## **EE6227** GENETIC ALGORITHMS AND MACHINE LEARNING

遗传算法和机器学习

Acad Unit: 3.0 Prerequisite: Nil

Effective: Acad Year 2019-2020 Last update: 6 January 2020

本课程前半部分的目标是深入讨论基于进化算法的优化程序。 由于大多数现代优化问题是复杂的,具有混合实整数变量,大量的局部最优解,不连续等。 进化算法可以比其他优化算法更有效地处理所有这些问题。

**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.

本课程后半部分的目标是让学生掌握机器学习的理论和范式。 它使学生了解最新的机器学习算法,如深度学习,核方法, 基于随机化的方法,使学生能够将知识应用于数据挖掘,模式识别和回归问题。 **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

通过本课程的学习,学生将能够运用各种进化优化算法来解决自己研究领域的问题。 优化问题在不同的学科中都会遇到。 此外,机器学习方法用于数据分析、识别、回归和时间序列预测。 因此,来自不同背景的学生将能够欣赏并受益于本课程的学习。

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

持续评估 Continuous Assessment 40%

Final Examination 60%

期末考试

组合学与概率论复习。 遗传算法导论。 付进化。 机器学习的范例。 内核的方法。

## REFERENCES

- Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2016 (Latest Edition).
- Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning (Springer Series in Statistics), 9th printing, 2017.
- Andries P. Engelbrecht, Computational Intelligence: An Introduction, Wiley, 2007.

Christopher M. Bishop,模式识别和机器学习,b施普林格,2016(最新版)

Trevor Hastie, Robert Tibshirani, Jerome Friedman,《统计学习的要素》(施普林格系列) ,2017年第9版。