Artificial Intelligence for Investment Analysis

(Course Orientation on Artificial Intelligence for Investment Analysis)

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http://mail.tku.edu.tw/myday/
2018-09-13
Artificial Intelligence for Investment Analysis
• 課程名稱：人工智慧投資分析 (Artificial Intelligence for Investment Analysis)

• 授課教師：戴敏育 (Min-Yuh Day)

• 開課系級：資管所碩專班 (TLMXJ1A)

• 開課資料：選修 單學期 3 學分 (3 Credits, Elective)

• 上課時間：週五 12,13,14 (Thu 19:20-22:10)

• 上課教室：D503 (淡江大學台北校園)
淡江大學
資訊管理學系
資訊技術
管理思維
淡江大學資訊管理系(所)教育目標

• 培育能整合資訊技術、管理技能及具有解決問題能力的高等資訊管理實務人才。
淡江大學資訊管理系(所)核心能力

• A. 現代管理知識應用。
• B. 邏輯思考。
• C. 關鍵分析。
• D. 結合資訊技術與管理。
• E. 研究與創新。
• F. 資料分析與應用。
• G. 資通安全管理。
• H. 言辭與文字表達。
課程簡介

本課程介紹人工智慧投資分析基本概念與研究議題

課程內容包括

- AI 金融科技: 金融服務創新應用
- 機器人理財顧問與AI交談機器人
- 投資心理學與行為財務學
- 財務金融事件研究法
- Python AI投資分析基礎
- Pandas量化投資分析
- Python Scikit-Learn 機器學習
- TensorFlow 深度學習財務時序序列預測
- 投資組合最佳化與程式交易
- 自然語言處理
- 人工智慧投資分析個案研究
Course Introduction

This course introduces the fundamental concepts and research issues of artificial intelligence for investment analysis.

Topics include

- AI in FinTech: Financial Services Innovation and Application
- Robo-Advisors and AI Chatbots
- Investing Psychology and Behavioral Finance
- Event Studies in Finance
- Foundations of AI Investment Analysis in Python
- Quantitative Investing with Pandas in Python
- Machine Learning with Scikit-Learn In Python
- Deep Learning for Financial Time Series Forecasting with TensorFlow
- Case Study on Artificial Intelligence for Investment Analysis
課程目標
(Objective)

• 瞭解及應用人工智慧投資分析基本概念與研究議題。
  (Understand and apply the fundamental concepts and research issues of Artificial Intelligence for Investment Analysis.)

• 進行人工智慧投資分析相關之資訊管理研究。
  (Conduct information systems research in the context of Artificial Intelligence for Investment Analysis.)
<table>
<thead>
<tr>
<th>週次 (Week)</th>
<th>日期 (Date)</th>
<th>內容 (Subject/Topics)</th>
</tr>
</thead>
</table>
| 1         | 2018/09/13 | 人工智能投資分析課程介紹  
(Course Orientation on Artificial Intelligence for Investment Analysis) |
| 2         | 2018/09/20 | AI 金融科技: 金融服務創新應用  
(AI in FinTech: Financial Services Innovation and Application) |
| 3         | 2018/09/27 | 機器人理財顧問與AI交談機器人  
(Robo-Advisors and AI Chatbots) |
| 4         | 2018/10/04 | 投資心理學與行為財務學  
(Investing Psychology and Behavioral Finance) |
| 5         | 2018/10/11 | 財務金融事件研究法 (Event Studies in Finance) |
| 6         | 2018/10/18 | 人工智能投資分析個案研究 I  
(Case Study on Artificial Intelligence for Investment Analysis I) |
課程大綱 (Syllabus)

週次 (Week) 日期 (Date) 內容 (Subject/Topics)
7 2018/10/25 Python AI投資分析基礎
   (Foundations of AI Investment Analysis in Python)
8 2018/11/01 Python Pandas量化投資分析
   (Quantitative Investing with Pandas in Python)
9 2018/11/08 Python Scikit-Learn 機器學習
   (Machine Learning with Scikit-Learn In Python)
10 2018/11/15 期中報告 (Midterm Project Report)
11 2018/11/22 TensorFlow 深度學習財務時間序列預測 I
   (Deep Learning for Financial Time Series Forecasting with TensorFlow I)
12 2018/11/29 TensorFlow 深度學習財務時間序列預測 II
   (Deep Learning for Financial Time Series Forecasting with TensorFlow II)
<table>
<thead>
<tr>
<th>週次 (Week)</th>
<th>日期 (Date)</th>
<th>內容 (Subject/Topics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>2018/12/06</td>
<td>人工智慧投資分析個案研究 II (Case Study on Artificial Intelligence for Investment Analysis II)</td>
</tr>
<tr>
<td>15</td>
<td>2018/12/20</td>
<td>投資組合最佳化與程式交易 (Portfolio Optimization and Algorithmic Trading)</td>
</tr>
<tr>
<td>16</td>
<td>2018/12/27</td>
<td>自然語言處理 (Natural Language Processing)</td>
</tr>
<tr>
<td>17</td>
<td>2019/01/03</td>
<td>期末報告 I (Final Project Presentation I)</td>
</tr>
<tr>
<td>18</td>
<td>2019/01/10</td>
<td>期末報告 II (Final Project Presentation II)</td>
</tr>
</tbody>
</table>
教學方法與評量方法

