AI in Financial Application

(Course Orientation on AI in Financial Application)

Min-Yuh Day
Associate Professor
Dept. of Information Management, Tamkang University

http://mail.tku.edu.tw/myday/
2019-09-20
AI in Financial Application
淡江大學108學年度第1學期
課程教學計畫表
Fall 2019 (2019.09 - 2020.01)

- 課程名稱：人工智慧財務金融應用
  (AI in Financial Application)
- 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 (Fri 19:20-22:10)
- 上課教室：D301 (淡江大學台北校園)
淡江大學
資訊管理學系
資訊創新
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。 (10%)
- B. 邏輯思考。 (10%)
- C. 關鍵分析。 (10%)
- D. 結合資訊技術與管理。 (30%)
- E. 研究與創新。 (10%)
- F. 資料分析與應用。 (20%)
- G. 資通安全管理。
- H. 言辭與文字表達。 (10%)
課程簡介

• 本課程介紹人工智慧財務金融應用基本概念與研究議題
• 課程內容包括
  - 人工智慧投資分析與機器人理財顧問、
  - 金融科技對話式商務與智慧型交談機器人、
  - 財務金融事件研究法、
  - Python AI 智慧金融分析基礎、
  - Python Pandas 量化投資分析、
  - Python Scikit-Learn 機器學習財務金融應用、
  - TensorFlow 深度學習財務金融應用、
  - 社會網絡分析財務金融應用、
  - 人工智慧財務金融應用個案研究。
Course Introduction

• This course introduces the fundamental concepts, research issues, and hands-on practices of AI in Financial Application.

• Topics include
  – Artificial Intelligence for Investment Analysis and Robo-Advisors,
  – Conversational Commerce and Intelligent Chatbots for Fintech,
  – Event Studies in Finance,
  – Quantitative Investing with Pandas in Python,
  – Machine Learning in Finance Application with Scikit-Learn In Python,
  – Deep Learning for Financial Application with TensorFlow,
  – Social Network Analysis for Financial Application,
  – and Case Study on AI in Financial Application.
• 瞭解及應用人工智慧財務金融應用基本概念與研究議題。
(Understand and apply the fundamental concepts and research issues of AI in Financial Application.)

• 進行人工智慧財務金融應用相關之資訊管理研究。
(Conduct information systems research in the context of AI in Financial Application.)
### 課程大綱 (Syllabus)

<table>
<thead>
<tr>
<th>週次 (Week)</th>
<th>日期 (Date)</th>
<th>內容 (Subject/Topics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2019/09/13</td>
<td>中秋節 (Mid-Autumn Festival) 放假一天 (Day off)</td>
</tr>
<tr>
<td>2</td>
<td>2019/09/20</td>
<td>人工智慧財務金融應用課程介紹 (Course Orientation for AI in Financial Application)</td>
</tr>
<tr>
<td>3</td>
<td>2019/09/27</td>
<td>人工智慧投資分析與機器人理財顧問 (Artificial Intelligence for Investment Analysis and Robo-Advisors)</td>
</tr>
<tr>
<td>4</td>
<td>2019/10/04</td>
<td>金融科技對話式商務與智慧型交談機器人 (Conversational Commerce and Intelligent Chatbots for Fintech)</td>
</tr>
<tr>
<td>5</td>
<td>2019/10/11</td>
<td>國慶日補假 (Bridge Holiday for National Day, Extra Day Off)</td>
</tr>
<tr>
<td>6</td>
<td>2019/10/18</td>
<td>財務金融事件研究法 (Event Studies in Finance)</td>
</tr>
</tbody>
</table>
課程大綱 (Syllabus)

週次 (Week) 日期 (Date) 內容 (Subject/Topics)
7 2019/10/25 人工智慧財務金融應用個案研究 I (Case Study on AI in Financial Application I)
8 2019/11/01 Python AI智慧金融分析基礎 (Foundations of AI in Finance Big Data Analytics with Python)
9 2019/11/08 Python Pandas 量化投資分析 (Quantitative Investing with Pandas in Python)
10 2019/11/15 期中報告 (Midterm Project Report)
11 2019/11/22 Python Scikit-Learn 機器學習財務金融應用 (Machine Learning in Finance Application with Scikit-Learn In Python)
課程大綱 (Syllabus)

週次 (Week) 日期 (Date) 內容 (Subject/Topics)
13 2019/12/06 人工智慧財務金融應用個案研究 II  
(Case Study on AI in Financial Application II)
14 2019/12/13 TensorFlow 深度學習財務金融應用 II  
(Deep Learning for Finance Application with TensorFlow II)
15 2019/12/20 TensorFlow 深度學習財務金融應用 III  
(Deep Learning for Finance Application with TensorFlow III)
16 2019/12/27 社會網絡分析財務金融應用  
(Social Network Analysis for Finance Application)
17 2020/01/03 期末報告 I (Final Project Presentation I)
18 2020/01/10 期末報告 II (Final Project Presentation II)
教學方法與評量方法

