110-1 Full Curriculum of Da-Yeh University

Information

Title	Machine Learning in Python for Experiencing AI	Serial No. /ID	2502 /CDC 7279
Required/Credit	Optinal /1	Time/Place	(Tue)8 /
Language	Chinese	Grade Type	Text
Lecturer /Full- or Part-time	Jhien-Shien Chen /Part-time	Graduate Class	Non-graduating Class
School System /Dept /Class, Grade	Bachelor /Liberal Arts Center /Class 2, Grade 6		
Office Hour / Place	n.a.		
Lecturer	n.a.		

Introduction

For the students finishing Mathematics thinking development and applications, the next course for them may be nothing other than encouraging them to find out themes from math-thinking-based daily necessities. To this end, this course uses Python, one of the computer languages, to introduce students to machine learning, that they enter its background base, which is mathematical thinking. Four parts make the content of this course. (1)Tools: Python program and Installation. (2)Module (or Package): Python software resources. (3)Mathematical thinking: machine learning algorithms. (4)What is Artificial Intelligence. Machine learning is a part of Artificial Intelligence, then lecturing their relationship is to stimulate students to prepare their attitude of continuous learning of necessary knowledge for the future workplace. Course goals: (1)Learn Python and the operation of the application network resources. (2)Recognize and practice the supervised and unsupervised learning examples of machine learning to expand the landscape on the application of mathematical thinking. (3)Cultivate an independent and continuous learning attitude.

Outline

I. Tools: Python program and Installation. II. Module (or Package): Python software resources. III. Mathematical thinking: 1. Logistic regression machine learning algorithm (supervised learning); 2. K-nearest neighbors machine learning algorithm (supervised learning); 3. K-means clustering machine learning algorithm (unsupervised learning); 4. Decision tree machine learning algorithm (supervised learning). IV. The idea in Artificial Intelligence. Multilayer perceptron (MLP) of neural network.

Prerequisite

Basic Algebra

Fundamental Ability

Professional Ability

Practical Ability

Teamwork Spirit

Active Learning

Creativity and Innovation

Global Vision

Professional Ethics

Leadership and Management

Confidence and Perseverance

Humanistic Qualities

Teaching Plan

Core Capability	Weight(%) A	Ability index(Performance Indicators)	Teaching Methods	Assessment and Weight	Core Competency Learning Outcomes B	Final Exam Grades C=B*A
Active Learning	50	Consists in helping students actively partake in a variety of learning processes with the aim to achieve self-promotion and self-realization.	Practical Operation (Experiment, Machine Operation Lecturing Film Appreciation	Written Report: 100%	Total: 100	50
Creativity and Innovation	25	Consists in fostering students’ creative and critical thinking skills together with their ability to identify and solve problems in an effective way.	Group Discussion Lecturing Practical Operation (Experiment, Machine Operation Film Appreciation	Homework Assignment: 50% Experiment Operation: 50%	Total: 100	25
Global Vision	25	Consists in broadening students’ global perspectives, fostering their ability to understand both the changes of the global community and the development trends of globalization.	Lecturing Group Discussion Practical Operation (Experiment, Machine Operation Film Appreciation	Midterm Exam: 100%	Total: 100	25

Grade Auditing

Written Report: 50%

Midterm Exam: 25%

Experiment Operation: 12.5%

Homework Assignment: 12.5%

Book Type (Respect intellectual property rights. Please use official textbooks and do not illegally photocopy others' works.)		
Book Type	Book name	Author
Textbook	Python	
Reference Books	PPython+TensorFlow 2.x	
Reference Books	Python　AIoT	

Lesson Plan

Weeks	Content	Teaching Methods
1	(week of preparation) & Intellectual Property Protection (use legitimate textbooks only) & Traffic safety Propaganda	Practical Operation (Experiment, Machine Operation
2	(week of preparation)	Practical Operation (Experiment, Machine Operation
3	(week of preparation)	Practical Operation (Experiment, Machine Operation
4	PM01* Python Installation. 1. Python installation for beginners https://www.youtube.com/watch?v=jUldDuC7Raw; 2. Python Module Install. for beginners (subtitle) https://www.youtube.com/watch?v=VhhOkUBMgz8; 3. Basic statements and program execution; 4. Assignment 1: Using NB or PC, (1) install an interpreter, (2) install modules, (3) execute a program and submit a learning note.	(1st meet on 1012)　Lecturing　Group Discussion　Practical Operation (Experiment, Machine Operation　Film Appreciation
5	PM02* Python resources. 1. Introduction to Machine Learning https://www.youtube.com/watch?v=OZ4vFQZufwg. 2. Pandas. 3. Numpy matrix operations. 4. Pyinstaller executable file. 5. Assignment 2: (1) Please convert the series [23,10,88,76] into the data type of series. Is this a one-dimensional or two-dimensional data type? (2) Please convert the execution result of question (1) into a 2D Data Frame.	(2nd meet on 1019)　Lecturing　Group Discussion　Practical Operation (Experiment, Machine Operation　Film Appreciation

