Advanced AI for Data Analysis

ÉCOLE POLYTECHNIQUE
EXECUTIVE EDUCATION

Advanced AI for Data Analysis

The volume of data generated on the Internet is growing exponentially. Incredible amounts of unstructured data such as texts, images, time series, are available, all being produced at an overwhelming pace. In recent years, the availability of very high processing power (i.e., GPU's), combined with industrial interest, has given rise to new impressive AI methods, such as deep and reinforcement learning, which allow to extract significant information from large scale data in a very short time, solving highly complex problems and opening new perspectives. The Advanced AI Program is designed to provide deep insights on these new methods and their applications to massive and highly heterogeneous data. Important applications of these methods include marketing, gaming, recommendation systems, text mining, neuro-linguisting programming, social networks, fraud detection, image and video recognition, etc.

Target

Technical engineers, project managers, researcher and quantitative scientists.

Requirements: Skills and knowledge in data science (mathematics and machine learning) and programming (Python).

Objectives

This Program offers a comprehensive in-depth experience, with hands-on and presentation of the state-of-the-art AI techniques for large-scale data. The course covers deep learning for text, graph and time series mining; NLP; influence maximization; and recommendation algorithms.

Competencies

› Acquire skills on recent machine learning methods
› Master machine/deep learning tools and methodologies
   to address problems in text mining and NLP
› Master machine/deep learning methods for graphs:
   link prediction, graph/node classification
› Master AI algorithms to develop online marketing, fraud detection
   and knowledge extraction algorithms from web data
› Integrate technical possibilities and ecosystem issues to characterize
   a data science-based project (massive data)
› Analyze the opportunities, challenges and impacts associated
   with the use of data

Program

ADMISSION

INTRODUCTION TO DATA MODALITIES AND LEGAL ASPECTS
Consumer analysis • Commercial offers • Client behaviour • Influencers • Legal aspects

DATA SCIENCE TOOLS - BIG DATA CONTEXT
Data base • Spark • Hadoop
Data science project pipeline • Exploration
Feature selection • Preprocessing
Dimensionality reduction

DEEP LEARNING
Introduction to advanced deep learning • Optimization of DL architectures • Attention based architectures • Transformers • Autoencoders for unsupervised learning

AI FOR TEXT MINING AND NLP
Architecture of web search engines • Advanced Machine learning for text and NLP • Deep learning methods for NLP • Word and Word/document and contextual word embeddings (ELMO, BIRT) • Automated summarization • Entity recognition • Chatbots

AI FOR GRAPHS AND TIME SERIES
Node/graph embeddings • Graph kernels • Graph neural networks • Graph autoencoders • Deep sets

INFLUENCE MAXIMIZATION FOR SOCIAL/ COLLABORATION GRAPHS
SIR/SIS • Greedy algorithms • IMM (influence maximization via martingales) • Stop and stare kai SKIM • Graph degeneracy based methods (D-core, RCG)

RECOMMENDATION ALGORITHMS
Factorization machines • NMF • Neural Collaborative Filtering • Deep Factorization Machines Autoencoder based • Randomized SVD and SVD++.

DATA CHALLENGE
Potential topics: Opinion mining • Product recommendation • Link prediction • Chatbots…

CERTIFICATION

Faculty director
MICHALIS VAZIRGIANNIS
École Polytechnique, Computer Science Department (DIX)

Certification
École Polytechnique Executive Education
Lead a data science project using advanced AI tools

Application process
CV + cover letter

Duration
11 days + certification

Language
English

Location
École Polytechnique Executive Education, Palaiseau (available for corporate programs)

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