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| COURSE TITLE | MACHINE LEARNING ESSENTIALS |
| COURSE CODE | 01CT0825 |
| COURSE CREDITS | 3 |

Objective:

- 1 Machine Learning concern with designing and developing of algorithms that allow machines, essentially computers, to evolve realistic or human like behavior based on the empirical data available. This course aims to discuss the building blocks of machine intelligence. The focus would be on how to develop algorithms that can automatically learn and recognize the complex pattern from the available date to make an intelligent decision which will be accepted to the users.

Course Outcomes: After completion of this course, student will be able to:

- 1 Apply the fundamentals of probability theory and algebra to perceive the gist of supervised machine learning algorithms
- 2 Understand and apply unsupervised algorithm for clustering
- 3 Evaluate various machine learning algorithms with appropriate evaluation metrics
- 4 Implement appropriate machine learning algorithms for the given case study

Pre-requisite of course: Programming using Python, Linear Algebra, Probability

Teaching and Examination Scheme

| Theory Hours | Tutorial Hours | Practical Hours | ESE | IA | CSE | Viva | Term Work |
|---------------------|-----------------------|------------------------|------------|-----------|------------|-------------|------------------|
| 3 | 0 | 0 | 50 | 30 | 20 | 25 | 25 |

| Contents : Unit | Topics | Contact Hours |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| 1 | Module Machine Learning Languages, Types, and Examples, Applications of Machine Learning, Machine Learning vs Statistical Modelling, Supervised vs Unsupervised Learning, Difference between Detection, Prediction and Generation, Basic types of data, exploring structure of data, plotting and exploring numerical data, categorical data, Data Quality and Remediation, data preprocessing, Importance of performance measurement, confusion matrix, Training Data Set, Testing Data Set, Validation Data Set, Overfitting, Underfitting, Bias, Variance, Supervised ad Unsupervised Learning Techniques. The course includes understanding the implementation of Machine Learning concepts to predict, classify or cluster the real time data dealing with different fields like Bioinformatics, Transportation, Logistics, Security, Education, Healthcare, Environment, Military, etc. | 42 |
| Total Hours | | 42 |

Textbook :

- 1 Fundamentals of Machine Learning for Predictive Data Analytics Algorithms, Worked Examples, and Case Studies, JD Kelleher, The MIT Press, 2015

References:

- 1 Fairness and Machine Learning Limitations and Opportunities, Fairness and Machine Learning Limitations and Opportunities, Solon Barocas, Moritz Hardt and Arvind Narayanan, The MIT Press, 2023

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

| Distribution of Theory for course delivery | | | | | |
|--------------------------------------------|------------|-------|---------|----------|----------------------------------|
| Remember / Knowledge | Understand | Apply | Analyze | Evaluate | Higher order Thinking / Creative |
| 10.00 | 20.00 | 30.00 | 40.00 | | |

Instructional Method:

- 1 Students may use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory, etc.

Supplementary Resources:

- 1 MOOC Course, NPTEL, COURSERA, Udemy, Infosys, Springboot, SWYAM etc. Online learning platform