Course Presentation

Department of Computer Languages and Systems

Contents

- Objectives: what are we trying to achieve?
- Methodology: how are we going to work?
- Contents: what are we going to study?
- Assessment: how will you be evaluated?
- Materials

Objectives

- To identify and explain a generic pattern recognition/machine learning problem
- To know how to apply a set of machine learning processes and methods to real problems
- To analyse a specific problem, evaluate alternative solutions, justify the choice and apply one or more models
- To know how to design experiments correctly and develop an evaluation and validation methodology

Methodology

- Theory classes: fundamental contents are introduced
- Practical classes: study of data set complexities, analysis and solution of practical exercises
- Autonomous work: preparation of practical activities, study for the final exam

Contents
Machine Learning Programme

Contents
Deep Learning Programme

1. Artificial neural networks
2. Convolutional neural networks
3. Regularization
4. Transfer learning
5. Reinforcement learning

Assessment

- Scientific literature review project: 30%
- Reports and memoranda of practices: 30%
- Final theory exam: 40%

The final grade for the course is obtained from the average of the three parts, **requiring a minimum grade of 4.0 in each of them!**

Materials

- Richard O. Duda, Peter E. Hart, David G. Stork (2000) Pattern Classification, 2nd Edition. Wiley.
- Brian D. Ripley (1996) Pattern Recognition and Neural Networks. Cambridge University Press.
- Christopher Bishop (2006). Pattern Recognition and Machine Learning. Spinger.
- Ethem Alpaydin (2010) Introduction to Machine Learning, 2nd Edition. The MIT Press.
- Ludmila I. Kuncheva (2014) Combining Pattern Classifiers: Methods and Algorithms, 2nd Edition. John Wiley & Sons.
- Salvador García, Julián Luengo, Francisco Herrera (2015) Data Preprocessing in Data Mining. Springer.

Materials

- Sebastian Raschka, Yuxi (Hayden) Liu, Vahid Mirjalili (2022) Machine Learning with PyTorch and Scikit-Learn: Develop Machine Learning and Deep Learning Models with Python. Packt Publishing.
- Konstantinos Koutroumbas, Sergios Theodoridis (2008) Pattern Recognition, 4th Edition. Academic Press.
- Ian Goodfellow, Yoshua Bengio, Aaron Courville. Deep Learning (online book), MIT Press, http://www.deeplearningbook.org, 2016.
- Richard S. Sutton, Andrew G. Barto. Reinforcement learning: An introduction. MIT press, 2018.

Materials: Online Resources

- scikit-learn User Guide
- GeeksforGeeks
- Aprendizaje Automático (in Spanish)
- Hands-On Machine Learning with R
- VideoLectures.net
- A Course in Machine Learning
- Python Tutorial With Google Colab (for beginners)
- NumPy quickstart (tutorial for beginners)
- Your First Deep Learning Project in Python with Keras Step-By-Step (Last Updated on August 16, 2022)

Materials: Online Books

- Data Preprocessing in Data Mining
- Neural Networks and Deep Learning
- Combining Pattern Classifiers
- VideoLectures.net
- Understanding Machine Learning: From Theory to Algorithms
- Building Machine Learning Systems with Python
- The Hundred-Page Machine Learning Book
- Foundations of Machine Learning
- Introduction to Machine Learning
- A Brief Introduction to Neural Networks
- Machine Learning, Neural and Statistical Classification
- Neural Networks and Deep Learning (2019)

Where can you find us?

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