Artificial Intelligence: Challenges and Tools

Seminar of 2 days - 14h
Ref.: IAO - Price 2025: CHF2 140 (excl. taxes)

This seminar introduces the main approaches to artificial intelligence, with a strong focus on machine learning and, in particular, neural networks. You will explore how the leading market solutions are applied to solve various problems: learning, classification, forecasting, and more.

EDUCATIONAL OBJECTIVES

At the end of the training, the trainee will be able to:

Understand what machine learning and deep learning tools are, along with their potentials and limitations.

Gain an up-to-date overview of the state of the art in these fields.

Recognize and comprehend the applications of these techniques across different industrial sectors.

Master the methodologies and tools specific to artificial intelligence projects.

Address the legal and ethical issues associated with AI.

Identify the potential benefits for each role, activity, or business sector.

PARTICIPANTS

Anyone interested in understanding the application areas and benefits of artificial intelligence: executives, CIOs, project managers, developers, architects, etc.

PREREQUISITES

Solid knowledge of digital project management. Experience required.

TRAINER QUALIFICATIONS

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

ASSESSMENT TERMS

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

TEACHING AIDS AND TECHNICAL RESOURCES

• The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.
• At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.
• A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

TERMS AND DEADLINES

Registration must be completed 24 hours before the start of the training.

ACCESSIBILITY FOR PEOPLE WITH DISABILITIES

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@ORSYS.fr to review your request and its feasibility.

THE PROGRAMME

last updated: 02/2025

1) What is Artificial Intelligence (up to Neural Networks)?

- The myth of artificial intelligence versus today's reality.
- Intellectual tasks versus algorithms.
- Types of actions: classification, regression, clustering, density estimation, dimensionality reduction.
- Collective intelligence: aggregating shared knowledge from numerous virtual agents.
- Genetic algorithms: evolving a population of virtual agents through selection.
- Machine learning: an overview and key algorithms (XGBoost, Random Forest).

2) Neural Networks and Deep Learning

- What is a neural network?
- What does it mean for a neural network to learn? Deep vs. shallow networks, overfitting, underfitting, convergence.
- Understanding a function through a neural network: presentation and examples.
- Generation of internal representations within a neural network.
- Generalization of a neural network's results.
- The deep learning revolution: the generality of tools and challenges.

Demonstration : Presentation of a classification algorithm and its limitations.

3) Applications of Deep Learning

- Data classification: various scenarios including raw data, images, audio, text, etc.
- The challenges of data classification and the decisions involved in choosing a classification model.
- Classification tools: using Multilayer Perceptrons or Convolutional Neural Networks in machine learning.
- Forecasting and sequential/temporal data: challenges and limitations of information prediction.

- Structural rules within data that can enable predictive logic; common forecasting tools.
- Data transformation/generation: reinterpretation operations such as denoising, image segmentation…
- Transformation within the same format: translating text from one language to another.
- Generation of “original” data: neural style transfer, generating images from textual descriptions.
- Reinforcement learning: controlling an environment.
- Experience replay and training neural networks on video games.

Demonstration : Classification of medical images, forecasting images in a video sequence, and controlling numerical simulations.

4) What Problems Can Be Solved with Machine/Deep Learning?

- Data conditions: volume, dimensionality, class balance, description.
- Raw data versus engineered features: making the right choice.
- Machine learning versus deep learning: using traditional ML algorithms or neural networks.
- Defining the problem: Unsupervised Learning versus Supervised Learning.
- Assessing the solution: understanding the gap between an assertion and the output of an algorithm.

Case study : Evaluating a problem that can be addressed with AI.

5) Preparing a Dataset

- Defining a dataset and distinguishing it from a traditional database (DB).
- Storing and monitoring data: controlling biases, cleaning/converting while allowing for iterative improvements.
- Understanding the data: using statistical tools to analyze data distribution and representation.
- Formatting data: deciding on input and output formats, linking them to the problem definition.
- Preparing the data: defining the Training Set, Validation Set, and Test Set.
- Establishing a framework to ensure that the algorithms used are truly relevant (or not).

Storyboarding workshops. : Defining a dataset and distinguishing it from a traditional database (DB).

6) Searching for the Optimal Solution

- Methodologies for progressing towards the best solution for an ML/DL problem.
- Choosing a research direction, locating similar publications or existing projects.
- Iterating from the simplest algorithms to the most complex architectures.
- Maintaining a comprehensive benchmarking framework.
- Achieving an optimal solution.

Case study : Grouping and balancing a range of solutions to achieve the optimal outcome.

7) The Tools

- What tools are available today?
- Which tools are best suited for research versus industrial applications?
- From Keras/Lasagne to Caffe, Torch, Theano, TensorFlow, Apache Spark, or Hadoop.
- Industrializing a neural network by strictly managing its process and ensuring continuous monitoring.
- Implementing successive retraining sessions to keep a network current and optimal.
- Training users to understand the neural network.

Demonstration : Implementation of successive retraining sessions.

DATES

Contact us