationship management. The talk concluded with business intelligence, the intelligent use of available data in decision-making by a company for increasing the competitive advantage.

Session III:

Resource person:

Dr. V. S. Patwardhan
Opsim Software
Pune.

Topic:

DESIGN AND DEVELOPMENT OF PROCESS SIMULATORS.

Dr. Patwardhan a known personality in the field of Chemical Engineering was graduated from Mumbai IIT with outstanding performance as a Chemical Engineer. His area of specialization includes process simulators and he is associated with many companies in and around India. He is also conducting training courses and sessions on simulators for various industrial clients.

The session started with a formal welcome note and the introduction of the chief guest by Ms. N. Sudha Bhuwaneswari. He started with an introductory note on his area of specialization and how he started developing his expertise in the area of process simulators. He gradually took over the crowd giving a very basic introduction to what simulators are? And why simulation plays a very important role in research. He also covered topics like Schematic Chemical Plant and the role of reactors, heaters and the heat exchange process, Process simulation with process simulation model, Distillation column heat exchange, the recycling process with importance to material recycling and heat recycling the most wanted need of the industries, sequential approach, modular approach and equation solving approach of simulation. To emphasize more on the usage of simulators he also discussed briefly with the mass about developing simulators, components and requirements, concept of dynamic simulation, Batch processing and scheduling. He concluded his session with an endnote on the commercial CAPE OPEN simulator.

The two hours session on simulators was a really interesting and resourceful talk delivered by Dr. V. S. Patwardhan and the way he presented a new area of simulators in a user-friendly format impressed the crowd very much that comprised audience of various categories from Professors, Associate Professors, Assistant Professors, PG and UG students. The session successfully came to a close with a word of thanks and gratitude offered by the School of IT & Science.
Session IV:

Resource person:
Dr. V. Saravanan
Director
Department of Computer App.
Dr NGP Institute of Technology,
Coimbatore.

Topic:
INCLUSIVE COMPUTING USING DATA MINING.

The talk begin with what is inclusive computing in the current scenario and do we use it to the fullest of our need. The next few slides focused on topic of knowledge representation or management, impact of social networking using web 3.0 and applying data mining patterns in web 3.0.

His agenda was to reduce the digital gap, knowledge representation management, Impact of social networking using web 3.0. He started with what the inclusive computing consists of and he explained how lack of resources, language barrier, fear of technology, computing in immerse in jargon can overcome by applying data mining techniques.

He discussed the optimality in utilizing resources instead of investing more on software and hardware. He asked some questions like Are we utilizing the technology? If so, can we use it to the fullest? He answered certainly not. Why and where is the gap? How to narrow down the gap? But why people don’t use it to the fullest. He answered it’s because of security threat. And also he discussed some languages which are used in web 3.0 RDF(Resource Description Language), XML(Extensible Markup Language), URI, SPARQL, XDI, XRI, SWRL(Semantic Web Rule Language), XFN, OWL, API. The session was very informative and gained many new ideas about how to apply and where to apply the data mining techniques.

The whole of the concept was interesting presented with a real life example of a stamp purchase which covered various languages such as XML, RDF, OWL, SWRL etc. The research challenges and obstacles in this area were discussed along with the security concerns.

Session V:

Resource person:
Prof. K. Giridhar
Professor
Department of EE
IIT, Madras.

Topic:
WIRELESS BROADBAND NETWORKS.
The session was on the topic of wireless technology of comparison between 3G SIM and Wimax. The technology of Wimax was exposed to the interference and the distance between the basestations. The formula used to compute the interference is $d^{2}$. The interference of Wimax gets reduced due to the distance between the basestations.

WiMAX is a second-generation protocol that allows for more efficient bandwidth use, interference avoidance, and is intended to allow higher data rates over longer distances. WiMAX, meaning Worldwide Interoperability for Microwave Access, is a telecommunications technology that provides wireless transmission of data using a variety of transmission modes, from point-to-multipoint links to portable and fully mobile internet access. The technology provides up to 20 Mbps in real world end-user throughput without the need for cables. The technology is based on the IEEE 802.16 standard (also called Broadband Wireless Access). The name "WiMAX" was created by the WiMAX Forum, which was formed in June 2001 to promote conformity and interoperability of the standard. The forum describes WiMAX as "a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL".

Session VI:

Resource person:
Dr. D.S. Nagaraj
Professor
Institute of Mathematics
Chennai.

Topic:
COMPUTATIONAL MODELLING.

