	J.S. University, Shikohabad Faculty of Information Technology	Value Added Course AY: 2019-20

MACHINE LEARNING

Learning Outcome:

- Understand a wide verity of learning algorithms.
- Understand how to evaluates models generated from data .
- Apply the algorithm to a real problem, optimize the models learning and report on the expected acurecy that can be achieved by appling the models

Duration: 30 Hours. (Theory and Practical)

Course Outcomes:

- Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
- Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
- Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
- Be able to design and implement various machine learning algorithms in a range of real-world applications.

MODULE-I
(8hrs.)

Introduction to Python: Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relationalm operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator). Structure of a Python Program, Elements of Python, IDEs for python, Python Interpreter, Using Python as calculator, Python shell, Indentation. Data analysis and Exploration: Data Analysis & visualization –using numpy, panda matplotlib, scipy etc.

MODULE-II
(6 hrs.)
Introduction: Learning theory, Hypothesis and target class, Inductive bias and bias-variance tradeoff, Occam's razor, Limitations of inference machines, Approximation and estimation errors.

MODULE-III
(8 hrs.)
Supervised learning: Linear separability and decision regions, Linear discriminants, Bayes optimal classifier, Linear regression, Standard and stochastic gradient descent, Lasso and Ridge Regression, Logistic regression, Support Vector Machines, Perceptron, Back propogation, Artificial Neural Networks, Decision Tree Induction, Overfitting, Pruning of decision trees, Bagging and Boosting, Dimensionality reduction and Feature selection.

MODULE-IV
(8 hrs.)
Support Vector Machines: Structural and empirical risk, Margin of a classifier, Support Vector Machines, Learning nonlinear hypothesis using kernel functions.

REFERENCES

1. E. Alpaydin, Introduction to Machine Learning, Prentice Hall of India, 2006.
2. T Hastie, R Tibshirani and J Friedman, The Elements of Statistical Learning Data Mining, Inference, and Prediction, 2nd Edition, Springer, 2009.
3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2010.
4. R. 0. Duda, P. E. Hart, and D.G. Stork, Pattern Classification, John Wiley and Soni,•2012.
5. Simon 0. Haykin, Neural Networks and Learning Machines, Pearson Education, 2016
6. Kuhlman, Dave. "A Python Book: Beginning Python, Advanced Python, and Python Exercises".

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