Tamkang University
淡江大學

人工智慧投資分析
AI for Investment Analysis
人工智慧投資分析課程介紹
(Course Orientation on Artificial Intelligence for Investment Analysis)

1082AIIA01
MBA, IMTKU (M2399) (8409) (Spring 2020)
Wed 3, 4 (10:10-12:00) (B206)

Min-Yuh Day
戴敏育
Associate Professor
副教授
Dept. of Information Management, Tamkang University
淡江大學 資訊管理學系
http://mail. tku.edu.tw/myday/

2020-03-04

人工智慧
投資分析
AI for Investment Analysis

淡江大學108學年度第2學期
課程教學計畫表
Spring 2020 (2020.03 - 2020.06)

- 課程名稱：人工智慧投資分析
  (AI for Investment Analysis)
- 授課教師：戴敏育 (Min-Yuh Day)
- 開課系級：資管所碩士班 (TLMXM1A)
- 開課資料：選修 單學期 2 學分 (2 Credits, Elective)
- 上課時間：週三 3, 4 (Wed 10:10-12:00)
- 上課教室： B206 (淡江大學淡水校園)

淡江大學

資訊管理學系

資訊創新

管理思維

IMTKU

淡江大學資訊管理系(所)教育目標

Tamkang University 淡江大學

- 致力於資訊科技與經營管理知識之科際整合研究發展，為國家與社會培育兼具資訊技術能力與現代管理知識的中高階人才。

淡江大學資訊管理系(所)核心能力

Tamkang University 淡江大學

- 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投資分析基本概念、研究議題與實務
- 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 機器學習投資分析、TensorFlow 深度學習投資分析、投資組合最佳化與程式交易、與人工智慧投資分析個案研究。

Course Introduction

- This course introduces the fundamental concepts, research issues, and hands-on practices 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 for Investment Analysis with Scikit-Learn In Python,
  - Deep Learning for Investment Analysis with TensorFlow,
  - and 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 AI 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 AI for investment analysis.)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
1	2020/03/04	人工智慧投資分析課程介紹 (Course Orientation on AI for Investment Analysis)
2	2020/03/11	AI 金融科技: 金融服務創新應用 (AI in FinTech: Financial Services Innovation and Application)
3	2020/03/18	機器人理財顧問與AI交談機器人 (Robo-Advisors and AI Chatbots)
4	2020/03/25	投資心理學與行為財務學 (Investing Psychology and Behavioral Finance)
5	2020/04/01	財務金融事件研究法 (Event Studies in Finance)
6	2020/04/08	人工智慧投資分析個案研究 I (Case Study on AI for Investment Analysis I)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
7	2020/04/15	Python AI投資分析基礎 (Foundations of AI Investment Analysis in Python)
8	2020/04/22	Python Pandas 量化投資分析 (Quantitative Investing with Pandas in Python)
9	2020/04/29	期中報告 (Midterm Project Report)
10	2020/05/06	Python Scikit-Learn 機器學習投資分析 (Machine Learning for Investment Analysis with Scikit-Learn In Python)
11	2020/05/13	TensorFlow 深度學習投資分析 I (Deep Learning for Investment Analysis with TensorFlow I)
12	2020/05/20	TensorFlow 深度學習投資分析 II (Deep Learning for Investment Analysis with TensorFlow II)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
13	2020/05/27	人工智慧投資分析個案研究 II (Case Study on Artificial Intelligence for Investment Analysis II)
14	2020/06/03	TensorFlow 深度學習投資分析 III (Deep Learning for Investment Analysis with TensorFlow III)
15	2020/06/10	投資組合最佳化與程式交易 (Portfolio Optimization and Algorithmic Trading)
16	2020/06/17	期末報告 I (Final Project Presentation I)
17	2020/06/24	期末報告 II (Final Project Presentation II)
18	2020/07/01	教師彈性補充教學

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

- 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 AI for Investment Analysisication)

參考書籍 (References)

1. Aurélien Géron (2019), Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, 2nd Edition, O'Reilly Media.
2. Yves Hilpisch (2018), Python for Finance: Mastering Data-Driven Finance, 2nd Edition, OReilly Media.
3. Paolo Sironi (2016), FinTech Innovation: From Robo-Advisors to Goal Based Investing and Gamification, Wiley.
4. Yuxing Yan (2017), Python for Finance: Apply powerful finance models and quantitative analysis with Python, Second Edition, Packt Publishing.

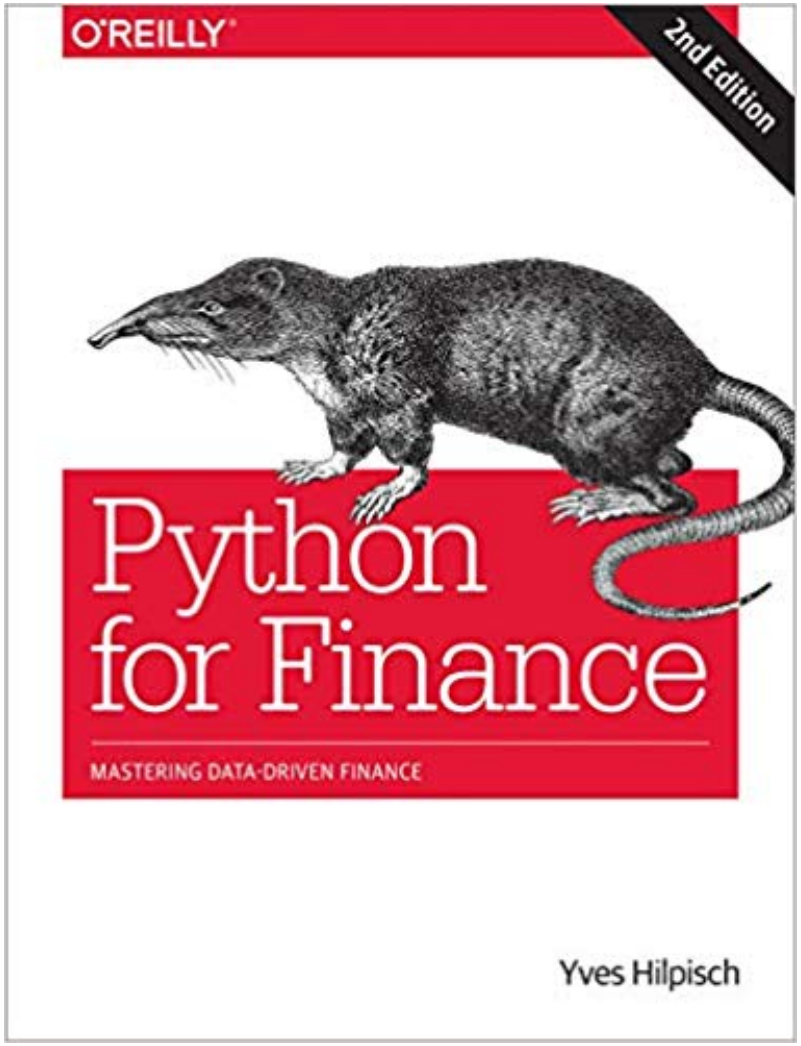
作業與學期成績計算方式

- 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)
  (Spring 2020, MBA 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

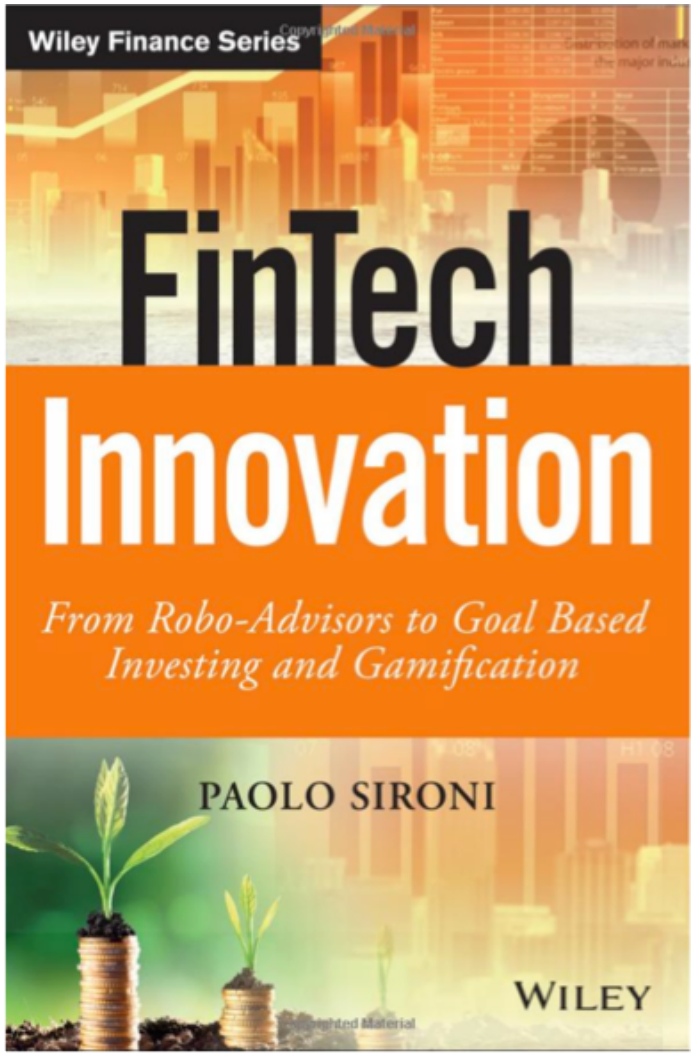


Source: https://www.amazon.com/Python-Finance-Mastering-Data-Driven/dp/1492024333

