



ISiM Executive Education Programme

Workshop on Machine Learning

April 21-25, 2008 Bangalore

International School of Information Management

University of Mysore

International School of Information Management
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Management School for IT, Technology School for IM

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- ▣ M. Tech in Information Systems & Management (Two-Year Full Time Programme)
- ▣ Doctoral Degree Programmes
- ▣ Executive Education Programmes

Executive Education Programme

ISiM Executive Education Programmes help individuals and organizations to leverage on technology management through our courses that integrates technical expertise with management.

Our Executive Education Programmes enables you to accumulate credits and complete your Certificate / Diploma / Degree in a flexible manner. Each Workshop in the Executive Education Programme Series is a 3 Credit programme. The classification and required credits for the different levels of certification are as follows:

Certificate in Information Systems & Mgmt.	18 credits
Diploma in Information Systems & Mgmt.	30 credits
M. Tech in Information Systems & Mgmt.	60 credits

**Registration Fee:
INR 15,000***

Venue
Conference Hall

Informatics (India) Ltd
No. 194, R.V. Road, Basavanagudi,
P.B. No. 400, Bangalore 560 004, India,
Tel: +91-080-40387777

* Registration Fee includes teaching materials, lunch and refreshments

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Workshop on Machine Learning



Background and Context

Machine Learning (ML) is one of the hottest areas of research in Computer Science today. ML is useful when a large amount of data is available and a model to explain the generation/relation is not. The main idea that surrounds these methods is obtaining a model from the data set; in other words, extracting knowledge that will enable one to transform input to output. As a branch of Artificial Intelligence (AI), ML is concerned with constructing programs that learn from experience.

ML methods draw heavily from concepts and results from diverse domains such as Statistics, Information theory, Biology, Computational complexity, and Control theory. Although ML methods have high computational costs, their use has grown exponentially due to the increase in computational power of computers in the last ten years.

ML has a wide spectrum of applications including natural language processing, syntactic pattern recognition, search engines, medical diagnosis, bioinformatics and cheminformatics, detecting credit card fraud, stock market analysis, DNA sequences classification, speech and handwriting recognition, object recognition in computer vision, game playing and robot locomotion.

Focus of the Workshop

Balancing theory and practice, this Workshop, will focus on the following applications:

- ▶ Information Retrieval
- ▶ Language Processing
- ▶ Document Analysis
- ▶ Speech Recognition

Objectives of the workshop

- ▶ Introduce participants to concepts of ML including concepts of clustering, Gaussian mixtures and dimensionality reduction
- ▶ Enable the use of the state of the art methods and tools in ML techniques
- ▶ Provide an overview of the major areas of applications of ML
- ▶ An in depth understanding of ML applications in the four focus areas - Information Retrieval; Language Processing; Document Analysis and Speech Recognition
- ▶ Provide hands on training on the key techniques

Participant Profile

This Workshop is designed for academicians and professionals in Computer Science and Engineering, Statistics and Social Sciences. The workshop is mainly targeted for:

- ▶ Academicians and industry practitioners of ML
- ▶ Professionals working in the areas of Information Retrieval, Language Processing, Document Analysis and Speech Recognition
- ▶ Researchers working in the application areas but new to ML
- ▶ Students pursuing projects in ML

Workshop Highlights and Benefits to Participants

- ▶ Get a panoramic view of ML
- ▶ Understand the basics of ML
- ▶ Learn the latest tools and techniques used in ML
- ▶ Get hands on experience on developing basic biometric, character and image recognition modules
- ▶ Gain knowledge of implementing advanced classifiers and boosting
- ▶ Get exposure to new arenas of research and projects

Course Outline

Module 1. Introduction : What is ML; Discriminative vs Generative; Regression Example;

Module 2: Probability Theory ; Decision Theory ; Information Theory ; Probability Distributions ; Linear Regression Models; Linear Basis Functions; Bias-Variance Trade-off; Bayesian Linear Regression

Module 3. Neural Networks and Kernel Machines: Biological Motivation ; Perceptrons ; Multilayer Networks and Backpropagation ; Representational Power; Applications ; Support Vector Machines

Module 4. Graphical Models and EM: Bayesian Networks; Conditional Independence; Markov Random Fields ; Inference in Graphical Models ; K-means Clustering ; Mixtures of Gaussians

Module 5. Sampling Methods: Basic Sampling Methods ; Monte Carlo Methods, Gibbs Sampling

Module 6: Sequential Data : Markov Models ; Hidden Markov Models ; Extensions to HMMs ; Linear Dynamical Systems ; Conditional Random Fields

Module 7. ML Applications with focus on: Information Retrieval, Document Analysis and Recognition, Natural Language Processing, Data Mining



Prof. Sargur Srihari is a SUNY

Distinguished Professor in the Department of Computer Science and Engineering at the University at Buffalo, State University of New York. He is the founding director of CEDAR, the Center of Excellence for Document Analysis and Recognition, which was recognized as the first United States Postal Service Center of Excellence in 1991. Prof. Srihari's research is in pattern recognition and machine learning with applications to handwriting recognition and computational forensics. Research at CEDAR led to a new thread of work leading to the first large-scale handwritten address interpretation systems deployed by the IRS and by the USPS (and then extended to UK-Royal Mail and Australia Post). His research on forensics led to the first computational study of the individuality of handwriting and of fingerprints providing scientific support for the use of such evidence in the courts. Prof. Srihari is an author of over 300 research papers, of which 65 are in journals and 6 are U.S. patents. He has served on the Board of Scientific Counselors of the U.S. National Library of Medicine, and presently serving on a U.S. National Academy of Sciences committee on identifying the needs of the forensic community. Srihari has received several honors including Fellow of IEEE, Fellow of IAPR, Fellow of IETE and Distinguished Alumnus of the Ohio State University College of Engineering.

Prof. Srihari is visiting faculty at International School of Information Management, University of Mysore.



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