EE6227 GENETIC ALGORITHMS AND MACHINE LEARNING

Acad Unit: 3.0
Prerequisite: Nil
Effective: Acad Year 2019-2020
Last update: 6 January 2020

OBJECTIVE

The objective of first half of this course is to provide in-depth treatment on optimization procedures based on evolutionary algorithms. As most modern optimization problems are complex with mixed real-integer variables, numerous locally optimal solutions, discontinuities, and so on. Evolutionary algorithms can handle all these issues more effectively than other optimization algorithms.

The objective of second half of this course is to equip students with machine learning theories and paradigms. It gives the students an understanding of the most current machine learning algorithms such as deep learning, kernel methods, randomization-based methods so that the students can apply the knowledge to data mining, pattern recognition and regression problems.

DESIRED OUTCOME

After completing this course, students would be able to apply various evolutionary optimization algorithms to solve problems in their own research areas. Optimization problems are encountered in diverse disciplines. In addition, machine learning methods are used for data analytics, recognition, regression and time series forecasting. Hence, students from diverse backgrounds will be able to appreciate and benefit from studying this course.

CONTENT

Review of Combinatorics and Probability. Introduction of Genetic Algorithms. Differential Evolution. Particle Swarm Optimization. Advanced Techniques. Principles of Machine Learning. Paradigms of Machine Learning. Kernel Methods.

ASSESSMENT SCHEME

Continuous Assessment 40%
Final Examination 60%

REFERENCES

1. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2016 (Latest Edition).

2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning (Springer Series in Statistics), 9th printing, 2017.

3. Andries P. Engelbrecht, Computational Intelligence: An Introduction, Wiley, 2007.