Paolo Sironi (2016)

FinTech Innovation:

From Robo-Advisors to Goal Based Investing and Gamification, Wiley



Source: https://www.amazon.com/FinTech-Innovation-Robo-Advisors-Investing-Gamification/dp/1119226988

Doron Kliger and Gregory Gurevich (2014),

Event Studies for Financial Research: A Comprehensive Guide,

Palgrave Macmillan

Source: https://www.amazon.com/Event-Studies-Financial-Research-Comprehensive/dp/1137435380/

沈中華、李建然 (2000),

事件研究法：

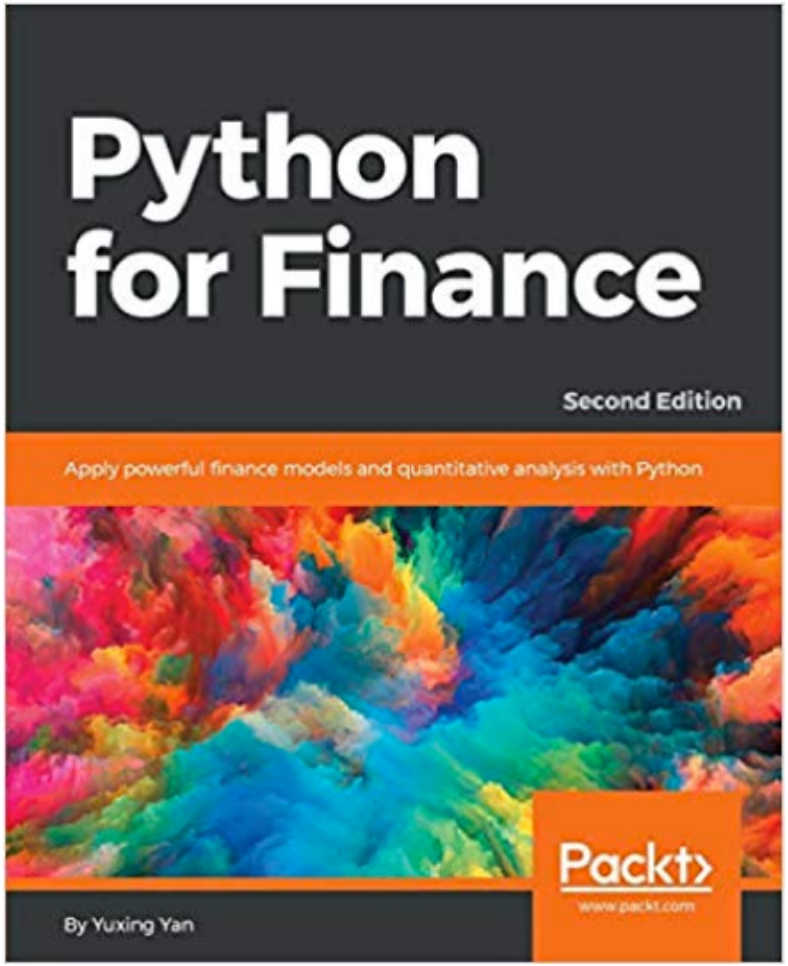
財務與會計實證研究必備

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,

Second Edition, Packt Publishing

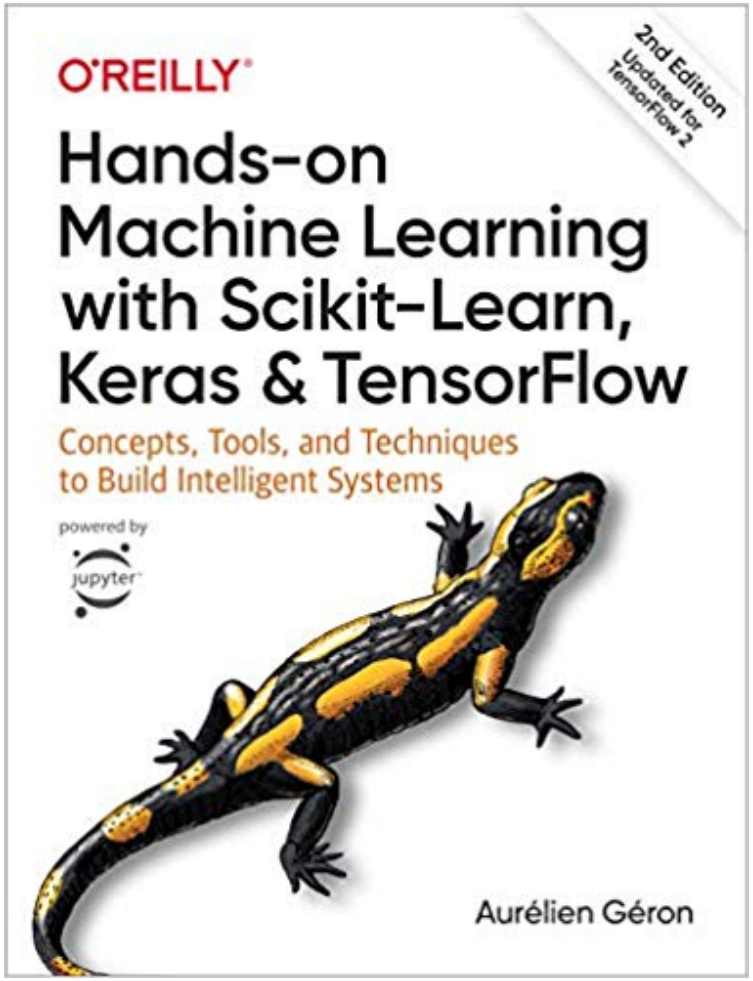


Source: https://www.amazon.com/Python-Finance-powerful-quantitative-analysis/dp/1787125696

Aurélien Géron (2019),

Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, 2nd Edition

O'Reilly Media, 2019



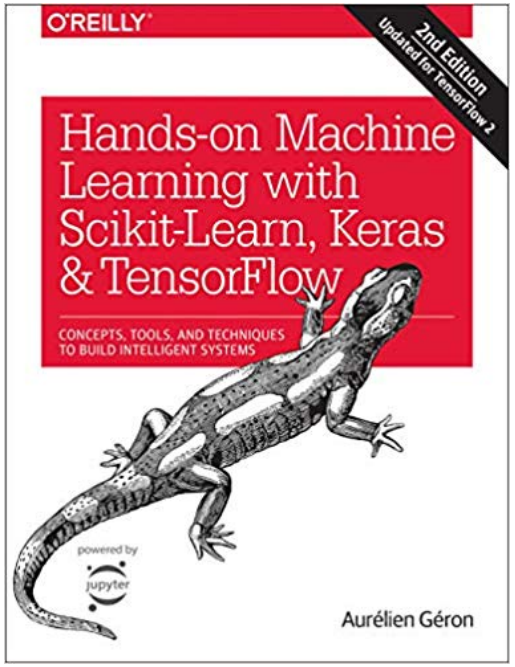
https://github.com/ageron/handson-ml2

Source: https://www.amazon.com/Hands-Machine-Learning-Scikit-Learn-TensorFlow/dp/1492032646/

Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow

Notebooks

1. The Machine Learning landscape
2. End-to-end Machine Learning project
3. Classification
4. Training Models
5. Support Vector Machines
6. Decision Trees
7. Ensemble Learning and Random Forests
8. Dimensionality Reduction
9. Unsupervised Learning Techniques
10. Artificial Neural Nets with Keras
11. Training Deep Neural Networks
12. Custom Models and Training with TensorFlow
13. Loading and Preprocessing Data
14. Deep Computer Vision Using Convolutional Neural Networks
15. Processing Sequences Using RNNs and CNNs
16. Natural Language Processing with RNNs and Attention
17. Representation Learning Using Autoencoders
18. Reinforcement Learning
19. Training and Deploying TensorFlow Models at Scale



https://github.com/ageron/handson-ml2

Sequences using RNNs and CNNs

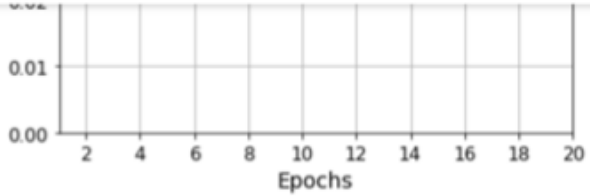
15_processing_sequences_using_rnns_and_cnns.ipynb

File Edit View Insert Runtime Tools Help Last edited on November 6 by ageron

Share

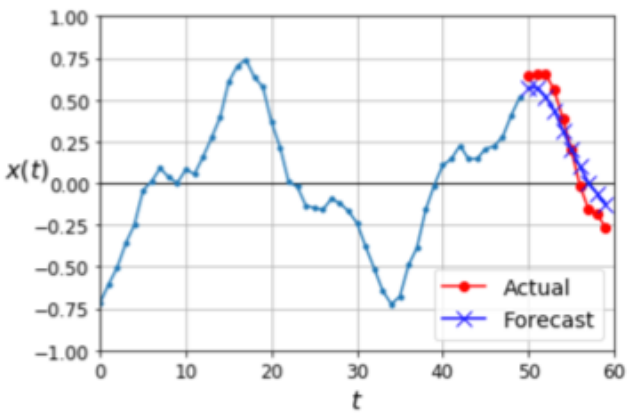
+ Code + Text Copy to Drive

Connect Editing



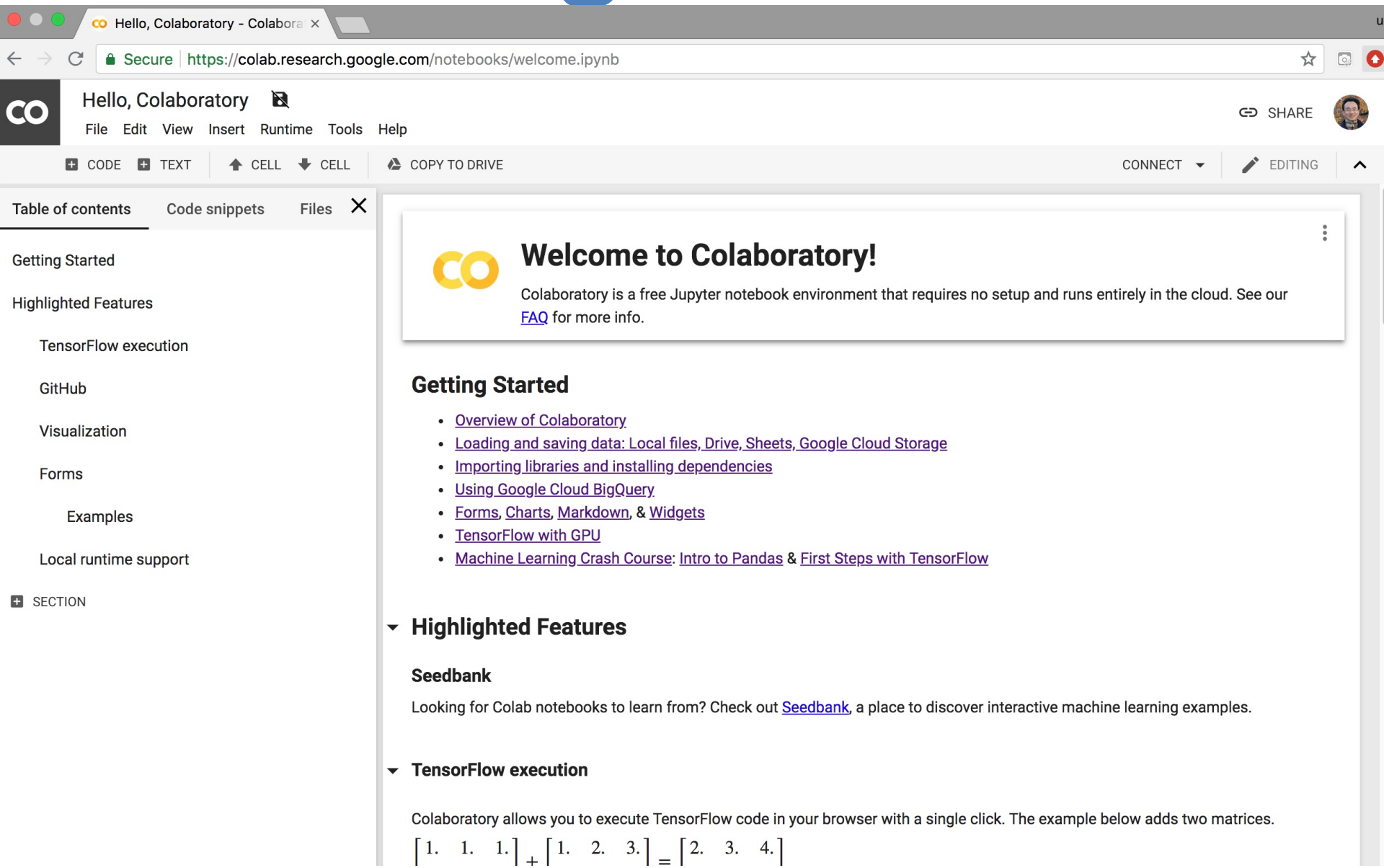

```
[ ]  1 np.random.seed(43)
     2
     3 series = generate_time_series(1, 50 + 10)
     4 X_new, Y_new = series[:, :50, :], series[:, 50:, :]
     5 Y_pred = model.predict(X_new)[:, -1][..., np.newaxis]
```

```
[ ]  1 plot_multiple_forecasts(X_new, Y_new, Y_pred)
     2 plt.show()
```



https://colab.research.google.com/github/ageron/handson-ml2/blob/master/15_processing_sequences_using_rnns_and_cnns.ipynb

Google Colab



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

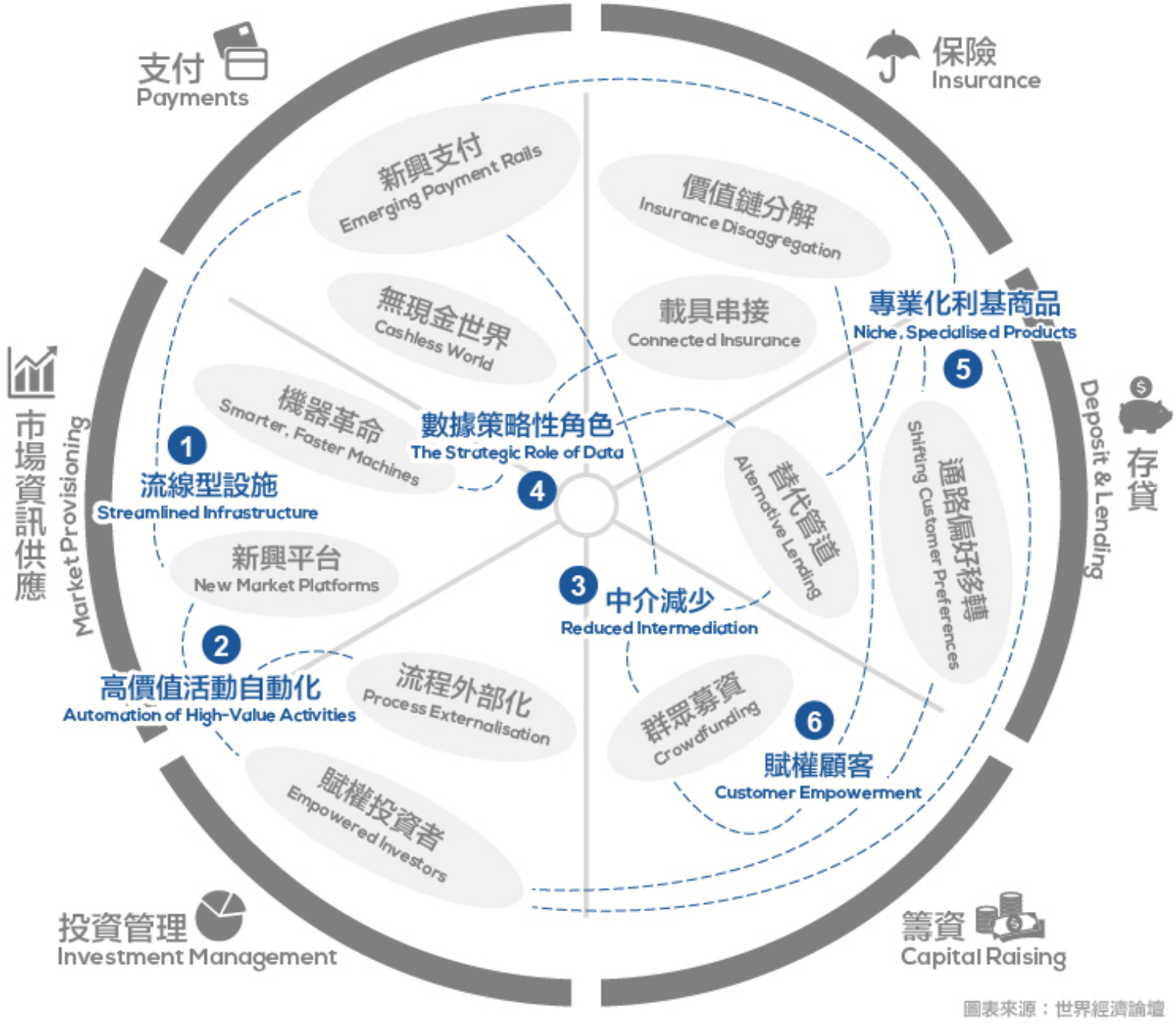
Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