• 教學方法
  - 講述、討論、賞析、模擬、問題解決、實作

• 評量方法
  - 實作、報告、上課表現
教材課本

- 講義 (Slides)
- 人工智慧投資分析相關個案與論文
  (Cases and Papers related to Artificial Intelligence for Investment Analysis)


作业与学期成绩计算方式

- 作业篇数
  - 3篇

- 学期成绩计算方式
  - 期中评分：30%
  - 期末评分：30%
  - 其他（课堂参与及报告讨论表现）：40%
AI and Big Data Analytics in Finance

• 金融科技 (Spring 2017) (EMBA IMTKU)
  – (Financial Technology, FinTech)

• 財務金融大數據分析 (Fall 2017) (EMBA IMTKU)
  – Big Data Analytics in Finance

• 人工智慧投資分析 (Fall 2018) (EMBA IMTKU)
  – Artificial Intelligence for Investment Analysis

• 人工智慧與財務應用
  – Artificial Intelligence and Financial Application

• 投資大數據分析
  – Big Data Analytics in Investment
Paolo Sironi (2016)

FinTech Innovation:
From Robo-Advisors to Goal Based Investing and Gamification,
Wiley
Doron Kliger and Gregory Gurevich (2014),
Palgrave Macmillan

沈中華、李建然 (2000),
事件研究法：財務與會計實證研究必備

Source: 沈中華、李建然 (2000), 事件研究法：財務與會計實證研究必備，華泰文化
Yves Hilpisch (2014),
Python for Finance: Analyze Big Financial Data, O'Reilly

Source: http://www.amazon.com/Python-Finance-Analyze-Financial-Data/dp/1491945281
Yves Hilpisch (2015), Derivatives Analytics with Python: Data Analysis, Models, Simulation, Calibration and Hedging, Wiley

Yuxing Yan (2017),
Python for Finance: Apply powerful finance models and quantitative analysis with Python,

Source: https://www.amazon.com/Python-Finance-powerful-quantitative-analysis/dp/1787125696
Wes McKinney (2012), *Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython*, O'Reilly Media

Michael Heydt (2015), Mastering Pandas for Finance, Packt Publishing

Source: http://www.amazon.com/Mastering-Pandas-Finance-Michael-Heydt/dp/1783985100
Robert Layton (2017),
Learning Data Mining with Python - Second Edition,
Packt Publishing
Frank Kane (2017),
Hands-On Data Science and Python Machine Learning: Perform data mining and machine learning efficiently using Python and Spark,
Packt Publishing

Aurélien Géron (2017),

Google Colab

Welcome to Colaboratory!

Colaboratory is a free Jupyter notebook environment that requires no setup and runs entirely in the cloud. See our FAQ for more info.

Getting Started

- [Overview of Colaboratory](#)
- [Loading and saving data: Local files, Drive, Sheets, Google Cloud Storage](#)
- [Importing libraries and installing dependencies](#)
- [Using Google Cloud BigQuery](#)
- [Forms, Charts, Markdown, & Widgets](#)
- [TensorFlow with GPU](#)
- [Machine Learning Crash Course: Intro to Pandas & First Steps with TensorFlow](#)

Highlighted Features

Seedbank

Looking for Colab notebooks to learn from? Check out [Seedbank](#), a place to discover interactive machine learning examples.

TensorFlow execution

Colaboratory allows you to execute TensorFlow code in your browser with a single click. The example below adds two matrices.

$$\begin{bmatrix} 1 & 1 & 1 \end{bmatrix} + \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} = \begin{bmatrix} 2 & 3 & 4 \end{bmatrix}$$

[https://colab.research.google.com/notebooks/welcome.ipynb](https://colab.research.google.com/notebooks/welcome.ipynb)
FinTech
Financial Technology
FinTech
Financial Technology
FinTech

“providing financial services by making use of software and modern technology”

Source: https://www.fintechweekly.com/fintech-definition
Financial Services
Financial Services

Source: http://www.crackitt.com/7-reasons-why-your-fintech-startup-needs-visual-marketing/
Financial Revolution with Fintech

A financial services revolution
Consumer Trends

1. Simplification
2. Transparency
3. Analytics
4. Reduced Friction

Source: http://www.hedgethink.com/fintech/european-fintech-top-100/
FinTech: Financial Services Innovation

