Course Title	:	Machine Learning for Business
Course Code	:	CDS524
Recommended Study Year	:	1
No. of Credits/Term	:	3
Mode of Tuition	:	Lectures
Class Contact Hours	:	42 hours (3 to 6 hours per week*)
Category	:	Required course (MScAIBA, MScDS, MResADS) Elective course (MADES)
Discipline	:	Business
Prerequisite(s)	:	Nil
Co-requisite(s)	:	Nil
Exclusion(s)	:	Nil
Exemption Requirement(s)	:	Nil

Brief Course Description:

Machine learning is a branch and one of the most popular AI techniques in recent years. Machine learning models and techniques have been widely used in many fields, such as natural language understanding, machine vision, and pattern recognition. This course will introduce the concepts, techniques, and business applications of machine learning. The course will cover the supervised, semi-supervised, unsupervised, transfer, and reinforcement learning paradigms. The techniques include regression, probability generative model, logistic regression, neural networks, support vector machine, Q-learning, and so on. The business application examples of these courses will be included and introduced in this course.

Aims:

This course aims to:

1. Introduce students to fundamental theories, concepts, approaches and business applications of machine learning;
2. Equip students with the ability of programming various machine learning models;
3. Enable students to apply appropriate machine learning models to solve problems arise in the business domain;
4. Enable students to present and deliver their machine learning solutions for business problems to different stakeholders.

Learning Outcomes (LOs):

Upon successful completion of this course, students will be able to:

1. Describe and apply supervised learning, semi-supervised, unsupervised learning, and reinforcement learning for problem solving;
2. Discriminate and verify the effectiveness of various machine learning models;
3. Develop and deploy machine learning programmes to solve some real-world business problems;
4. Present machine learning solutions for business problems by using layman language.

Indicative Contents:

1. Machine Learning Introduction

    Basic concepts of machine learning
    Different categories of learning algorithms
    Model evaluation and selection

2. Unsupervised Learning

    The concepts of unsupervised learning
    K-means clustering
    Density-based spatial clustering
    Sparse autoencoder
    Bayesian Networks
    Business application- customer segmentation

3. Supervised Learning

    The concepts of supervised learning
    Probability generative model
    Neural network
    Business application-sales prediction

4. Semi-supervised Learning

    The concepts of semi-supervised learning
    Semi-supervised support vector machines
    Generate semi-supervised models
    Self-training
    Co-training
    Graph theory-based models
    Business application- abnormal detection

5. Transfer Learning

    The concepts of transfer learning
    Instance-based transfer learning
    Feature-representation transfer learning
    Parameter-transfer learning
    Relational-knowledge transfer learning
    Business application- the identity of named entity

6. Reinforcement Learning

    The concepts of reinforcement learning and control

The main framework of Markov decision process and Q-learning
Business application- forest management

7. Integrated Business Cases

Fraud prevention
Content recommendation
Service improvement
Media optimization

Teaching Methods:

There are different teaching and learning activities, including lectures, assignments, and tutorials. The concepts of machine learning and different categories will be discussed in lectures. Students will also learn various supervised learning, unsupervised learning, semi- supervised learning, transfer learning, reinforcement learning, and model selection methods in lectures. The implementations of some learning algorithms in machine learning platforms and tools will be assigned as daily group assignments. Moreover, different machine learning paradigms, machine learning models will be learnt by students through some case studies and simulation, while the machine learning programs and solutions will be learnt in the form of project-based learning and collaborative learning. The detailed elaborations and computations of some learning algorithms will be discussed in tutorials.