Cancer, Ageing and Rejuvenation Graduate School - CARe

Master's Program

2023 - 2024

Title of the Teaching Unit (UE): Introduction to AI (Artificial Intelligence)		
Semester: 10	**Number of ECTS: 3**	**Hourly volume: Lecture (22h) ; Practicals (8h)**
Teaching Team	R. VanRullen	
Objective	To familiarize students with the history of AI, and its recent developments. Expose them to state-of-the-art methods in various domains (image, text processing). Give them pointers to use and apply modern software and deep learning frameworks.	
Content	➢ Symbolic AI : history and foundations (2h - IRIT : Emiliano Lorini) • Introduction : symbolic AI vs subsymbolic AI • Chronological view of symbolic AI • Formal methods for symbolic AI • Logic-based modeling in AI • Integration of symbolic and subsymbolic approaches… ➢ Neural networks : history and foundations (1h cours + 1h TP - VanRullen chair/PhD/post-doc) • History of neural networks • Artificial neurons - Perceptrons • Multi-layer perceptrons (MLPs), CNNs and RNNs • Objective functions, Gradient descent and Back-propagation • Loss functions, optimization, regularization and hyperparameters ➢ Deep learning in Computer Vision (6h cours + 2h30 TP - VanRullen or Serre chairs/PhD/post-doc) • Image classification • Object detection, semantic segmentation, U-nets • Zero-shot and few-shot learning • Self-supervised and unsupervised learning, auto-encoders, GANs • Visual reasoning ➢ Natural Language Processing (NLP) (4h cours + 2h TP - IRIT : Chloe Braud, ANITI : Romain Bielawski) • Word embeddings • LSTMs and recurrent neural networks for NLP • Neural machine translation • Transformers • Deep learning for sound processing, speech recognition (1h cours + 1h TP - IRIT : Thomas Pellegrini) • Deep Learning and predictive medicine (4h, Paul Monsarrat) • Machine learning and data mining, oral medicine as an example.	
Assessment	Project	
Pre-requisites	Basic knowledge of Python programming	
Keywords	AI, deep learning, neural networks	