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



圖表來源：世界經濟論壇

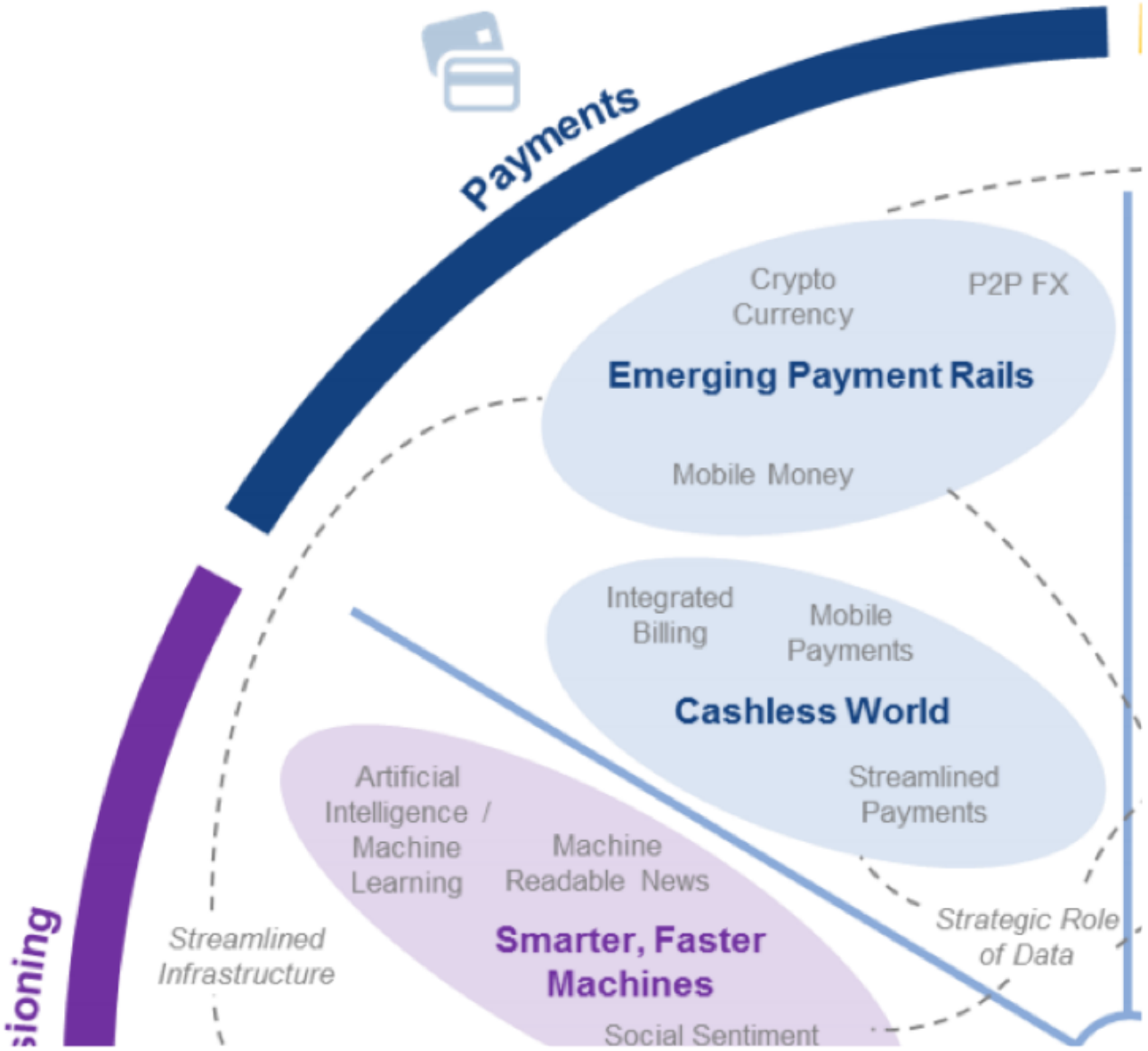
Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

FinTech: Financial Services Innovation

圖表來源：Fugle團隊整理

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

1 FinTech: Payment



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

1

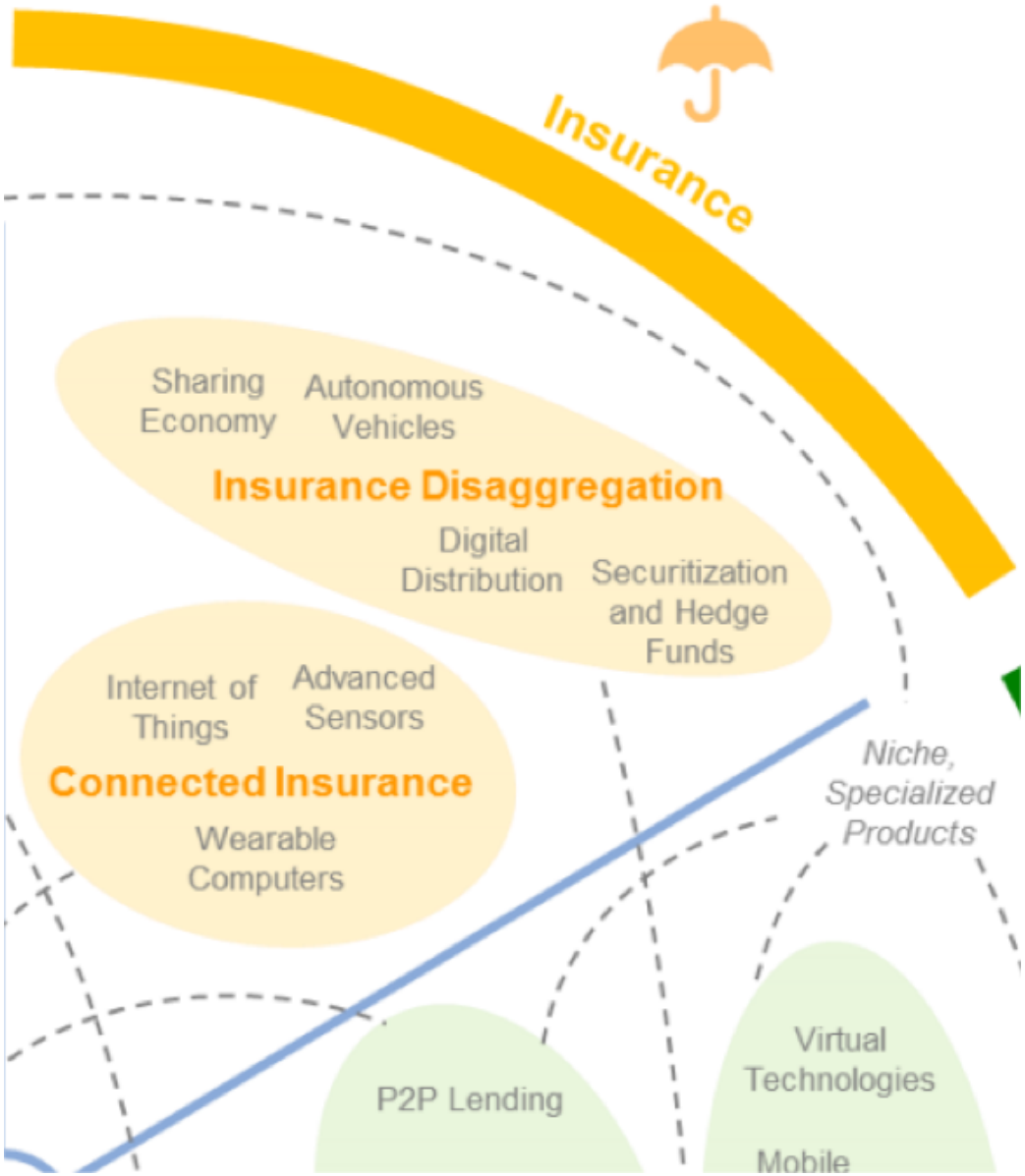
FinTech: Payment
Cashless World
Emerging Payment Rails

