IS5152 Data-driven decision making

Semester 2, 2023/2024

Wednesday, 6.30-8.30 pm, COM1-0212

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- **Course objective:** to introduce students to decision making technologies that can support decision making in the financial, operational, marketing and other strategic areas.
- **Description:** Data-driven decision making improves productivity and profitability of businesses. This module teaches students decision making techniques based on data analysis. Various machine learning (ML) techniques for data analysis will be presented. The module also discusses aspects related to building an effective model for decision making such as: (i) methods for data preparation such as feature selection, data reduction and sample selection, (ii) metric for determining a good model, (iii) visualization of model performance, (iv) over-fitting and its avoidance. Examples of practical business decision making problems will be used to illustrate the merits of the ML techniques presented.

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- **Topics covered:**

  The techniques covered in this course include neural networks for classification/regression, decision tree methods, support vector machine, data envelopment analysis and data mining.

- Journal articles that present relevant techniques for decision making and/or describe successful application of the existing methods in solving practical problems will be discussed in class.

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This course assumes the students to have some background knowledge in:

- Calculus
- Simple linear algebra
- Basic probability and statistics

No computer programming skill is required.

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Tentative schedule:

Week 1	January 17, 2024	Class administration. Basic mathematics
Week 2	January 24, 2024	Optimization and decision making
Week 3	January 31 , 2024	Support vector machines
Week 4	February 7, 2024	Data envelopment analysis
Week 5	February 14, 2024	Decision making with multiple objectives
Week 6	February 21, 2024	Decision making under uncertainty
	February 28, 2024	No lecture. Mid-semester break
Week 7	March 6, 2024	Probabilistic classification models
Week 8	March 13, 2024	Exam 1
Week 9	March 20, 2024	Classification: model development and evaluation
Week 10	March 27, 2024	Decision tree method for classification/regression
Week 11	April 3, 2024	Neural networks
Week 12	April 10, 2024	Hari Raya Puasa (no lecture)
Week 13	April 17, 2024	Exam 2

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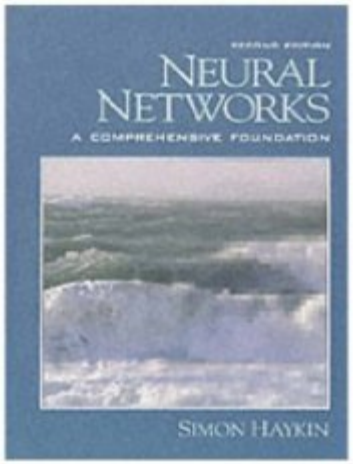
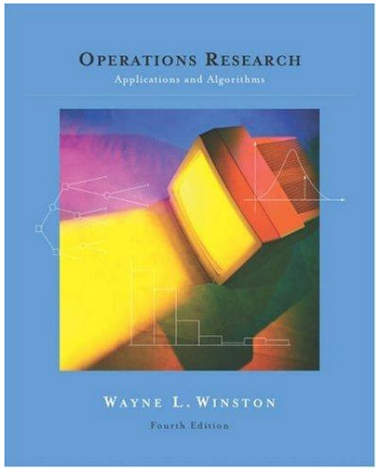
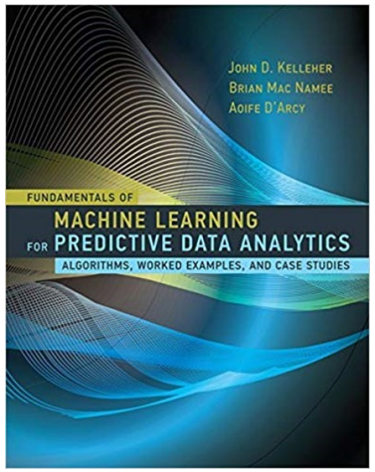
References: Available in the RBR sections of Central Library and HSS Business Library.







1. Neural networks: A comprehensive foundation
   Author: Haykin, Simon S
2. Machine Learning
   Author: Mitchell, Tom M
3. Operations research : applications and algorithms
   Author: Winston, Wayne L
4. Fundamentals of Machine Learning for Predictive Data Analytics
   Authors: John D. Kelleher, Brian Mac Namee, Aoife D'Arcy.

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Grading:

1. Four assignments: 20%
2. Exam 1 on Wednesday, 13 March 2024, 6.30 – 8.30pm: 40%
3. Exam 2 on Wednesday, 17 April 2024, 6.30 – 8.30 pm: 40%

The midterm and the final exam are open-book examinations.

- Do check CANVAS for this course regularly for announcements, updates, etc.
- All lecture materials and assignments will be available from Canvas - Files.