Samsung Innovation Campus: Artificial intelligence

Course Objectives

- Understand the foundational math behind data science and machine learning: linear algebra, probability and statistics.
- Be able to do data preprocessing with the Python libraries (NumPy and Pandas) for the execution of optimal machine learning models and data visualization.
- Explore supervised and unsupervised learning and be able to apply the most suitable machine learning algorithm.
- Learn to process textual data to derive high quality information from text and apply new insights to real-world business (NLP)
- Build and train deep neural networks, use the deep learning libraries such as TensorFlow and Keras to gain proficiency, as well as handle various deep learning techniques.

Course Breakdown

✓ Lecture (270hrs.) + Capstone project(80hrs.)

✓ Lecture covers most subject areas in general concepts of each technology.

✓ Focuses on building fundamental capabilities of AI modeling on a concrete foundation of mathematics, including linear algebra, probability and statistics.

✓ Introduces A to Z in Machine Learning tools, from NumPy to Keras, and techniques including CNN and practice with hands-on exercises.

✓ Offers 80 hours of real-world problem-solving experience as a capstone project, handling open-source data with participants' own AI

Course Content	Duration
Chapter 1. Introduction to Artificial Intelligence	4H
- Unit 1. The Concept of Artificial Intelligence	1H
- Unit 2. Applications of Artificial Intelligence	1H
- Unit 3. Techniques in Artificial Intelligence	1H
- Unit 4. Artificial Intelligence: Trends and Markets - Unit 5. Course Roadmap	1H
Chapter 2. Math for Data Science	33H
- Unit 1. Introduction	3H
- Unit 2. Basic Math for Data Science	7H
- Unit 3. Understanding Data Science: Vector	7H
- Unit 4. Understanding Data Science: Matrix	7H
- Unit 5. Understanding Deep Learning: Derivatives	7H
- Quiz	2H
Chapter 3. Exploratory Data Analysis: NumPy Arrays for Optimized Numerical Computation and Pandas	33H
- Unit 1. NumPy Array Data Structure for Optimal Computational Performance	7H
- Unit 2. Optimal Data Exploration Through Pandas	8H
- Unit 3. Pandas Data Preprocessing for Optimal Model Execution	8H
- Unit 4: Data Visualization for Various Data Scales	8H
- Quiz	2H

Chapter 4. Probability and Statistics	33H
- Unit 1. Understanding of Probability	7H
- Unit 2. Understanding of Statistics I	8H
- Unit 3. Understanding of Statistics II	8H
- Unit 4. Statistical Hypothesis Testing	8H
- Quiz	2H
Chapter 5. Machine Learning 1 – Supervised Learning	37H
- Unit 1. Machine Learning Based Data Analysis	4H
- Unit 2. Application of Supervised Learning Model for Numerical Prediction	4H
- Unit 3. Application of Supervised Learning Model for Classification	4H
- Unit 4. Decision Tree	4H
- Unit 5. Naïve Bayes Algorithm	4H
- Unit 6. KNN Algorithm	5H
- Unit 7. SVM Algorithm	5H
- Unit 8. Ensemble Algorithm	5H
- Quiz	2H
Chapter 6. Machine Learning 2 – Unsupervised Learning	33H
- Unit 1. Unsupervised Machine Learning Algorithm	7H
- Unit 2. Hierarchical Clustering	8H
- Unit 3. Non-Hierarchical Clustering	8H
- Unit 4. Linear Factor Model for Dimensionality Reduction	8H
- Quiz	2H
Chapter 7. Natural Language Processing and Language Models for Text Mining	33H
- Unit 1. Text Mining	7H
- Unit 2. Text Preprocessing	8H
- Unit 3. Language Model	8H
- Unit 4. Natural Language Processing with Keras	8H
- Quiz	2H
Chapter 8. Neural Network and Deep Learning	32H
- Unit 1. Basics of Neural Network	10H
- Unit 2. Basics of TensorFlow	10H
- Unit 3. Deep Learning Methods using TensorFlow and Keras	10H
- Quiz	2H
Chapter 9. Various Deep Learning Topics	32H
- Unit 1. CNN Model	10H
- Unit 2. RNN for Sequential Data Modeling	10H
- Unit 3. Generative Adversarial Neural Network to Create Non-Existent Images	10H
- Quiz	2H
Total Class Hours	270H

Course Assessment:

The scoring assessments of the students will follow the below criteria:

Criteria	Weight
Quiz - Quiz will be placed at the end of each chapter - Approximately 5 ~ 10 questions per quiz	40 %
Capstone Project - Project is measured based on the quality of final product, presentation and teamwork	60 %
Participation - Participation is measured by the instructor throughout the course	$+ \alpha$
Total	100%

Certification:

The students will be eligible for a certification when both qualifications below are met.

Qualification	Cut-off Rate
1. Attendance higher than	90 %
2. Total grade for assessment higher than	50 %
▶ Certified when both qualifications are met	-