



Indian Institute of Technology Delhi

CEP Short-Term Course

MACHINE LEARNING FOR ENGINEERING APPLICATIONS

IIT Delhi Campus, New Delhi 9th – 13th December 2019



About IIT Delhi

IIT Delhi is one of the oldest technological institutes in India. The institute has nearly 35 academic units that imparts knowledge on Engineering, Science, Design, Social Science, among others. IIT Delhi has been instrumental in providing solutions to the technological and societal problems through its academic and research activities. IIT Delhi has been consistently placed among top academic universities around the globe, and as per the recent QS University ranking, the institute stands at 61st in the list of Engineering and Technology domain. Recently, IIT Delhi has been elevated to the status of “Institution of Eminence” by Govt. of India.

Scope of the Course

The aim of the course is to introduce the relevance of machine learning in a wide range of academic and industrial problems relevant to various engineering disciplines. Topics of the sessions will include the basics of widely used algorithms for linear and non-linear regressions such as elastic net, principal component regression, support vector machine, and neural networks. This will be achieved through: (i) lectures, (ii) short projects (both individual and group) and (iii) hands-on session through various software packages.

Learning Outcomes

- Appreciate the role of machine learning in engineering disciplines
- Understand machine learning algorithms

- Use data mining to predict hidden trends
- Make appropriate decisions employing data-based modelling
- Gain hands-on experience on open source packages for machine learning algorithms

Course Contents

Data Analysis; Probability Distributions – Discrete and Continuous; Estimation and Hypothesis Testing; Linear Regression and its Derivatives – Partial Least Squares, Principal Component Analysis, Lasso, Ridge and Elastic Net; Estimation and Inference; Non-Linear Regression: Support Vector Machine, Neural Networks, Gaussian Process Modelling; Classification and Clustering; Engineering Applications and Hands-on sessions.

Course Faculty

The following faculty members will deliver lecture during the course

Prof. N.M. Anoop Krishnan, Department of Civil Engineering, IIT Delhi

Prof. Manoj M., Department of Civil Engineering, IIT Delhi

Prof. Hariprasad Kodamana., Department of Chemical Engineering, IIT Delhi

Target Audience

The course is designed for practising engineers, industry professionals, faculty members and students from *All Engineering Disciplines*

Course fee

The total course fee payable to IITD CEP account: Rs. 40000+18% GST per person (excluding accommodation)

Venue: IIT Delhi

Course plan

Day 1: Introduction

Forenoon: 09:00 hrs – 13:00 hrs

Introduction to engineering applications of machine learning, cases and examples, Introduction to data cleaning and visualization

Afternoon: 14:00 hrs – 17:00 hrs

Hands own sessions in computational lab:

Installation and basic programming operations on R and Python

Day 2: A quick dive into the theory of statistical methods

Forenoon: 09:00 hrs – 13:00 hrs

A quick dive into the theory of statistical methods such as hypothesis testing, basics of regression and analysis

Afternoon: 14:00 hrs – 17:00 hrs

Hands own sessions in computational lab:

Statistical analysis using R

Day 3: Going deep into of theory of machine learning

Forenoon: 09:00 hrs – 13:00 hrs

Introduction to theory of machine learning: classification, clustering, and re-visiting regression.

Afternoon: 14:00 hrs – 17:00 hrs

Hands own sessions in computational lab:

Machine learning using Python

Group projects and problem definitions

Day 4: Problem solving using machine learning

Forenoon: 09:00 hrs – 13:00 hrs

Afternoon: 14:00 hrs – 16:30 hrs

Group projects in computational lab: Using Python/R

Submission of projects

Day 5: Lessons learnt and takeaways

Forenoon: 09:00 hrs – 13:00 hrs

Review of the projects and presentations

Afternoon: 14:00 hrs –

Feedback and lessons learnt

Contacts:

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