Natural language processing with deep learning

Academic Year: (2021 / 2022) **Review date: 29/06/2021 21:51:53**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: SEGURA BEDMAR, ISABEL

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

OBJECTIVES

- Create and train deep neural network architectures (such as Convolutional Neural Networks, Recurrent Neural Networks, LSTMs, Transformers) and apply them to tackle NLP applications such as text classification, machine translations, information extraction, text simplification and text summarization.
- Study, implement and use word embeddings to represents texts.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction
2. NLP basic tasks.
3. Word embeddings.
4. Deep Learning architectures for text classification.
5. Deep Learning architectures for named entity recognition (NER).
6. Deep Learning architectures for relation extraction (RE).
7. Text similarity
8. Deep Learning architectures for text summarization.
9. Deep Learning architectures for machine translation.

LEARNING ACTIVITIES AND METHODOLOGY

The flippled classroom model will be applied:

Each week, the teacher will publish in aulaglobal a Jupyter notebook that describes and contains the implementation of a deep architecture for the resolution of a certain NLP application (for example, the detection of fake news or the anonymization of clinical notes). Students should study and run these notebooks before class.

During class, the teacher will explain the notebook and resolve any possible doubts. Once resolved, the teacher will propose possible improvements and raises new challenges or problems to solve. Students should try to extend or adapt the implementations of notebooks to solve the new challenges posed by the teacher.

The methodology is practical. The classes will have a configuration of work in pairs in a computer room.

Tutoring by appointment is limited to 2 hours per week. These can be online or face to face.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

CONTINUOUS ASSESSMENT. The activities planned during the classes will be valued.

In particular, four lab cases will have to be implemented:
1) Implement and evaluate a deep architecture for text classification (25%).
2) Implement and evaluate a deep architecture for named entity recognition (25%).
3) Implement and evaluate a deep architecture for relation extraction (25%).

% end-of-term-examination/test:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

4) Implement and evaluate a deep architecture for text summarization (25%).

BASIC BIBLIOGRAPHY

- Delip Rao, Brian McMahan Natural Language Processing with PyTorch: Build Intelligent Language Applications Using Deep Learning, o'really, 2019

- Delip Rao, Brian McMahan Natural Language Processing with PyTorch: Build Intelligent Language Applications Using Deep Learning, o'really, 2019

- Li Deng (Redactor), Yang Liu (Redactor) Deep Learning in Natural Language Processing, SPRINGER, 2018

- Palash Goyal, Sumit Pandey, Karan Jain Deep Learning for Natural Language Processing: Creating Neural Networks with Python, APRESS, 2018

- Edward Loper, Steven Bird, Ewan Klein Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit, 0'REALLY, 2009

ADDITIONAL BIBLIOGRAPHY

- Amandeep Implement NLP use-cases using BERT: Explore the Implementation of NLP Tasks Using the Deep Learning Framework and Python, bpb, 2021

BASIC ELECTRONIC RESOURCES

- Isabel Segura Bedmar . Repositorio de implementaciones para aplicaciones de PLN: http://github.com/isegura/