圖表來源：Fugle團隊整理

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

2

FinTech: Insurance



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

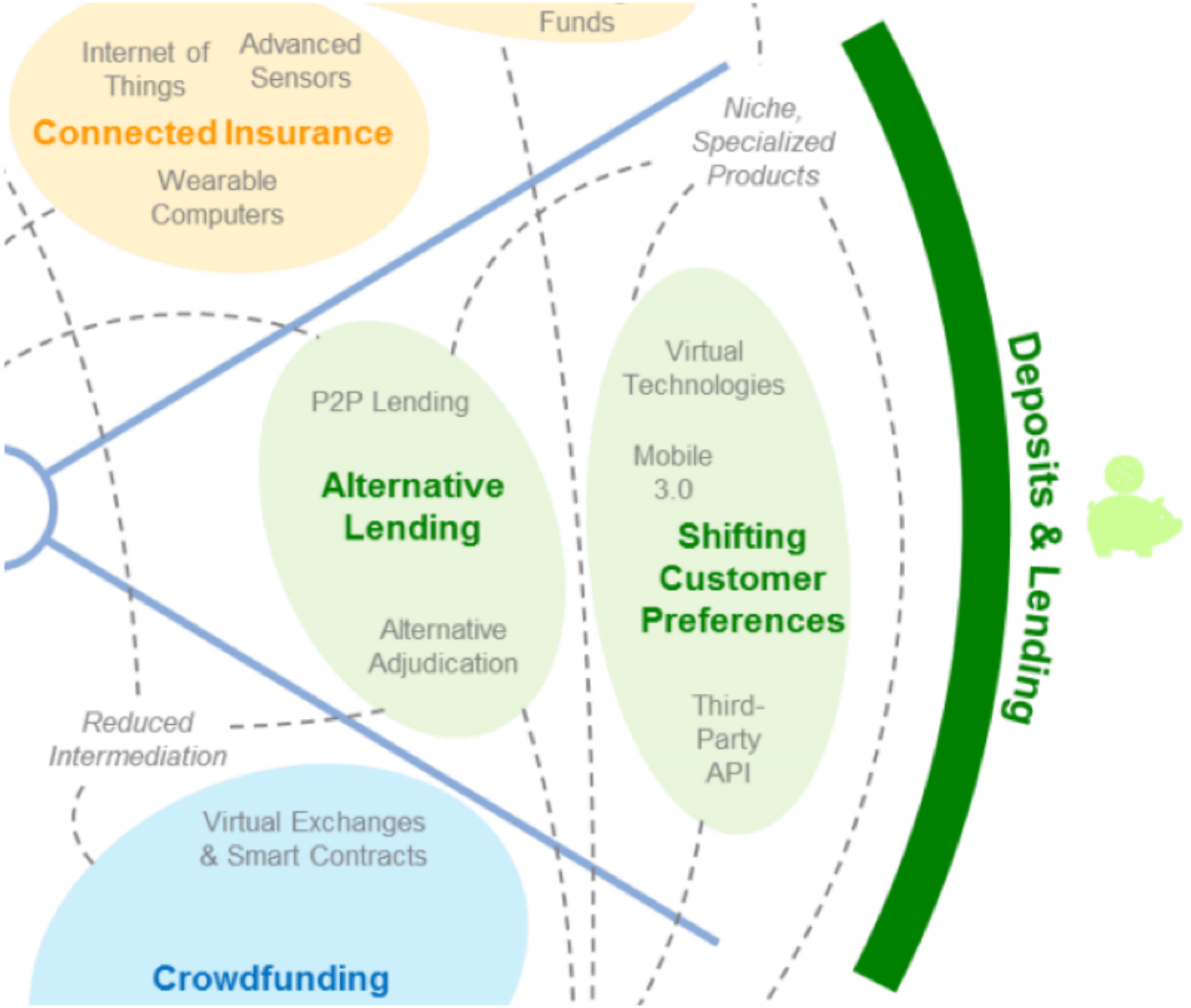
2

FinTech: Insurance
Insurance Disaggregation
Connected Insurance

圖表來源：Fugle團隊整理

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

3 FinTech: Deposits & Lending



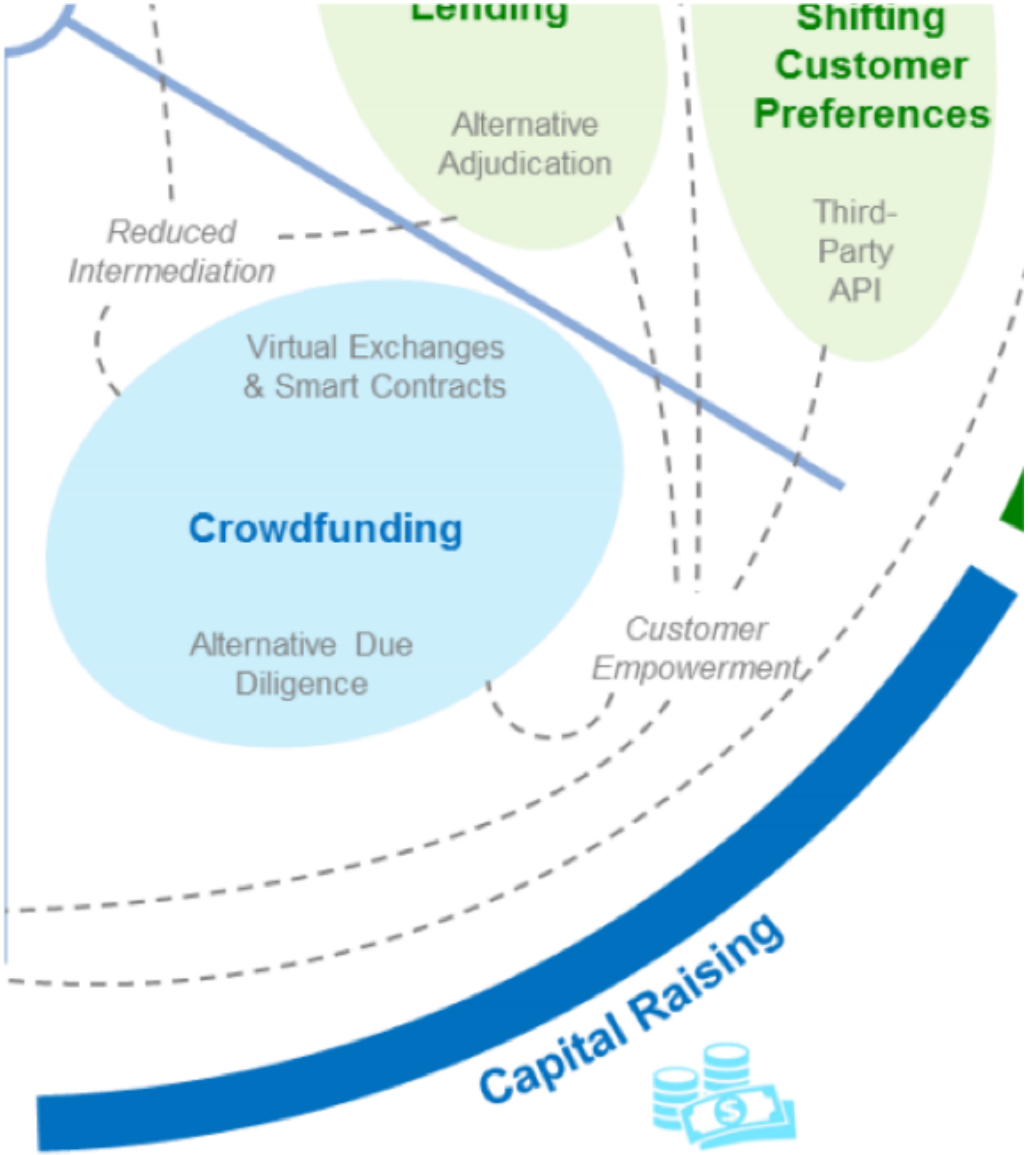
Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

