CODE xxx Neural network modelling AI for Health Applications

Credits:	**3 ECTS**
Semester:	**1**
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Content of the Course Unit

The main goal of this course is to describe the origins and basic principles of neural network modeling, from the pioneer work of Frank Rosenblatt to the advent of Convolutional Neural Networks. The course present an historical view of this (largely) unknown conception of artificial intelligence as well as the understanding of the basic principles of neural network modelling : transfer functions, synaptic weights modifications, non-linear problems, convolutional and pooling layers, advantages of parallel and distributed systems, etc.

Detailed program

The program is organised as follow:
- The origin of neural network modelling and cognitive sciences.
- The Perceptron and the concept of non-linear problems.
- Transfer functions and synaptic weight modifications.
- Back-propagation algorithm and iterative training rules.
- From the Multi-Layer Perceptron to Deep Neural Networks and Spiking Neural Networks.
- The ground-breaking perspectives of parallel & distributed neural systems.
- Exploring the "Black Box".
- Beyond Deep Learning: Perspectives for more resilient and efficient neural network algorithms.
- Beyond the Turing-Von Neumann bottleneck: Perspectives for Edge-AI and Neural processor Units.
- Toward Self-Consciousness in Artificial Neural Networks?

Competencies acquired for MIAI Label

Competencies	Novice	Intermediate	Advanced
1 - Select and use the right tools for structuring, exploring, researching, storing, and using data	X		
1.1 - By collecting and consolidating, explaining the data for decision-making assistance (business intelligence)		X	
1.2 - Knowing the sources and the data acquisition to train a model	X		
1.3 - By assessing the ethical and regulatory impacts linked to the data and their use			
2 - Know and apply learning and symbolic AI technologies	X		

2.1 - Knowing the main models and tools (their context and application conditions, their inputs and outputs)		X	
2.2 - By modeling a customer or application problem and identifying the use of AI to solve it	X		
3 - Identify, explore and model AI technologies on real applications	X		
3.1 - By having the ability to interact with specialists in the field to identify the problem and specify the needs	X		
3.2 - By understanding the AI architecture dedicated to an application and by making it evolve so that it matches business or customer needs: data (collection, storage, management); learning; decision making; analysis and model relevance.	X		
3.3 - By knowing and mastering the management of an AI project in a company	X		
3.4 - Using AI to transform the company and its management			

Organisation
3 ECTS - 12 modules (lectures provided by Martial Mermillod)

Rules of validation
Final exam (100%)-Online forum (depending on the plateform)