• 教學方法
  - 講述、討論、
  發表、實作

• 評量方法
  - 討論、實作、報告
教材課本

- 講義 (Slides)
- 人工智慧財務金融應用相關個案與論文 (Cases and Papers related to AI in Financial Application)


作業與學期成績計算方式

• 作業篇數
  – 3篇

• 學期成績計算方式
  – ☑ 期中評量：30 %
  – ☑ 期末評量：30 %
  – ☑ 其他（課堂參與及報告討論表現）：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

• 人工智慧財務金融應用 (Fall 2019) (EMBA IMTKU)
  – AI in Financial Application

• 智慧金融大數據分析 (Fall 2019) (MBA, DBETKU)
  – AI in Finance Big Data Analytics
Yves Hilpisch (2018), Python for Finance: Mastering Data-Driven Finance, O'Reilly

Source: https://www.amazon.com/Python-Finance-Mastering-Data-Driven/dp/1492024333
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
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
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

Source: https://www.amazon.com/Learning-Data-Mining-Python-Second/dp/1787126781

Aurélien Géron (2017), 
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.

\[
\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \end{bmatrix} + \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \end{bmatrix} = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 5 & 7 \end{bmatrix}
\]

https://colab.research.google.com/notebooks/welcome.ipynb
FinTech
Financial Technology
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

Source: http://www3.weforum.org/docs/WEF_The_future_of_financial_services.pdf
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
數據策略性角色

1. 流線型設施
Streamlined Infrastructure

2. 高價值活動自動化
Automation of High-Value Activities

3. 中介減少
Reduced Intermediation

4. 流程外部化
Process Externalisation

5. 專業化利基商品
Niche, Specialised Products

6. 賦權顧客
Customer Empowerment

投資管理
Investment Management

市場資訊供應
Market Provisioning

市場資信
Market Provisioning

新興支付
Emerging Payment Rails

新興平台
New Market Platforms

機器革命
Smarter, Faster Machines

倉儲
Deposit & Lending

無現金世界
Cashless World

載具串接
Connected Insurance

價值鍊分解
Insurance Disaggregation

替代管理
Alternative Lending

群眾募資
Crowdfunding

圖表來源：世界經濟論壇

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

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

無現金世界
Cashless World
流線型支付 (Streamlined Payment)、次世代安全 (Next Generation Security)、帳單整合、手機支付

新興支付
Emerging Payment Rails
密碼協定 (Cryptographic Protocols)、行動錢包、P2P

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
2

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

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

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

另類仲裁 (Alternative Adjudication)、賦權天使投資者 (Empowered Angel Investors)

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/
5 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  KENS
cortical.io  Numenta  H2O
dataRobot  nervana systems

Market Research & Sentiment Analysis
indico  acuity
Lucena Quantitative Analytics  NUMERAI
Dataminr

Search Engine
alphasense

Quantitative Trading
sentient technologies  CLONE ALGO
Alpaca  WALNUT ALGORITHMS

AI Assistants/Bots
KASIST  TRIM
Penny  INSURIFY SURE.

Blockchain
Skry  EUKLID

Credit Scoring
TypeScore  aire
creditrisk  zest finance
ADF  APPLIED DATA FINANCE
Wecash  CREAM FINANCE

Personal Banking
personetics  SBDA group

Debt Collection
feedzai
TrueAccord

Fraud Detection
Biocatch
Less Friction. Less Fraud.

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
- KENSICO
- cortical.io
- Numenta
- turi
- 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
  - EUKLID

- **Debt Collection**
  - TrueAccord

- **Fraud Detection**
  - feedzai
  - BIOLIGHT
  - BIOTRACK

- **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
3

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

智慧金融大數據分析
Summary

• This course introduces the fundamental concepts, research issues, and hands-on practices of AI in Financial Application.

• Topics include
  – Artificial Intelligence for Investment Analysis and Robo-Advisors,
  – Conversational Commerce and Intelligent Chatbots for Fintech,
  – Event Studies in Finance,
  – Quantitative Investing with Pandas in Python,
  – Machine Learning in Finance Application with Scikit-Learn In Python,
  – Deep Learning for Financial Application with TensorFlow,
  – Social Network Analysis for Financial Application,
  – and Case Study on AI in Financial Application.
AI in Financial Application

Contact Information

戴敏育博士 (Min-Yuh Day, Ph.D.)
副教授 (Associate Professor)

淡江大學 資訊管理學系
Department of Information Management, Tamkang University

電話：02-26215656 #2846
傳真：02-26209737
研究室：B929
地址：25137 新北市淡水區英專路151號
Email：myday@mail.tku.edu.tw
網址：http://mail.tku.edu.tw/myday/