Dauphine | PSL
UNIVERSITÉ PARIS

Artificial Intelligence for finance

ECTS : 3

Description du contenu de l'enseignement :

Course Description

This course introduces Generative AI (Gen AI) through its main models, algorithms and applications, then explores its applications in the financial sector.

The Gen AI architectures and frameworks that will studied are Transformers, Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs).

Large Language Models (LLMs) being the most popular generative model in Gen AI, they will be introduced and deeply analyzed.

By the end of this course, students will have a good understanding of these architectures, frameworks, and models, and be able to use them to solve real-world financial problems.

Session 1: An Introduction to Generative AI

- **Topics**:
  - An overview of Generative AI (Definitions, models, applications).
  - Neural architectures for Generative AI : from Recurrent neural networks to Transformers (RNN àLSTM & GRU à Encoder-Decoder à Attention mechanism à Transformers).

Session 2: Large Model Languages (LLMs)

- **Topics**:
  - What is a generative model?
  - What is a language model?
  - From statistical to neural LMs.
  - Training in LLMs.
  - Important examples of LLMs: Bert, GPT, LLMA.

Session 3: Regulatory Compliance, Risk Management, Fraud Detection and Reporting

- **Objective:** Understand the application of generative AI in ensuring regulatory compliance and automating reporting tasks.
- **Topics Covered:**
  - AI-driven automation of regulatory reporting
  - Anomaly detection using AI and LLMs
  - Interpretation of complex legal texts and regulations using LLMs
  - Compliance monitoring and auditing with AI

Session 4: Financial Forecasting, Economic Modeling and Portfolio Management

- **Objective:** Explore the use of generative AI for economic modeling and financial forecasting.

Session 5: ESG Sentiment Analysis and Market Research

- **Objective:** Delve into how LLMs are used for ESG sentiment analysis and market research to inform financial decisions.

Session 6: Final Project and Case Studies

- **Objective:** Apply knowledge through a final project and review case studies of AI applications in finance.

Conclusion:

- **Recap:** Overview of the applications covered and potential future developments.
- **Discussion:** Ethical and practical considerations in the deployment of AI in

Compétence à acquérir :

Course Objectives

- Understand the theoretical foundations of generative AI models.
- Apply generative models to financial data analysis and prediction.
- Evaluate ethical considerations and challenges of AI in finance.

Mode de contrôle des connaissances :

A comprehensive project applying Gen AI to a financial problem.

Bibliographie, lectures recommandées :

1. "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville
2. " GANs in Action: Deep learning with Generative Adversarial Networks " by Jakub Langr and Vladimir Bok
3. "Reinforcement Learning: An Introduction" by Richard S. Sutton and Andrew G. Barto
4. G. Neubig, Neural Machine Translation and Sequence-to-sequence Models : A Tutorial (2017). arXiv: 1703.01619. https://doi.org/10.48550/arXiv.1703.01619
5. A. Graves, Generating Sequences With Recurrent Neural Networks (2014). arXiv: 1308.0850. https://doi.org/10.48550/arXiv.1308.0850
6. Understanding VAE: https://towardsdatascience.com/understanding-variational-autoencoders-vaes-f70510919f73
7. Understanding Attention in Deep Learning https://towardsdatascience.com/attaining-attention-in-deep-learning-a712f93bdb1e
8. Transformers: https://towardsdatascience.com/transformers-89034557de14.
9. Selected research articles and case studies