B.Sc Data Science II

Introduction to the Lecture

LectureSlide

D. T. McGuiness, Ph.D

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Introduction

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Introduction

- Warning: This is the content only covered by me as this lecture is shared by Peter Kandolf in Tutorials.
- The goal of this lecture is to give you a much deeper understanding of how machine learning algorithms work and work through practical examples.
- In this lecture we will focus on Neural Networks (NN) a type of machine learning algorithm with uncountable amount of applications in industry.
- This lecture is a total of 4 SWS with a total of sixty (60) UE.
- A unit (UE) is defined as 45 min lecture.

Introduction

- For three (3) sessions there will be a self-guided study which will require you to work through the material on your own.
- In these sessions you should focus on two topics: **Ensemble Learning and Random Forests** and **Dimensionality Reduction**. You can either access this content on WebBook or LectureBook which hold the **same** content.
- The next face-to-face session will focus on a recap of these topics along with any questions you may have.
- Afterwards there will be a 15 min long quiz covering these two topics **only**.

Introduction

- Lecture materials and all possible supplements will be present in its Github Repo.
  - You can easily access the link to the web-page from here.

> Github is chosen for easy access to material management and CI/CD capabilities and allowing hosting websites.

- In the lecture content is also distributed as a WebBook which can be accessed from the Repo website.

- The student should be comfortable with working with either Python and should have gained a working knowledge of statistics.

Requirements	Taught Lecture	Code	Degree	Outcome
Python Programming	Software Design	SWD	B.Sc	Programming
Working with IoT	Internet of Things	IOT	B.Sc	Understanding AI/ML
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

Table 1: Distribution of materials across the semester.

Description	Value
Official Name	Machine Learning & Data Science 2
Lecture Code	MLDS2
Module Code	MECH-B-5-MLDS-MLDS2-ILV
Lecture Name	Data Science II
Semester	5
Season	WS
Lecturer	Daniel T. McGuiness, Ph.D
Module Responsible	BnM
Software	Python
SWS Total	4
UE Total	60
ECTS	5
Working Language	English

- The lecture will have one personal assignment, (along with tutorial work), which will be based on applying machine learning principles with programming.
- For the written exam you are allowed to write your own equation reference paper, as long as it is a single sheet of A4, double sided and contains no exercise or solutions.

Assignment Type	Value
Quiz	5
Personal Assignment	35
Final Exam	60
Sum	100

Title
Neural Networks: Methodology and Applications
Python for Data Analysis: Data Wrangling with Pandas, Numpy, and iPython
Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow
TensorFlow for Deep Learning: From Linear Regression To Reinforcement Learning
AI and Machine Learning for Coders
Neural Networks and Deep Learning
Python Machine Learning
Machine Learning with Python Cookbook

Table 2: Lecture sources which can be useful during the course of the lecture. For more information on sources, please consult the repo.

Topic	Units	Self Study
Support Vector Machines	4	8
Decision Trees	4	8
Ensemble Learning and Random Forests	4	8
Dimensionality Reduction	4	8
Unsupervised Learning	4	8
Introduction to Artificial Neural Networks	4	8
Computer Vision using Convolutional Neural Networks	4	8
SUM	28	56