COURSE DETAIL

ADVANCED DATA SCIENCE
Country Japan
Host Institution Waseda University
Program(s) Waseda University
UCEAP Course Level Upper Division
UCEAP Subject Area(s) Statistics Computer Science
UCEAP Course Number 125
UCEAP Course Suffix
UCEAP Official Title ADVANCED DATA SCIENCE
UCEAP Transcript Title ADV DATA SCIENCE
UCEAP Quarter Units 6.00
UCEAP Semester Units 4.00

Course Description

This is an advanced-level Data Science course, focusing on deep learning, which has witnessed great success over the past decade. Two of the most successful fields of deep learning are image processing and natural language processing.

Some of the most successful applications of deep learning in image processing include object detection, image segmentation, and image classification. In natural language processing, deep learning has been used to develop applications such as machine translation, text classification, automatic summarization and question answering.

The course begins with an overview of deep learning, and a review class for Python and the PyTorch library respectively. Then, the course studies linear algebra and calculus from numerical perspectives. The course also reviews the basics of statistics and information theory for deep learning and the basics of machine learning, including topics like overfitting, supervised and unsupervised learning, and stochastic gradient descent.

The course introduces neural network models using the familiar linear and softmax regression, as well as the concept of multilayer perceptrons and the essential technique of backward propagation. The course also studies various ways to regularize deep neural networks, such as putting norm penalties or allowing dropout, and how to do optimization for training these regularized deep neural networks. The latter half of the course focuses on convolutional neural networks for image processing and recurrent and recursive neural networks for natural language processing. Last, the recent important topic of fine-tuning a pre-trained large language model will also be covered.

Language(s) of Instruction
English

Host Institution Course Number
INFY301L

Host Institution Course Title
ADVANCED DATA SCIENCE

Host Institution Course Details
https://www.wsl.waseda.jp/syllabus/JAA104.php?pKey=210MI417005120232
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Host Institution Campus
Waseda University

Host Institution Faculty

Host Institution Degree

Host Institution Department
SILS - Information Science

Course Last Reviewed
2023-2024

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