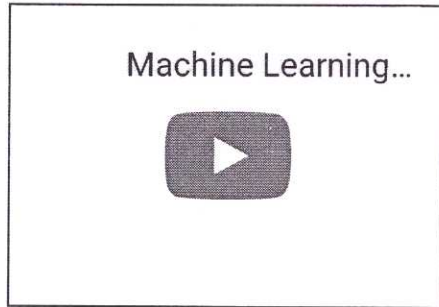X

Courses » Machine Learning for Engineering and Science Applications

Announcements   **Course**   Ask a Question   Progress   FAQ

Register for
Certification exam

Course outline

How to access
the portal

Matlab and
Learning
Modules

Pre-Requisite
assignment

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

Download

Machine Learning for Engineering and Science Applications

ABOUT THE COURSE:

Recent applications of machine learning have exploded due to cheaply available computational resources as well as wide availability of data. Machine Learning (ML) techniques provides a set of tools that can automatically detect patterns in data which can then be utilized for predictions and for developing models. Developments in ML algorithms and computational capabilities have now made it possible to scale engineering analysis, decision making and design rapidly. This, however, requires an engineer to understand the limits and applicability of the appropriate ML algorithms. This course aims to provide a broad overview of modern algorithms in ML, so that engineers may apply these judiciously. Towards this end, the course will focus on broad heuristics governing basic ML algorithms in the context of specific engineering applications. Students will also be trained to implement these methods utilizing open source packages such as TensorFlow.

INTENDED AUDIENCE:
Postgraduate students in all engineering and science disciplines. Mature senior undergraduate students may also attempt the course.

CORE/ELECTIVE: Elective

Machine Learning…

▶

21559 students have enrolled already!!

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Videos

TEXT TRANSCRIPTS

Interaction session

UG/PG: Senior UG/PG/PhD

PREREQUISITES: Familiarity with Multivariable Calculus, Linear Algebra, Probability, Statistics. Comfortable with programming in Python

INDUSTRY SUPPORT: Should be of interest to companies trying to employ engineers familiar with Machine Learning

ABOUT THE INSTRUCTOR:

Dr Balaji Srinivasan is a faculty member in the Mechanical Engineering Department at IIT-Madras. His areas of research interest include Numerical Analysis, Computational Fluid Dynamics and applications of Machine Learning.
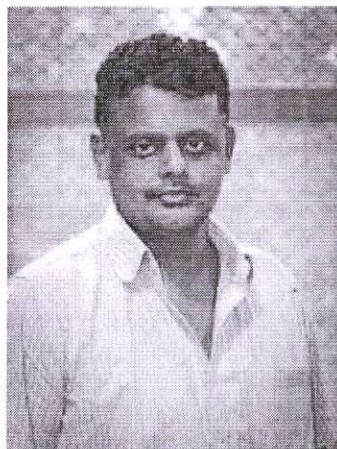
Dr Ganapthy Krishnamurthi is a faculty member in the Engineering Design Department at IIT-Madras. His areas of research interest include Medical Image Analysis and Image Reconstruction.

COURSE LAYOUT:

Week 1 : Mathematical Basics 1 – Introduction to Machine Learning, Linear Algebra
Week 2 : Mathematical Basics 2 -- Probability
Week 3 : Computational Basics – Numerical computation and optimization, Introduction to Machine Learning packages

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Week 4 : Linear and Logistic Regression — Bias/Variance Tradeoff, Regularization, Variants of Gradient Descent, MLE, MAP, Applications

Week 5 : Neural Networks — Multilayer Perceptron, Backpropagation, Applications

Week 6 : Convolutional Neural Networks 1 — CNN Operations, CNN architectures

Week 7 : Convolutional Neural Networks 2 — Training, Transfer Learning, Applications

Week 8 : Recurrent Neural Networks ¬— RNN, LSTM, GRU, Applications

Week 9 : Classical Techniques 1 — Bayesian Regression, Binary Trees, Random Forests, SVM, Naïve Bayes, Applications

Week 10 : Classical Techniques 2 — k-Means, kNN, GMM, Expectation Maximization, Applications

Week 11 : Advanced Techniques 1 — Structured Probabilistic Models, Monte Carlo Methods

Week 12 : Advanced Techniques 2 — Autoencoders, Generative Adversarial Networks

SUGGESTED READING MATERIALS:

Deep Learning, Goodfellow et al, MIT Press, 20172. Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 20093. References to research papers will be provided through the course.

CERTIFICATION EXAM :

- The exam is optional for a fee.
- Date and Time of Exams: **April 28 2019(Sunday).** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
- Registration url: Announcements will be made when the registration form is open for registrations.
- The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published.

CERTIFICATION:

- Final score will be calculated as : 25% assignment score + 75% final exam score

- 25% assignment score is calculated as 25% of average of Best 8 out of 12 assignments

- E-Certificate will be given to those who register and write the exam and score greater than or equal to 40% final score. Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Madras.It will be e-verifiable at nptel.ac.in/noc.

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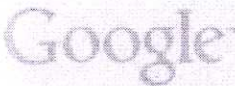
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No. of weeks of NPTEL Courses	Equivalence of NPTEL course with regular FDP
4	$\frac{1}{2}$ FDP of one week
8	Full FDP of one week
12	$1\frac{1}{2}$ FDP

Duration of NPTEL course: 12 Weeks

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This certificate is awarded to

PARUPALLI SRIPADMA

for successfully completing the course

Machine Learning for Engineering and Science Applications

with a consolidated score of **70** %

Prof. Andrew Thangaraj
NPTEL Coordinator
IIT Madras

(Jan-Apr 2019)

Prof. Dileep N. Malkhede
Advisor-I (Research, Institute & Faculty Development)
All India Council for Technical Education

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Shaikpet, Hyderabad – 500104

Department: Electronics and Communication Engineering
2018-19
REPORT
NPTEL FDP on **"Machine Learning for Engineering and Science Applications"**
Date of program: 14 Jan 2019- 24 Apr 2019
Resource person: Dr Balaji Srinivasan
About the Program:

This course aimed to provide a broad overview of modern algorithms in ML, so that engineers may apply these judiciously. Towards the end, the course focused on broad heuristics governing basic ML algorithms in the context of specific engineering applications.

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Signature of the Faculty member