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DeCAIR

Applied Machine Learning

Course Introduction

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Developing Curricula for Artificial Intelligence and Robotics (DeCAIR)
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Outline

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- Grading
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Basic Information

- **Instructor**: Prof. Gheith Abandah
- **Email**: abandah@ju.edu.jo
- **Office**: CPE 406
- **Home page**: http://www.abandah.com/gheith
- **MS Team**: Link
- **Office hours**: Sun – Thu, 13:00 – 14:00

Learning Methodologies

- **Flipped Classroom**: A type of blended learning, which aims to increase student engagement and learning by having student complete readings at home and work on live problem-solving during class time.
- **Assignment Based Learning**
- **Project Based Learning**

What is Machine Learning?

- YouTube Video from Google Cloud

https://youtu.be/HcqpanDadyQ

Textbooks

1. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow: Concepts: Tools, and Techniques to Build Intelligent Systems, 3rd Edition, O'Reilly Media, Oct 2022.
2. François Chollet, Deep Learning with Python, 2nd Edition, Manning Pub. Oct 2021.
3. Course web page at: https://www.abandah.com/gheith/?page_id=3180

References

4. Alberto Artasanchez, Prateek Joshi, Artificial Intelligence with Python, 2nd Edition, Packt Publishing, Jan 2020.
5. Wes McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython, O'Reilly Media, 3rd Edition, Aug 2022.
6. K. Koutroumbas, S. Theodoridis, Pattern Recognition, 4th ed. Academic Press, Oct 2008.
7. Richard O. Duda, Peter E. Hart and David G. Stork, Pattern Classification, 2nd ed. Wiley Interscience, 2001.

Course Objectives

1. Introduce students to the techniques used in ML including data preparation, training models, regression, classification, neural networks, and deep learning.
2. Introduce students to the practical techniques used in developing ML systems including sample collection, training, and evaluation.
3. Introduce students to the programming techniques and libraries used in ML (Python, Scikit-Learn, Keras, and TensorFlow).
4. Enable the students to gain practical skills in solving wide range of problems using ML techniques.

Program Learning Outcomes (PLO)

1. Analyze and discuss the basic concepts, principles, techniques, and theories in AIR including artificial neural networks, machine learning, data science, industrial and service robots, and intelligent and autonomous robots.
2. Use critical thinking on concepts, principles, and practices related to AIR, and rigorously evaluate tools, techniques, and outcomes using structured arguments based on subject knowledge.
3. Apply the methods and techniques of AIR in the design, analysis, and deployment of AIR solutions and solving practical problems.

Program Learning Outcomes (PLO)

4. Show the ability to produce distinguished research work from problem inception to implementation, and write quantitative and qualitative reports, and deliver them orally and in writing.
5. Demonstrate life-long learning, independent self-learning, and continuous professional development skills, and apply new AIR knowledge.
6. Take responsibility, work effectively within a team, abide by professional ethics and societal values in performing tasks and work, and apply work ethics and professional honor codes.
7. Use practical research methodologies to analyze and investigate issues related to AIR.

Intended Learning Outcomes (ILO)

No	ILO	PLO
1	Demonstrate a sound understanding of the main techniques and algorithms in ML.	1
2	Solve a practical problem by developing an appropriate ML system.	3
3	Communicate the development of a ML system through a detailed technical report.	4
4	Use Python and its specialized libraries to develop programs for solving ML problems.	3

Course Outline

Week	Topic	ILO	Resources
1-2	Introduction to ML	1	1
3-4	Python programming language	4	5
5-6	Data preparation and regression	1, 2, 4	1
7	Classification	1, 2	1
8	Training models	1	1
9	Classical techniques	1, 2	1
10	Unsupervised learning and clustering	1, 2	1
11-12	Neural networks	1, 2	1
13	Deep neural networks	1	1, 2
14	Recurrent neural networks	1, 2	1
14	Reinforcement learning	1, 2	1
14	Recommendation systems	1, 2	4

Grading

Assessment tool	Mark	Topic(s)	Time
Lab Reports	10%	Programming aspects	W2-W14
Midterm exam	30%	Theoretical and practical aspects	W4, W8, W12
Term project report	20%	Practical and reporting aspects	W15
Final exam	40%	All material	W16
Total	**100%**		

Policies

- Attendance is required
- Makeup exams need acceptable absence cause
- Late penalty is 25%
- All submitted work must be yours
- Cheating will not be tolerated
- Open-book exams
- Join the course Microsoft Team at: Link
- Check department announcements at:
  - MSc in AIR Link
  - MSc in CEN https://www.facebook.com/profile.php?id=100087040924274

Important Dates

Tue 27/2/2024	First Lecture
Tue 30/4/2024	Midterm Exam
Tue 7/5/2024	Term project proposal is due
Tue 21/5/2024	Term project report is due
Tue 28/5/2024	Last Lecture
Sun 2/6 – Thu 13/6/2024	Final Exam Period

Machine Learning & Artificial Intelligence

- YouTube Video from CrashCourse

https://youtu.be/z-EtmaFJieY