6	PM03* Logistic regression algorithm. 1. Logistic Regression, https://www.youtube.com/watch?v=vtMrtzYrPDI. 2. Sigmoid function. 3. Iris data collection. 4. Data cutting and confusion matrix. 5. Logistic model. 6. Assignment 3: Use all the fields of iris to make a logistic regression model prediction. Standardize the data, the correct rate, mixing matrix, and comprehensive report.	(3rd meet on 1026) Lecturing Group Discussion Practical Operation (Experiment, Machine Operation Film Appreciation
7	PM04* K-Nearest Neighbor KNN algorithm (supervised learning). 1. How kNN algorithm works How kNN algorithm works (+ 4:30) https://www.youtube.com/watch?v=UqYde-LULfs.	(4th meet on 1102) Lecturing Group Discussion Practical Operation (Experiment, Machine Operation Film Appreciation
8	PM05* Machine Learning 3: Mean clustering K means algorithm (unsupervised learning). 1. StatQuest: K-means clustering StatQuest: K-means clustering (+ 8:10) https://www.youtube.com/watch?v=4b5d3muPQmA. 2. Assignment 4: Practice each step of the K-means clustering example in the textbook by yourself, and write a personal skill record write-up.	(5th meet on 1109) Lecturing Group Discussion Practical Operation (Experiment, Machine Operation Film Appreciation
9	PM06* Machine learning exercise plan. 1. Mid-term exam: From textbooks or reference books, each student chooses a data set and drafts a personal plan for machine learning exercises about which machine learning algorithms to use as the subject of the final written report. 2. Group discussion: Students observe each other's machine learning planning matters.	(6th meet on 1116) Lecturing Group Discussion Practical Operation (Experiment, Machine Operation Film Appreciation
10	PM07* Machine Learning 4: Decision Tree Algorithm (Supervised Learning). 3. Decision tree prediction model. 4. Solve the problem of overfitting. 5. Explore the eigenvalues. 6. Drawing of the decision tree. 7. Let's Write a Decision Tree Classifier from Scratch-Machine Learning Recipes # 8 (+ 9:52) https://www.youtube.com/watch?v=LDRbO9a6XPU.	(7th meet on 1123) Lecturing Group Discussion Practical Operation (Experiment, Machine Operation Film Appreciation

11	PM08* Artificial Intelligence Introduction: Neural-like multilayer perceptron model. 1. Artificial neuron: input, output, weight, bias. 2. How do neurons learn regression problems: regression problems, activation function, neural network 3. Neuron learning process: prediction value prediction, label label, Mean Squared Error (MSE) 4. Training: optimizer Optimizer, Backpropagation (BP).	(8th meet on 1130) Lecturing Group Discussion Practical Operation (Experiment, Machine Operation Film Appreciation
12	PM09* Report observations. 1. What is AI, machine learning, and deep learning? https://www.youtube.com/watch?v=voUdAAwk52c. 2. Students observe the results of the written report with each other. 3. The teacher guides the students' program problems and assists in solving the difficulties so that students can finish the written report on time.	(9th meet on 1207) Lecturing Group Discussion Practical Operation (Experiment, Machine Operation Film Appreciation
13	(Students' independent practice)	Group Discussion Practical Operation (Experiment, Machine Operation
14	(Students' independent practice)	Group Discussion Practical Operation (Experiment, Machine Operation
15	(Students' independent practice)	Group Discussion Practical Operation (Experiment, Machine Operation
16	(Students' independent practice)	Group Discussion Practical Operation (Experiment, Machine Operation
17	(Students' independent practice)	Group Discussion Practical Operation (Experiment, Machine Operation
18	(Students' independent practice)	Group Discussion Practical Operation (Experiment, Machine Operation