3 FinTech: Deposits & Lending
Alternative Lending
Shifting Customer Preferences

圖表來源：Fugle團隊整理

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

4 FinTech: Capital Raising



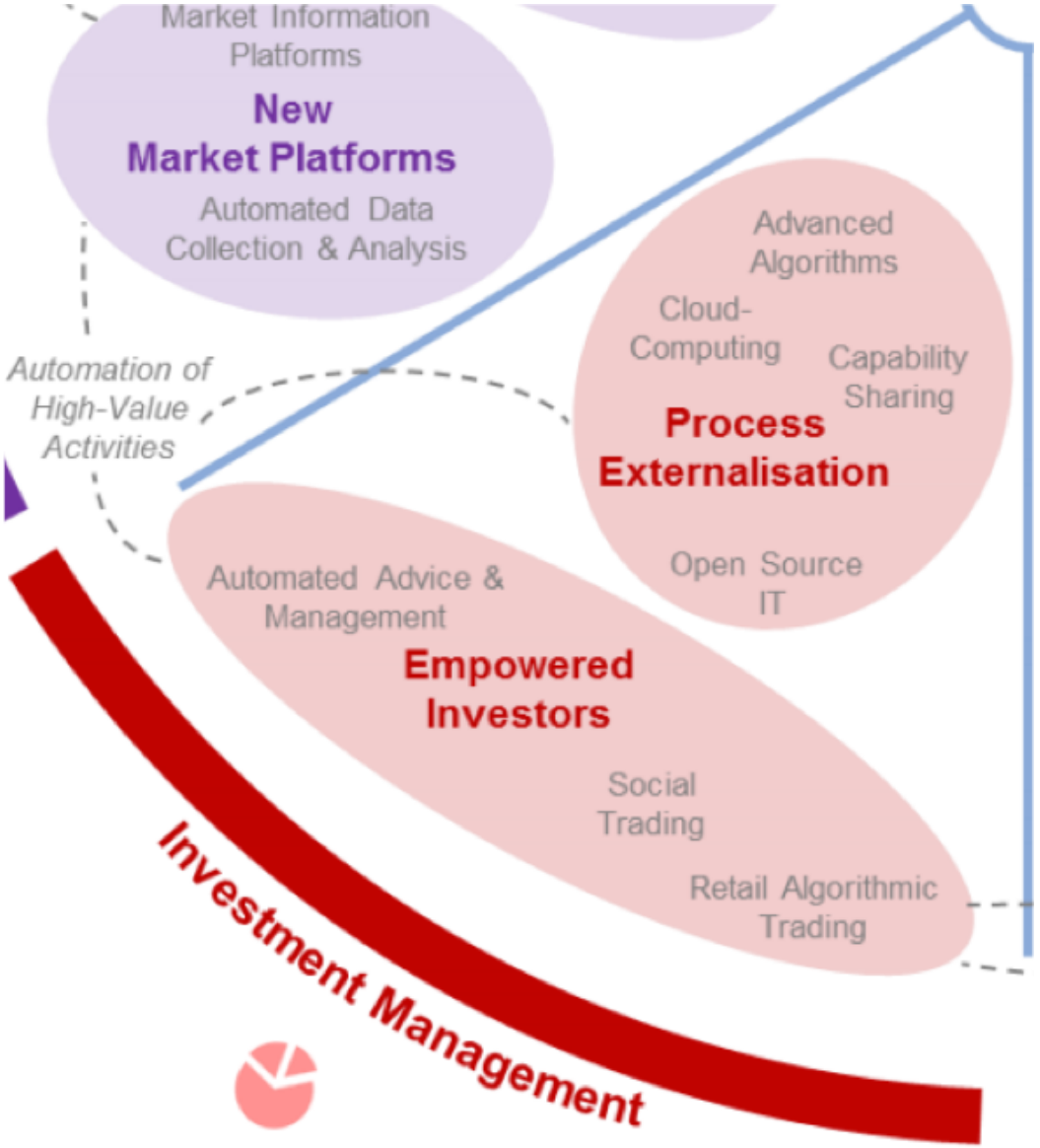
Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

4 FinTech: Capital Raising Crowdfunding

圖表來源：Fugle團隊整理

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



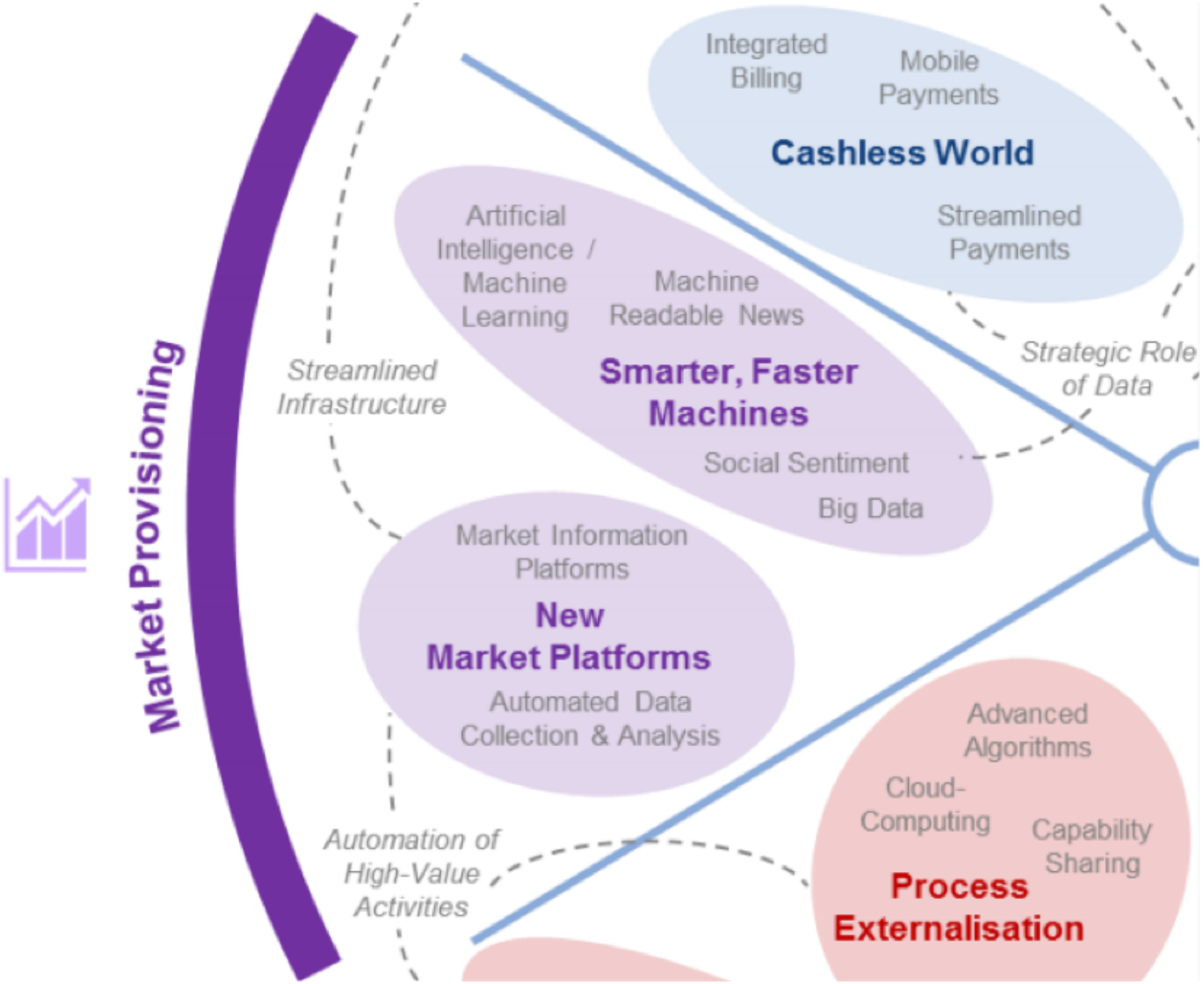
Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