1. Payments
2. Insurance
3. Deposits & Lending
4. Capital Raising
5. Investment Management
6. Market Provisioning

Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf
FinTech: Financial Services Innovation

<table>
<thead>
<tr>
<th>功能</th>
<th>創新項目</th>
</tr>
</thead>
<tbody>
<tr>
<td>支付 Payments</td>
<td>無現金世界 (Cashless World) 新興支付 (Emerging Payment Rails)</td>
</tr>
<tr>
<td>保險 Insurance</td>
<td>價值鏈裂解 (Insurance Disaggregation) 保險串接裝置 (Connected Insurance)</td>
</tr>
<tr>
<td>存貸 Deposit &amp; Lending</td>
<td>替代管道 (Alternative Lending) 通路偏好移轉 (Shifting Customer Preferences)</td>
</tr>
<tr>
<td>籌資 Capital Raising</td>
<td>群眾募資 (Crowdfunding)</td>
</tr>
<tr>
<td>投資管理 Investment Management</td>
<td>賦權投資者 (Empowered Investors) 流程外部化 (Process Externalisation)</td>
</tr>
<tr>
<td>市場資訊供應 Market Provisioning</td>
<td>機器革命 (Smarter, Faster Machines) 新興平台 (New Market Platforms)</td>
</tr>
</tbody>
</table>

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/
FinTech: Payment

Source: http://www3.weforum.org/docs/WEF_The_future_of_financial_services.pdf
FinTech: Payment
Cashless World
Emerging Payment Rails

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/
FinTech: Insurance

Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf
FinTech: Insurance

Insurance Disaggregation

Connected Insurance

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/
FinTech: Deposits & Lending

Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf
3 FinTech: Deposits & Lending
Alternative Lending
Shifting Customer Preferences
FinTech: Capital Raising

Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf
4 FinTech: Capital Raising Crowdfunding

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/
FinTech: Investment Management

Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf
FinTech: Investment Management Empowered Investors
Process Externalization

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/
FinTech: Market Provisioning

Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf
FinTech: Market Provisioning
Smarter, Faster Machines
New Market Platforms
Artificial Intelligence and Deep Learning for Fintech
From Algorithmic Trading to Personal Finance Bots: 41 Startups Bringing AI to Fintech

Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/
From Algorithmic Trading To Personal Finance Bots: 41 Startups Bringing AI To Fintech

AI in Fintech

41 Startups Bringing Artificial Intelligence To Fintech

General Purpose/Predictive Analytics
AYASDI
KENSHEL
DataRobot

Quantitative Trading
sentient technologies
turi

AI Assistants/Bots
KASIST
Penny

Credit Scoring
TypeScore
ZestFinance

Market Research & Sentiment Analysis
Digital Reasoning
cortical.io
Numenta

Blockchain
Skry

Personal Banking
Personetics

Search Engine
alphasense

Debt Collection
feedzai

Fraud Detection
Biometrics

CBINSIGHTS
www.cbinsights.com

Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/
Artificial Intelligence (AI) in Fintech

General Purpose/ Predictive Analytics

AYASDI  
Digital Reasoning  
context relevant  
H₂O  
Kensho  
cortical.io  
Numenta  
DataRobot  
nervana SYSTEMS

Market Research & Sentiment Analysis

indico  
acuity TRADING  
Lucena Quantitative Analytics  
NUMERAI  
Dataminr™

Search Engine

alphasense

Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/
Artificial Intelligence (AI) in Fintech

Quantitative Trading
- Sentient Technologies
- Clone Algo
- Alpaca
- Walnut Algorithms

AI Assistants/Bots
- KASIST
- TRIM
- Penny
- Insurify
- SURE.

Credit Scoring
- TypeScore
- Aire
- CreditVidya
- Zest Finance
- ADF
- Applied Data Finance
- Wecash
- Cream Finance

Blockchain
- Skry
- Euclid

Debt Collection
- TrueAccord

Fraud Detection
- Feedzai
- Biocatch

Personal Banking
- Personetics
- SBDA Group

Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/
Wealthfront Robo Advisor

Source: https://www.wealthfront.com/
Financial Technology,
FinTech
財務金融大數據分析

Big Data Analytics in Finance
Artificial Intelligence for Investment Analysis
Artificial Intelligence and Financial Application
Big Data Analytics in Investment
Summary

• This course introduces the fundamental concepts and research issues of artificial intelligence for investment analysis.

• Topics include
  – AI in FinTech: Financial Services Innovation and Application
  – Robo-Advisors and AI Chatbots
  – Investing Psychology and Behavioral Finance
  – Event Studies in Finance
  – Foundations of AI Investment Analysis in Python
  – Quantitative Investing with Pandas in Python
  – Machine Learning with Scikit-Learn In Python
  – Deep Learning for Financial Time Series Forecasting with TensorFlow
  – Case Study on Artificial Intelligence for Investment Analysis
Contact Information

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