

## INTENSIVE POSTGRADUATE 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)

#### 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