The session consisted of mathematics and its application in all research fields, choosing best mathematical technique for research, algebraic geometry in computer field etc. While doing Research in Arts or humanities there is a need to collect data in various forms, compare and analyze them. The mathematics involved here is that of numbers and events, which is number theory and probability theory. If one is doing research in science subjects there will be a need for more deep mathematics. Like equations, shapes, figures etc. The mathematics involved here apart from number theory and probability theories are calculus, analysis, differential equations, algebra, topology and geometry. Algebraic Geometry is the study of geometric objects using algebra. First of all it is natural to expect the geometric objects which one considers in algebraic geometry are themselves defined by algebra.

One of the recent successful applications of Algebraic geometry is in mathematics itself. The theory of elliptic curves of algebraic geometry was used in proving ‘Parram’s Last Theorem’ which states that the only solutions in rational numbers of $Xn + Yn = 1, n$
3. According to Wikipedia, Algebraic geometry now finds application in Statistics, Control theory, Robotics, Error-correcting codes, phylogenetics and geometric modeling. It is also involved in other areas such as Biology, Chemistry, Economics, Physics apart from other areas of Mathematics. Computational algebraic geometry can be used to study parameter spaces and other features of statistical models. But the advent of computer algebra systems and the development of algorithms implementing the theory of Gröbner bases (a nonlinear generalization of Gaussian elimination) have brought to the fo’c’kle. Broadly speaking, phylogenetics is the art—or, increasingly, the science—of inferring past relationships from present similarities. The ultimate aim is to map out the entire evolutionary “tree of life,” from its ribonucleic roots to its ephemeral buds and blossoms.

As part of its 2006-07 program on applications of algebraic geometry, the IMA had scheduled an early March workshop on “emerging” applications. That event morphed into a workshop on algebraic biology and statistics, where more than a hundred participants learned about the roles of toric varieties, projective space, polytopes, and polynomials over finite fields are beginning to play in such seeming arcane as phylogenetics, etc. Many of the talks and posters focused on the rapidly evolving role of algebraic geometry in studies of evolutionary relationships of living (and extinct) organisms. Mathematics appears everywhere, in particular in research. When math’s appears in your research you try to find out what is the best method available to use or solve the problem.

The session was concluded as “First one has to make some simple models of the problem and use the available Mathematical tools to solve it, before going to the general problem. If one is going to use algebraic geometry there are packages like Singular, Macaulay which are very useful. Also, there is a package called Mathematics which has built-in digital image and analysis.”

Session VII:

Resource person:

Mr. T. Senthilkumar
Assistant Professor(SG)
Dept. of CSE
Amrita School of Engineering
Coimbatore.

Topic:

NS2-PRINCIPLES AND HANDS ON TRAINING.

The session was handled by the resource person Mr. Senthil Kumar, Assistant Professor, Amrita University. He gave a lecture on NS-2 which included that ns-2 stands for network simulator version 2. It is a discrete event simulator for networking research. It mainly works at packet level and provides substantial support to simulate bunch of
protocols like TCP, UDP, FTP, HTTP and DSR. NS-2 can simulate both wired and wireless network. It is primarily based on Unix and uses TCL as its scripting language. It has single thread of control and back end of it is the c++ event scheduler. The resource person gave the instructions for installing ns/2 and also how to use the tool. The instructor taught on how to create a TCL script, open an existing file and to run the script. He showed the step for executing a program with an example. The advantages of the simulator is that it is cheap, complex scenarios can be easily tested, results can be obtained quickly and it is more suited for controlled experimental conditions. The resource person also explained on the applications of the tool. The lecture was very interesting and useful.

Session: VIII

Resource person:
Mrs.V.Thavavel
Assistant Professor(SG)
Karunya University
Coimbatore

Topic:
DATA MINING USING MATLAB & POLYANALYST AND HANDS ON TRAINING.

The final session of the Lecture work shop was a hands on session by Mrs. V. Thavavel, Assistant Professor(SG), Karunya University, Coimbatore. She handled the session by providing a “hands on training” on MATLAB. Matlab is a scientific computational package that provides an expandable environment for mathematical computing and visualization for data analysis. It also provides an intuitive language for development of algorithms and applications. To date, it is estimated that there are 500,000 users worldwide and has more than 600 mathematical, statistical, and engineering functions.

The session was focused on applying MATLAB with data mining. The hands on experience was given in Matlab fuzzy logic tool box, Fuzzy logic tool box membership editor, Rule Editor. The merits and the demerits of the rule based system was discussed using the example of student evaluation. The same application worked out again using the neural network technique to overcome the disadvantage in the rule based approach. Exposure was also given to the GA tool box.

The session ended with the resource person answering to the queries of the participants.
# Lecture Workshop on Research Paradigms in Communication and Data Engineering

**18th & 19th March 2010**  
**SCHOOL OF INFORMATION TECHNOLOGY AND SCIENCE**

## Session Details

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<td>Research Issues in Data Mining</td>
<td>Design and Development of Simulators</td>
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