

**Supervised Learning Regression**

**Course Description:**

* Machine learning teaches computers to do what comes naturally to humans and animals: learn from

experience. Machine learning algorithms use computational methods to “learn” information directly from data without relying on a predetermined equation as a model. The algorithms adaptively improve their performance as the number of samples available for learning increases.

* Machine learning uses two types of techniques: supervised learning, which trains a model on known input and output data so that it can predict future outputs, and unsupervised learning,

which finds hidden patterns or intrinsic structures in input data.

* In this course you will learn about different and most popular algorithms of supervised learning.
* The aim of supervised machine learning is to build a model that makes predictions based on evidence in the presence of uncertainty. A supervised learning algorithm takes a known set of input data and known responses to the data (output) and trains a model to generate reasonable predictions for the response to new data.

**Learning Outcomes:**

After the end of this course, the participants will be able to:

* Understand Machine Learning and its applications
* Perform different techniques of supervised learning
* Understand the importance of different techniques in different analysis scenario
* Understand regression and challenges of application
* Appreciate the use Python for all the techniques learnt during this course

**Course Prerequisites:**

* Students are expected to come to the class with practice of Python and understanding of statistical concepts in data analysis

# Pedagogy

* The course is a mixture of classroom lectures, deck, in-class lab exercises, quizzes, take-home exercises and mini-projects. Jupyter notebook will be the medium of teaching python.

**Week 1**

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| * Regression Analysis |
| * Covariance and Correlation |
| * Ordinary Least Squares Method |
| * Measures of Variation |
| * Inferences about slope |
| * Assumptions of Linear Regression |
| * Model Evaluation Metrics * Optimization Algorithm |
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**Week 2**

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| * Machine Learning Pipeline * Data Processing * Feature Extraction   + Feature Transformation   + Feature Engineering   + Feature Selection * Optimization   + Prediction Evaluation   + Model Validation   + Fine Tuning |
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**Week 3**

* Gradient Descent
  + Batch Gradient Descent
  + Stochastic Gradient Descent
  + Mini Batch Gradient Descent
* Regularization
  + Ridge Regression
  + Lasso Regression
  + Elastic-Net Regression
* Grid Search