## Artificial Intelligence in Finance at Hong Kong University of Science and Technology

Course Schedule			
Session	Торіс	Application & Case Study	
1	<ul> <li>History and Overview of Artificial Intelligence</li> </ul>	<ul> <li>Case study on HireVue</li> </ul>	
2	<ul> <li>Introduction to Supervised Learning</li> </ul>	<ul><li>Google Experiments: Draw!</li><li>Chatbots</li></ul>	
3	<ul> <li>Regression. Classification, Model Assessment and Selection</li> </ul>	<ul> <li>Google Experiments: Vision Sensing</li> <li>Case study: WorkFusion (Robotic Process Automation)</li> </ul>	
4	<ul> <li>Decision Trees, Random Forests and Boosting</li> </ul>	<ul> <li>Credit analysis</li> </ul>	
5	<ul> <li>Tutorials</li> </ul>	<ul> <li>Tutorial on Machine Learning with Python</li> <li>Tutorial on GPU server</li> </ul>	
6	<ul> <li>Topics in Blockchain</li> </ul>	<ul> <li>FinTech &amp; Blockchain</li> </ul>	
7	<ul> <li>An Introduction to Neural Networks and Deep Learning</li> </ul>	<ul> <li>Natural language processing</li> <li>Case study: Deep Instinct (Cybersecurity)</li> </ul>	
8	<ul> <li>An Introduction to Recurrent Neural Networks (RNN) and Long Short Term Memory (LSTM)</li> </ul>	<ul> <li>Google Image Recognition</li> <li>Case study: SenseTime (Computer Vision)</li> </ul>	
9	<ul> <li>An Introduction to Reinforcement Learning</li> </ul>	<ul> <li>Competition of Cryptocurrency Trading with Deep Learning</li> <li>Introduction to Deep Reinforcement Learning Trading</li> </ul>	
10	<ul> <li>Introduction to Unsupervised Learning: PCA, AutoEncoder, VAE and GANs</li> </ul>		
11	<ul> <li>Investment Trends and FinTech Outlook</li> </ul>	<ul> <li>Sales and Trading Business in Global Investment Banks – Ripe for Disruption by AI?</li> </ul>	
12	<ul> <li>Tutorial on Deep Learning in Python</li> </ul>	<ul> <li>Exercise on Python Notebook</li> </ul>	
13	<ul> <li>Class Wrap</li> </ul>		

Note: Details may change depending on class progress, development of relevant technologies, as well as information and feedback from students' surveys.

## ≡ kaggle

### Q Search

Overview

Description

Evaluation

Honor-Code

Submission-

Instructions

Timeline

Prizes

HomeCompete

Data Data

<> Notebooks

E Discuss

🕤 Courses

: More



Overview Data Notebooks Discussion Leaderboard Rules

# How can we use the world's tools and intelligence to forecast economic outcomes that can never be entirely predictable? This question is at the core of countless economic activities around the world – including at Two Sigma Investments, who has been applying technology and systematic strategies to financial trading since 2001.

For over 15 years, Two Sigma has been at the forefront of applying technology and data science to financial forecasts. While their pioneering advances in big data, AI, and machine learning in the financial world have been pushing the industry forward, as with all other scientific progress, they are driven to make continual progress. Through this exclusive partnership, Two Sigma is excited to explore what untapped value Kaggle's diverse data science community can discover in the financial markets.

\$100,000

Prize Money

Economic opportunity depends on the ability to deliver singularly accurate forecasts in a world of uncertainty. By accurately predicting financial movements, Kagglers will learn about scientifically-driven approaches to unlocking significant predictive capability. Two Sigma is excited to find predictive value and gain a better understanding of the skills offered by the global data science crowd.

## What is a Code Competition?

Welcome to Kaggle's very first Code Competition! In contrast to our traditional competitions, where competitors submit only prediction outputs, participants in Code Competitions will submit their code via Kaggle Kernels. All kernels are private by default in Code Competitions. You can build your models in Kernels by running them on a training set and, once you're ready to submit your code, your model's performance will be evaluated against the test set and your score and public leaderboard position revealed. As with our traditional competitions, we still maintain a private leaderboard test set, which your code is also evaluated against for final scoring, but is not revealed until the competition closes.

