

LLM PROGRAMME

AI IN LEGAL PRACTICE AND ITS REGULATION

Curricular unit

Basics of AI

Responsible Academic staff and respective workload in the curricular unit

Sofia Pinto/Ricardo Ribeiro/Martim Zanatti

Syllabus

❖ **Slot 1 - NLP - Natural Language Processing** (Ricardo Ribeiro)

➤ Introduction to Natural Language Processing

- Real NLP applications
- Well-known tasks and modules
- Types of knowledge about the language
- Ambiguity
- Processing models

➤ Words

- Morphology
- Language models
- Part-of-Speech

➤ Parsing

- Syntax
- Syntactic structure
- Context Free Grammars (CFG)
- Parsing algorithms

➤ Semantics

- Introduction to semantics
- Relations between words and their meanings

- Available resources
- The WordSpace model
- Embeddings
- Tools
- ❖ **Slot 2 - NLP - Applications in Law** (Ricardo Ribeiro)
- Information extraction
 - Named entity recognition and anonymization
 - Relation extraction
 - Open information extraction
- Text classification
 - Sentiment analysis
 - Prediction of the outcome of legal cases
- Topic modelling
 - Linear Algebra-based vs Probabilistic-based approaches
 - Clustering
- Summarization
- ❖ **Slot 3 Other areas of AI** (Sofia Pinto)
- Intelligent Agents
 - Main concepts and areas of application
- Search
 - Main concepts and main types, and areas of application
 - Uninformed search (breadth-first, depth-first)
 - Informed search (best-first, a*)
 - Adversarial search (min-max, optimised via alpha-beta pruning)
- Knowledge Representation & Reasoning

- Main concepts
- Successful KBS (medical diagnosis, configuration, music, etc)
- Difficulties and Limitations of AI
 - Accountability (who to sue when a program fails?)
 - Explainability (at the human level)
 - Bias (propagating injustices)
 - Creativity (how to go outside the "usual stuff", for instance Genetic Programming)
- ❖ **Slot 4:**
 - Real world applications. Exploring existing real projects for the legal domain (segmentation, classification, summarization, entity recognition) (Sofia Pinto/Ricardo Ribeiro)
 - Tutorial (I+II+III): Hands-on Project for evaluation (Martim Zanatti)

Teaching methodologies (including evaluation)

Main Bibliography

1. Speech and Language Processing (3rd ed. draft), Dan Jurafsky and James H. Martin (2022, <https://web.stanford.edu/~jurafsky/slp3/>);
2. Artificial Intelligence, A Modern Approach, Norvig & Russell 4thEdition (2020);
3. A set of Articles to be referenced.