5 FinTech: Investment Management Empowered Investors Process Externalization

圖表來源：Fugle團隊整理

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

6 FinTech: Market Provisioning



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

6 FinTech: Market Provisioning Smarter, Faster Machines New Market Platforms

圖表來源：Fugle團隊整理

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

Artificial Intelligence and Deep Learning for Fintech

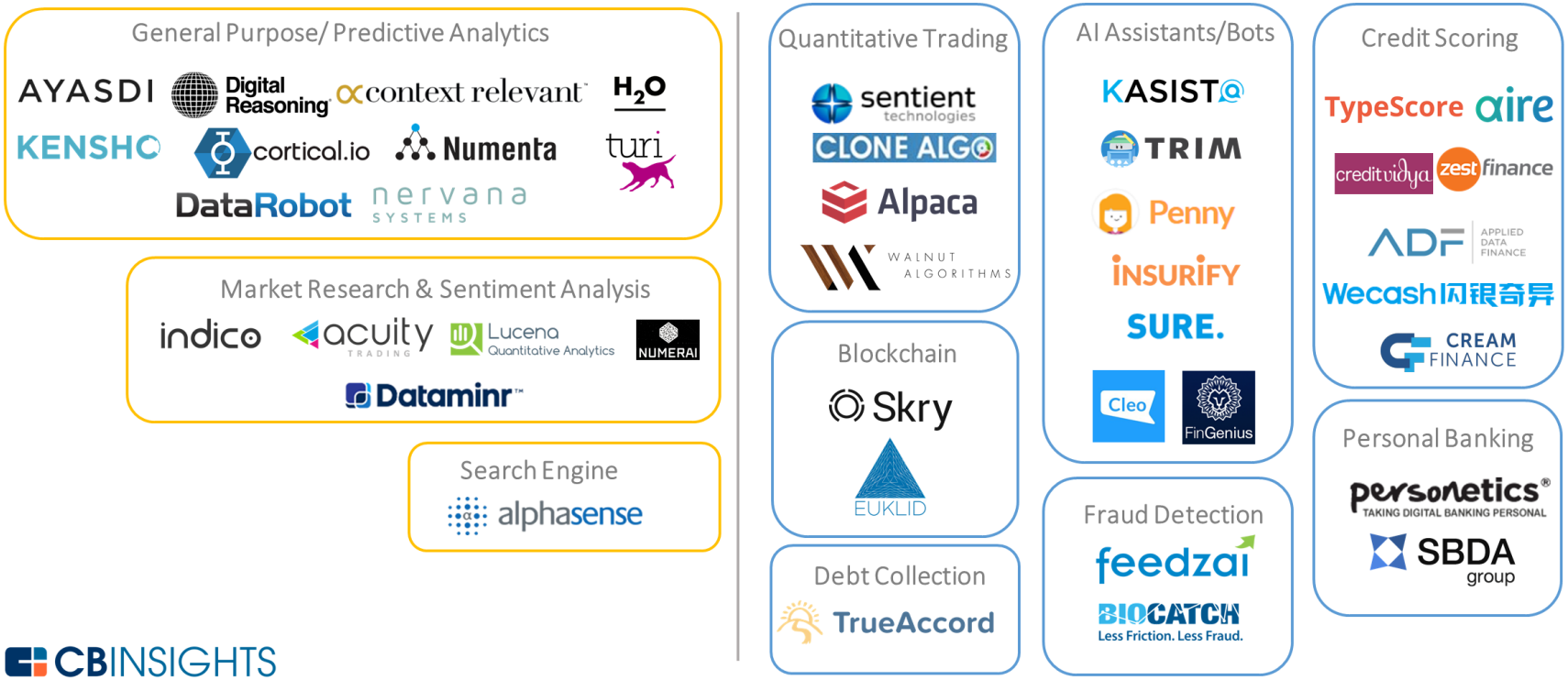
From Algorithmic Trading to Personal Finance Bots: 41 Startups Bringing AI to Fintech

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

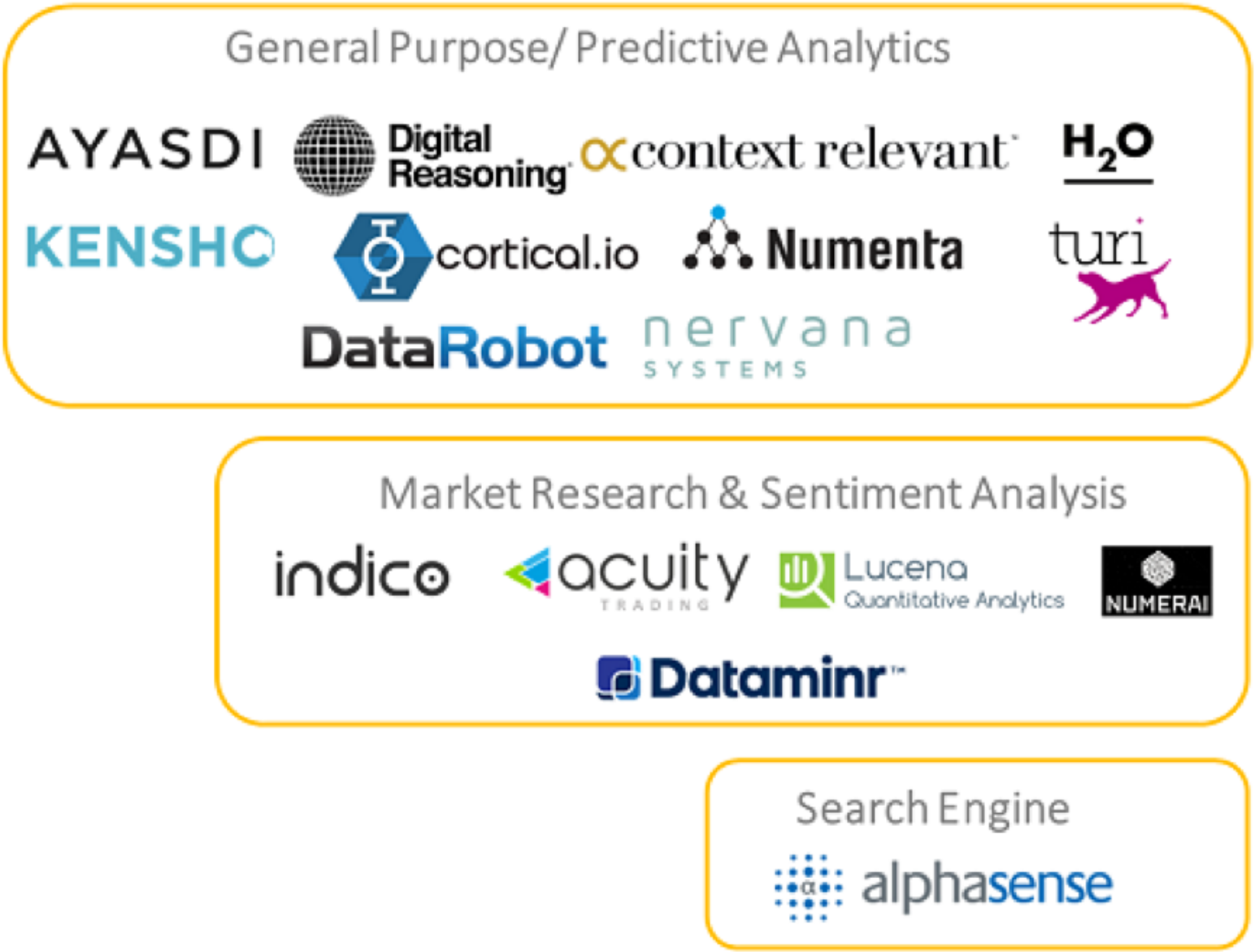
41 Startups Bringing Artificial Intelligence To Fintech