Since Code Competitions are brand new, we ask for your patience if you encounter bugs or frustrating platform quirks. Please report any issues you find in the forums and we'll do our best to respond.

Sign In Register



**Key Responsibilities** Students to form groups of five (5) to complete the following:

- Develop an understanding of the AI/ML industry landscape and relevant technologies
- Creation of a conference chatbot application to be deployed in June 2020



## Deliverables

- Knowledge assessment of NLP techniques and related applications via in-person interviews
- Monthly progress reports and regular updates
- Final group presentation on-campus or Central

## **Position Requirements**

 Undergraduate or postgraduate students, preferably majoring in Artificial Intelligence, Mathematics, Statistics, Computer Science, Business Analytics, Finance, and/or Economics



Anthony Woo CFA CAIA FRM Associate Director Alpha Intelligence Capital aw@aicapital.ai

Duration: Spring and summer 2020 Format: Groups of five (5) with multidisciplinary (and complementary) skillsets Opportunity to convert to full-time based on performance



**JUN 20** 

CogX 2020 tickets

## The World's Most Exciting Celebration of Innovation and Transformational Opportunities

| Festival of AI, Blockchain and Breakthrough Technologies Mon 8 - Wed 10 June 2020, King's Cross, London

Last Chance Super Early Bird CogX 2020 Tickets









# **Team Project Options**



Required

NLP

May 31

N/A

Any

May 31

Note: 1. High performers will be invited to interviews for full-time positions at Alpha Intelligence Capital

N/A

Trading

May 31

Interviews

Nature

Deadline

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N/A

Various

April 15

## Q Search

Finance & Banking Masters - Finance and Banking MSc with King's. An Industry Leading Online Experience Ad ....

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My Network

Home

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Jobs

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Messaging

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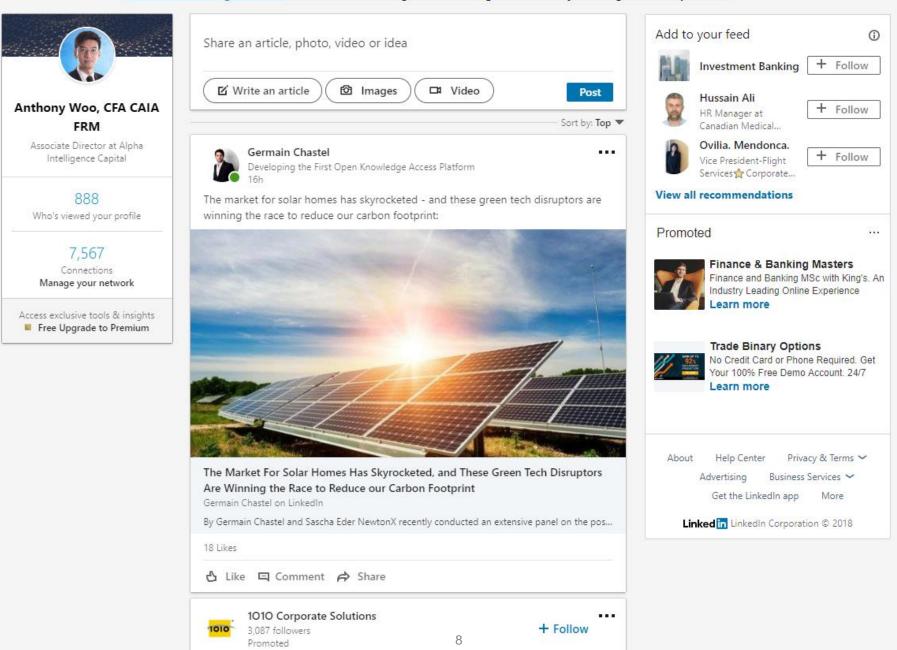
Notifications

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Work -

Free Upgrade

to Premium



# HireVue Overview

This will be a new experience for many applicants because top banks like Goldman Sachs and JP Morgan have recently begun to use HireVue. It apparently adds 13% more top performers above the client's industry.

