Samsung Innovation Campus: Artificial intelligence

Course Objectives

- Understand linear algebra, probability and statistics that are the essential math for machine learning
- 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 Contents	Duration
Chapter 1. Introduction to Artificial Intelligence	**4Hrs**
- Unit 1. The Concept of Artificial Intelligence	1Hrs
- Unit 2. Applications of Artificial Intelligence	1Hrs
- Unit 3. Techniques in Artificial Intelligence	1Hrs
- Unit 4. Artificial Intelligence: Trends and Markets	1Hrs
- Unit 5. Course Roadmap	
Chapter 2. Math for Data Science	**33Hrs**
- Unit 1. Introduction	3Hrs
- Unit 2. Basic Math for Data Science	7Hrs
- Unit 3. Understanding Data Science: Vectors	7Hrs
- Unit 4. Understanding Data Science: Matrix	7Hrs
- Unit 5. Understanding Deep Learning: Derivatives	7Hrs
- Quiz	2Hrs
Chapter 3. NumPy Arrays for Optimized Numerical Computation & Pandas for Exploratory Data Analysis	**33Hrs**
- Unit 1. NumPy Array Data Structure for Optimal Computational Performance	7Hrs
- Unit 2. Optimal Data Exploration Through Pandas	8Hrs
- Unit 3. Pandas Data Preprocessing for Optimal Model	8Hrs
- Unit 4: Data Visualization For Various Data Scales	8Hrs
- Quiz	2Hrs

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

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	+α
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	-