**Artificial Intelligence Applications for Business Administration Students**

Winter 2020 Zoom: 5811404402

Friday at 9:30

Teaching Staff:

Instructor: Dr. Royi Ronen, Tel. 0523803265, [ronen.royi@gmail.com,](mailto:ronen.royi@gmail.com,R)

Office Hours: After the Lecture.

Prerequisites:

Same as requirements of Big Data and Business Intelligence track.

Credits: 2

Study hours per week: 4 hours during a mini-semester

**Course Goals and Description**

The course is intended for MBA students who wish to acquire knowledge on modern uses of artificial intelligence (AI) and machine learning. We start with basic concepts, understand relevant technical tools, especially in the field of machine learning. We then continue to concrete use cases from various domains. Emphasis will be put on understanding entire systems and on up-to-date examples.

**Learning Outcomes**

The student will understand basic concepts in artificial intelligence and machine learning.

The student will know guiding principles of building AI-based systems.

The student will have in depth understanding of a number of popular AI applications.

The student will acquire tools to analyze and design an AI-based system.

**Course Content/Topics**

Introduction to AI. Concepts in machine learning. Application: recommenders. Comparison between different recommenders. Deep learning. Application: media analysis. Concepts in natural language processing. Recent developments in natural language processing. Application: cyber security. Guest lectures. Student presentations. Concluding assignment.

**Assignments and Grading Procedures**

Homework 1 – 15%

Homework 2 – 15%

Homework 3 – 15%

Concluding assignment – 55%

Active participation in class will give up to 10 points credit.

**Course Schedule (Topics, assignments, Exams)**

|  |  |  |
| --- | --- | --- |
| Date | Topic | Lessons, in order |
| 1.1.2021 | Introduction and First Algorithm | 1. Administration. 2. Introduction to Artificial Intelligence 3. First learning algorithm – and the Titanic example 4. Discussion: relationship between machine learning and artificial intelligence, big data and cloud technology. |
| 8.1.2021 | Machine Learning | 1. Supervised and unsupervised learning 2. Classification and regression 3. Evaluation of model performance. In the lab and in production 4. Overfitting, underfitting 5. Examples and comparison: customer churn prediction, facial recognition system 6. Homework No. 1 |
| 15.1.2021 | Recommendation Systems | 1. Motivation and examples that everyone knows 2. Two approaches to recommendation systems, content-based filtering and collaborative filtering. 3. Algorithms for recommendations. Dimension reduction. 4. Systems analysis: Recommendation for movies and recommendation for news articles. 5. Privacy in recommendation systems 6. Homework No. 2 |
| 22.1.2021 | Media analysis (video, audio and text) and deep learning | 1. Video analysis and motivation for cluster algorithms 2. Cluster algorithms and their evaluation – people in video 3. Neuron networks and how they learn 4. Deep learning 5. Deep learning applications 6. End-to-end design of video analysis 7. Homework No. 3 |
| 29.1.2021 | Con’t: media analysis  Cybersecurity | 1. Concepts in natural language processing. 2. Comparison of deep learning with classical learning in the context of natural language 3. Examples for the uses of natural language processing 4. Language models and GPT3. 5. Guest Lecturer – Dr. Tamer Salman, Microsoft. The opportunity and challenges in cyber 6. Concluding assignment |
| 5.2.2021 | Con’t Cybersecurity  Advanced Applications | 1. Examples of common attacks and their ML-based detection 2. Polymorphism of viruses, clustering and LSH 3. Workshop: build a learning system to identify spam 4. Guest lecturer, Dr . Iris Yoster, Bar-Ilan University. About smart cities 5. Artificial Intelligence Uses in CRM – Natural Language |
| 12.2.2021 | Privacy and Ethics | 1. Privacy protection and its impact on artificial intelligence systems. GDPR Regulations 2. Ethics in Artificial Intelligence 3. In-depth lecture on a topic by student’s choice 4. Concluding assignment presentations 5. Conclusions and farewell |

**Course Requirements & Course Policies**

Attendance, homework and concluding assignment are mandatory.

Students skilled in programming will be able to substitute homework with programming tasks.

Since the course is given for the first time, there may be slight changes in schedule.

**Accommodation for Students with special needs**

Students with special needs are kindly requested to contact the lecturer.

**Text book(s) and/or other materials**

[Data Mining – Concepts and Techniques](https://www.amazon.com/Data-Mining-Concepts-Techniques-Management/dp/0123814790)

[Recommender System – An Introduction](https://www.amazon.com/Recommender-Systems-Introduction-Dietmar-Jannach/dp/0521493366/ref=sr_1_14?dchild=1&keywords=Recommender+Systems&qid=1605991133&sr=8-14)

[Machine Learning and Security – Protecting Systems with Data and Algorithms](https://www.amazon.com/Machine-Learning-Security-Protecting-Algorithms-ebook/dp/B079C7LKKY)

**Academic Integrity**

Technion standards apply.

**Other useful information for students**