The first interview is provided by HireVue; however, it will not completely replace the more traditional, intensive recruiting process. If the first interview is successful, then a representative from the bank will contact the candidate for a second interview. From then on, any upcoming interviews will be part of the regular interview rounds, involving live interactions with analysts, associates and even VPs and MDs.

You will be given about **20-30 seconds for each question to think of a response**. After that, you'll have about **3 minutes to record your answer**. The amount of time given really depends on the questions. For instance, a question about why you would be the best candidate for the role will require a much longer and thoughtful response than answering a question about what your overall GPA is.



## **Practice First!**

Take as many practice questions as you like before you start the interview.

Don't worry, your practice questions are not recorded or seen by anyone.

Practice

Start Interview

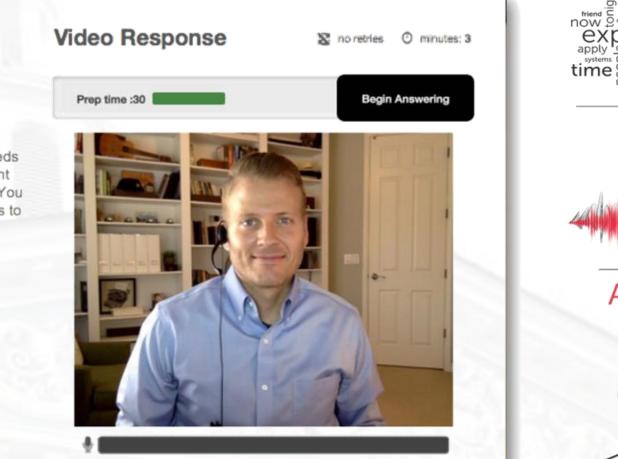
## **Deep Learning on Bespoke Video Assessments**

## Question 1 of 6

## Scenario

Imagine you are responding to a call from a customer in which the person is noticeably upset because they are locked out of their account. She informs you that she needs to transfer funds immediately from her investment account to a bank account to avoid overdrawing on the account. You try to address the customer's concerns, but she demands to speak to your supervisor.

How would you attempt to de-escalate the situation first without involving your supervisor?





## **WorkFusion**

## Robotic Process Automation 机器人与工序自动化

Full-stack AI-enabled Robotic Process Automation (RPA) solution suite for business-critical tasks spanning multiple applications and data silos

# OSARO

## Real-Time Robotics Automation 实时机器人自动化

Deep reinforcement learning-based Al software platform that enables enhanced perception, reaction and control in realtime robotics environments



## Quantum Computing 量子计算

Solution provider and platform developer for quantum and classical computing for predictive analytics, forecasting, and optimization

**A**another

**AI Chips** 

人工智能芯片

Deep reinforcement learning-based AI

software platform that enables enhanced

perception, reaction and control in real-

time robotics environments



## Computer Vision 计算机视觉

Developer of deep learning technologybased computer vision solutions aimed at a broad range of consumer and enterprise applications



## Knowledge Graph 知识图表

Dynamically evolving knowledge graphs that provides inference strength across concepts, events and themes derived from a wide variety of information services



## Cybersecurity 网络安全

Advanced deep learning technologybased cybersecurity products and solutions for threat detection and prevention



Music Augmentation 音乐强化

Developer of a music augmentation technology that transforms linear music to dynamically personalized music for consumers, ad-agencies, music labels, and producers

