

Title: Neural Networks and Learning Systems

Instructors: Professor Ashish Ghosh, Indian Statistical Institute, Kolkata, India
Professor Susmita Ghosh, Jadavpur University, Kolkata, India

Dates: September 24, 2018 to September 28, 2018



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Topics to be covered:

Machine Learning

Defining a learning problem, introduction to machine learning, relation between machine learning, statistics and artificial intelligence, Types of learning (based on information available, role of learner, type of output), training, testing, cross validation, measuring prediction performance, overfitting, general model of learning system and its components, eager and lazy learner, batch versus online learning, applications 4 hrs

Linear Classifiers

Minimum distance, k nearest neighbor, Perceptron, Support Vector Machine 2 hrs

Neuro-computing

Brain versus digital computer, biological neural network (NN) and artificial NN, general framework of NNs, activation function, characteristics of NNs, advantages of NNs, popularly used NN models for supervised and unsupervised learning, Perceptron, linear separability, cascading layers, Multi-layer Perceptron, Parameter updating, example and applications 3 hrs

Deep Learning: Convolution Neural Network 2 hrs

Kohonen Self Organizing Feature Map Neural Networks

Hebbian learning, competitive learning, self organization, feature map, properties of feature map, self organizing feature map, architecture of kohonen's net, learning algorithm, structure of neighborhood and neighborhood functions, tuning of parameters, pros and cons of SOFM, applications 2 hrs

Kernel Tricks, Radial Basis Function Networks 2 hrs

Applications of Neural Networks: in pattern recognition and image processing 2 hrs

Abstract:

Learning is a process by which a system improves its performance from experience. Machine learning is the field of study that provides computers the ability to learn without being explicitly programmed. Machine learning is used in cases where plenty of data is available and there is an intuition that a certain rule exists; but the rule is not explicitly known or cannot be expressed mathematically. Neural networks (NNs) are a class of model for machine learning capable of achieving human like performance. Based on the types of learning, supervised or unsupervised, various NNs are designed. Multilayer Perceptron (MLP), Radial Basis Function (RBF) NN operate in supervised mode; whereas, Kohonen's Self Organizing Feature Map (SOFM), Adaptive Resonance Theory (ART) work in unsupervised manner. Support Vector Machine (SVM) and Deep Neural Networks (DNNs), enhanced versions of NNs, are popularly used recent learning models exhibiting encouraging performance.

In this series of lectures, focus will be given on introducing neural networks as machine learning tools. A thorough discussion will be made on some of the popular neural networks working both in supervised and unsupervised frameworks. This will be followed by discussion on today's thrust area: Deep Learning. Applications of these topics on problems in pattern recognition and image processing arena will also be presented.

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Venue: School of Information Technology (SIT), King Mongkut's University of Technology Thonburi (KMUTT)

Neural Networks & Learning Systems Workshop <					
TOPIC	INSTRUCTOR	DAY	LOCATION	START TIME	END TIME
Introduction to Machine Learning	Ashish Ghosh, Susmita Ghosh	MONDAY	Training Room 4/1	1:00 PM	5:00 PM
Linear Classifiers	Ashish Ghosh	TUESDAY	Computer Room 1/3	10:00 AM	12:00 PM
Neuro-computing	Susmita Ghosh	WEDNESDAY	Training Room 4/1	9:00 AM	12:00 PM
Deep Learning: CNN	Ashish Ghosh	WEDNESDAY	Training Room 4/1	1:30 PM	3:30 PM
Kohonen SOFM Neural Networks	Susmita Ghosh	THURSDAY	Training Room 4/1	10:00 AM	12:00 PM
Kernel Tricks, RBF Networks	Ashish Ghosh	THURSDAY	Training Room 4/1	1:30 PM	3:30 PM
Applications of Neural Networks	Ashish Ghosh	FRIDAY	Training Room 4/1	10:00 AM	12:00 PM
Workshop Wrap-up	Ashish Ghosh, Susmita Ghosh	FRIDAY	Meeting Room 3/1	1:30 PM	3:30 PM

Neural Networks and Learning Systems					SCHEDULE START 9:00 AM	TIME INTERVAL 30 MIN	Class List >
TIME	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
9:00 AM				Neuro-computing			
9:30 AM				Susmita Ghosh			
10:00 AM			Linear Classifiers		Kohonen SOFM Neural Networks	Applications of Neural Networks	
10:30 AM			Ashish Ghosh		Susmita Ghosh	Ashish Ghosh	
11:00 AM							
11:30 AM							
12:00 PM							
12:30 PM							
1:00 PM		Introduction to Machine Learning					
1:30 PM		Ashish Ghosh, Susmita Ghosh		Deep Learning: CNN	Kernel Tricks, RBF Networks	Workshop Wrap-up	
2:00 PM				Ashish Ghosh	Ashish Ghosh	Ashish Ghosh, Susmita Ghosh	
2:30 PM							
3:00 PM							
3:30 PM							
4:00 PM							
4:30 PM							
5:00 PM							

Register here: <https://goo.gl/forms/2eVYEGqxsZRCwp4B3>