CBINSIGHTS
www.cbinsights.com

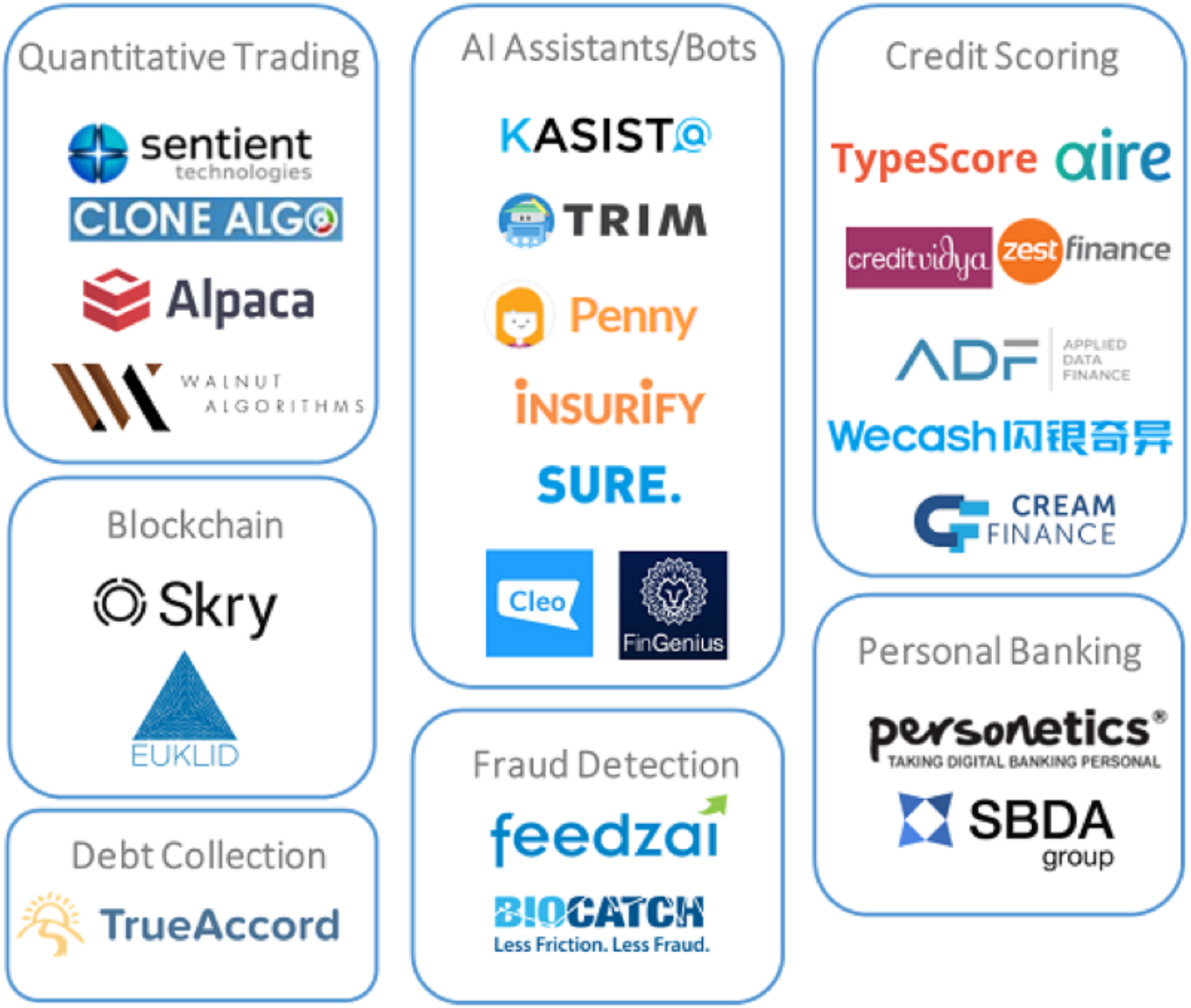
Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/

Artificial Intelligence (AI) in Fintech



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

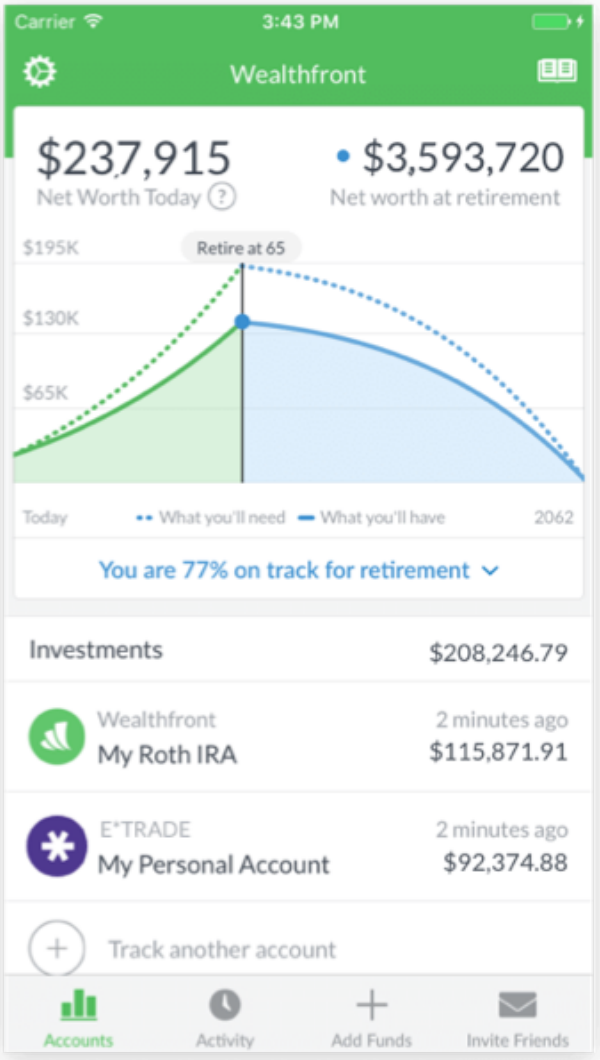
Artificial Intelligence (AI) in Fintech

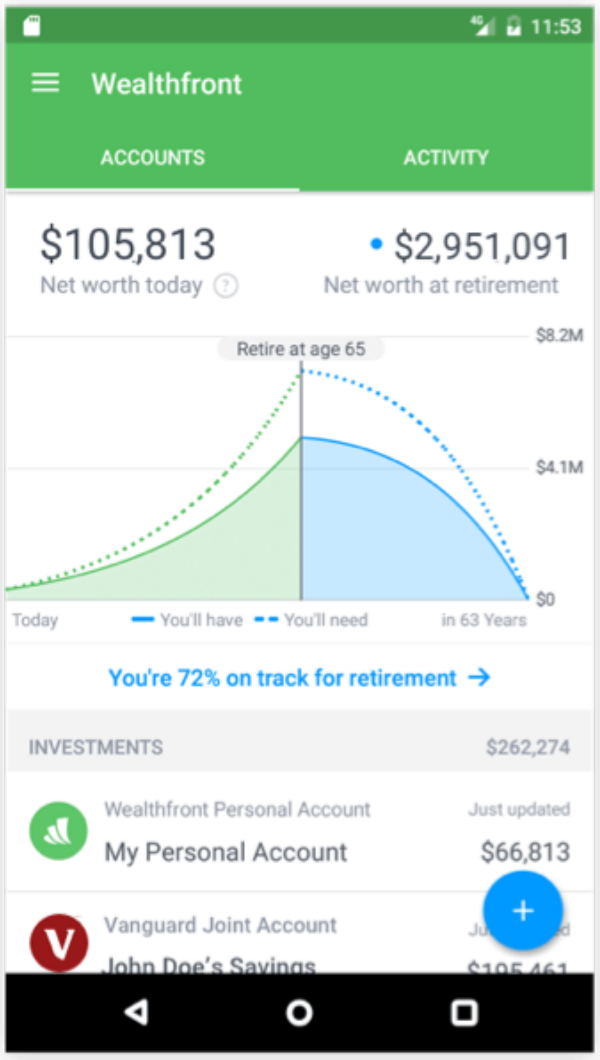


Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/

wealthfront

Wealthfront Robo Advisor





Source: https://www.wealthfront.com/

1

金融科技

Financial Technology, FinTech

2

財務金融大數據分析

Big Data Analytics in Finance

3

人工智慧投資分析

Artificial Intelligence for Investment Analysis

4

人工智慧
財務金融應用
AI in Financial Application

5

智慧金融大數據分析

AI in Finance Big Data Analytics

References

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2. Yensen Ni, Paoyu Huang, Yaochia Ku, Yiching Liao, and Min-Yuh Day (2020), "Investing Strategies as Stochastic Oscillator Indicators Staying in Overreaction Zones for Consecutive Days with Big Data Concerns", Journal of Computers, Volume 31, Number 1, February 2020, pp. 1-17.
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Summary

- This course introduces the fundamental concepts, research issues, and hands-on practices 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 for Investment Analysis with Scikit-Learn In Python,
  - Deep Learning for Investment Analysis with TensorFlow,
  - and Case Study on Artificial Intelligence for Investment Analysis

人工智慧投資分析
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