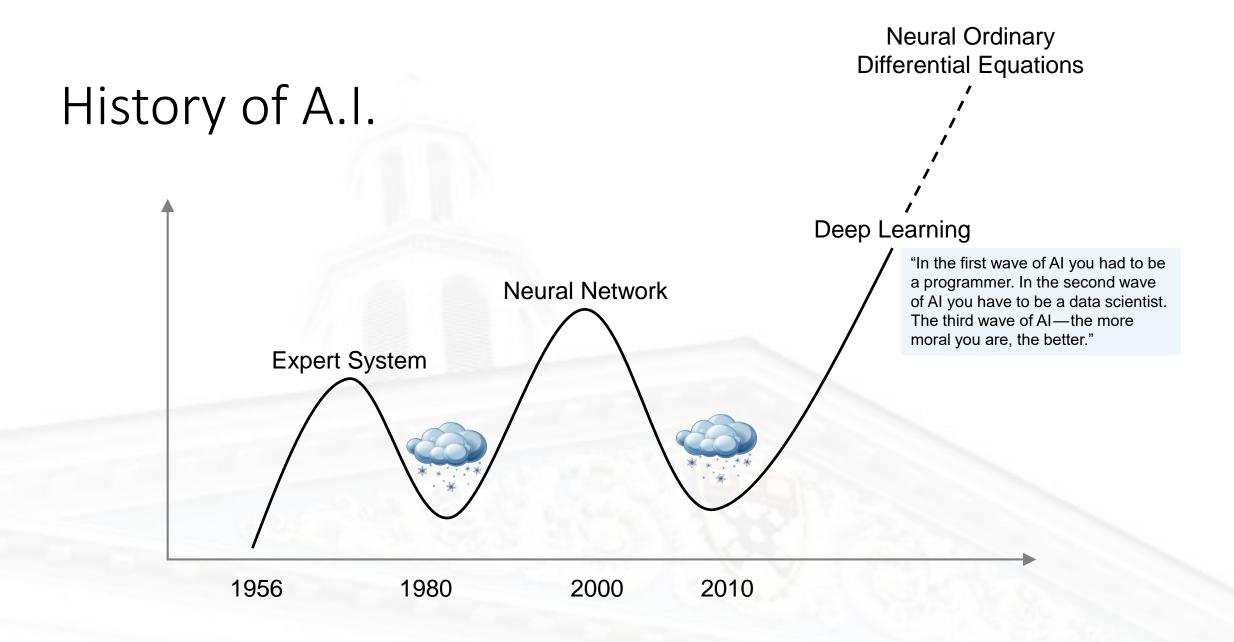
Contents are based on information from sources believed to be reliable, but accuracy and completeness cannot be guaranteed. Nothing herein should be construed as any past, current or future recommendation to buy or sell any security or an offer to sell, or a solicitation of an offer to buy any security. This material does not purport to contain all of the information that a prospective investor may wish to consider and is not to be relied upon as such or used in substitution for the exercise of independent judgment.

# Beyond the Classroom

Session	Торіс	Session	Торіс
А	<ul> <li>HireVue: Recruiting &amp; AI</li> </ul>	F	<ul> <li>LinkedIn &amp; Networking</li> </ul>
В	<ul> <li>Company Research: Bloomberg, McKinsey Insights, Zero2IPO</li> </ul>	G	<ul> <li>Industry Primer: Investment Banking</li> </ul>
С	<ul> <li>PowerPoint Creation</li> </ul>	н	<ul> <li>Industry Primer: Management Consulting</li> </ul>
D	<ul> <li>CV Writing &amp; Interview Preparation</li> </ul>		<ul> <li>Industry Primer: FinTech &amp; VC/PE</li> </ul>
E	<ul> <li>Certifications (CFA, CPA, GMAT)</li> </ul>	J	<ul> <li>Presentation Skills</li> </ul>

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# A Tale of Two AI Camps

Property	Symbolic Al	Connectionist Al
Knowledge Acquisition	Theoretical knowledge insertion can be made in a simple and direct manner. It is sufficient to clarify, convert, and formalize the knowledge.	<ul> <li>Theoretical knowledge may not useful in constructing neural networks, while examples are always required for knowledge acquisition.</li> </ul>
Processing Mode	<ul> <li>Processing is sequential. Answer and consultation times are long.</li> </ul>	<ul> <li>Neural networks consist of a set of units with information processing completed in a parallel fashion.</li> </ul>
New Knowledge Insertion	<ul> <li>Insertion of knowledge (rules) can be made very quickly once experts have already processed them.</li> </ul>	<ul> <li>Training process is often time-consuming as weights and biases are trained gradually.</li> </ul>
Training	<ul> <li>Training is not a basic process. Knowledge acquisition is done by explicitation, with potential bottleneck issues.</li> </ul>	<ul> <li>Training and generalization from examples are fundamental and integrate processes.</li> </ul>
Results Explanation	<ul> <li>Reasoning process allows for explanability. Knowledge is coded in a language close to natural language, and therefore easily interpretable.</li> </ul>	<ul> <li>Neural networks are "black" boxes, where knowledge is coded in weights and interconnections, with a lack of access to a form that is interpretable by humans.</li> </ul>

Source: Souici-Meslati, Labiba & Sellami, Mokhtar. (2004). A hybrid approach for Arabic literal amounts recognition. The Arabian Journal for Science and Engineering. 29.

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# A Tale of Two AI Camps

Property	Symbolic Al	Connectionist Al
Information Processing	<ul> <li>Theoretical knowledge must be complete beforehand, and the approach is not conducive to approximate or incomplete information processing.</li> </ul>	✓ Neural networks are conducive to approximate and incomplete information processing (i.e. fuzzy logic).
Knowledge Coding	<ul> <li>Knowledge is represented by rules and data structures.</li> </ul>	<ul> <li>Knowledge is coded in networks representing the relationships among input variables.</li> </ul>
Development	<ul> <li>Long development cycles with domain experts are typical.</li> </ul>	<ul> <li>Architecture and (hyper)parameters derivation and tuning can be time-consuming and difficult.</li> </ul>
Maintenance	<ul> <li>Managing and maintaining large databases of rules are challenging. Adding new rules and updating existing ones may be difficult.</li> </ul>	<ul> <li>Maintenance and management are often easy, and networks can be retrained based on changes in situational factors.</li> </ul>

# A.I. Landscape: China vs. U.S.

	China	United States
Institutional Norm	Large volume of <u>data</u> via proprietary systems, yet to focus on building innovation capacity. China tends to be averse to adopting the standard metrics structures used by most multinationals. Chinese A.I. initiatives are good at developing facial recognition as well as tools for surveillance and tracking.	A.I. ecosystem with <u>unified standards and cross-platform sharing</u> . More conducive to developing international standards for what is acceptable for law enforcement use of big data and A.I., and how they will be held accountable for abuse. Developing A.I. tools for surveillance and tracking remains a sensitive topic in U.S.
Regulatory Environment	Tends to set regulations <i>after</i> product commercialization. Pursues a strategy of " <u>military-civil</u> <u>fusion</u> " in A.I., as China devises a range of policy mechanisms to incentivize industry cooperation. A looser approach to digital regulations means that companies have more freedom to experiment.	Tends to set regulations <i>before</i> product goes to market. The White House has so far been characterized as " <u>missing-in-action</u> " in terms of policymaking for A.I.
Industry Structure	<u>592 A.I. companies</u> (23% of global). Came second in the total number of A.I. enterprises in the world in 2017, and contributed 48% of the world's total A.I. startup funding. A.I. Potential Index = 17.	Ranked first with <u>1,078 A.I. firms</u> (42% of global). Provided 38% of the funding for A.I. startups globally in 2017. A.I. Potential Index = 33.

# A.I. Landscape: China vs. U.S. (Cont'd)

## China

## **Institutional Norm**

- China has a large volume of data via proprietary systems.
- China has yet to focus on building its innovation capacity. But the nation has been supporting different research and workforce development, and reportedly aiming for international collaboration and expansion.
- In China, "outside companies do not plug in," but become part of the business as one of hundreds of players in an ecosystem.
- China tends to be averse to adopting the standard metrics structures used by most multinationals; local suppliers, distributors or customers become partners to help them achieve success in an uncertain business environment.
- With regarding to developing software and hardware in A.I., China looks at it from a marathon perspective.
- Chinese A.I. initiatives are good at developing facial recognition as well as tools for surveillance and tracking.

- The U.S. is in process of creating a data-friendly ecosystem with unified standards and cross-platform sharing.
- The U.S is producing more influential A.I. research, with a more robust ecosystem nurturing more competitive A.I. startups.

**United States** 

- Companies in U.S. tend create platforms which external parties either plug into or put to use directly.
- The U.S. believes it is essential to develop international standards for what is acceptable for law enforcement use of big data and A.I., and how they will be held accountable for abuse.
- The U.S. is driving A.I. innovation across the spectrum in both software and hardware, with more early adopters and innovators.
- In U.S., companies in A.I. tend to be averse to developing tools for surveillance and tracking.

# A.I. Landscape: China vs. U.S. (Cont'd)

## China

## **Regulatory Environment**

- China can be the leader in introducing new regulations for the A.I. industry in the world, suggested by Jeffrey Ding, Macrostrategy Researcher at Future of Humanity Institute in Oxford University.
- The Chinese government sets regulations <u>after</u> product commercialization in the market.
- China pursues a strategy of "**military-civil fusion**" in A.I., as it wields a range of policy mechanisms to incentivize industry cooperation.
- The Chinese government is willing to give private entrepreneurs the opportunity to test ideas, e.g. creating policy frameworks, providing subsidies and setting preferential policies to help them.
- A looser approach to digital regulations means that companies can experiment more freely.

• The White House has so far been characterized as "missing-in-action".

**United States** 

- Regulations are often devised <u>before</u> the product goes to the market.
- U.S. companies with the best A.I. technology are often considerably less willing to invest in national security applications.
- In 2017, the U.S. government drafted the first policy to move the U.S. public sector beyond acknowledging the significance of A.I., and toward fully embracing A.I. technologies.
- More emphasis placed on **digital regulations**, e.g. tighter cryptocurrency regulations.

# A.I. Landscape: China vs. U.S. (Cont'd)

### China **United States** • With **592 A.I. companies** (23%), China came second in The U.S. ranked first with 1,078 A.I. firms, the total number of A.I. enterprises among the world in representing 42% of the total worldwide. 2017. About 50% of global A.I. investments went to U.S. Chinese A.I. companies received RMB 63.5 billion (USD) startups, reaching RMB 97.8 billion (USD 15.5 billion) 10.1 billion) in funding as of June 2017, and collectively as of June 2017, and leading the world in terms of funding.

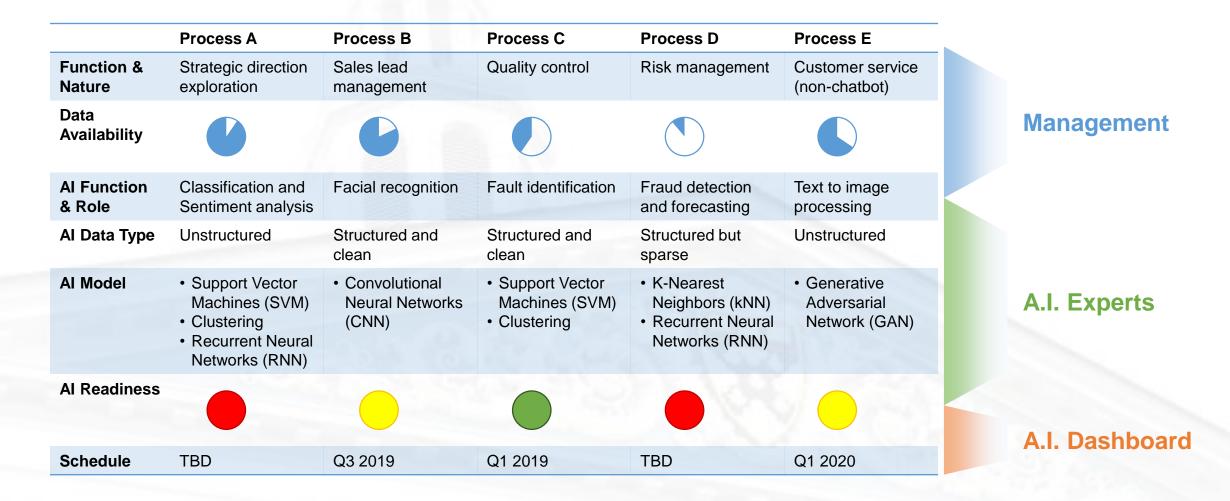
- In 2017, the U.S. provided 38% of the funding for A.I. startups globally, and led in both the total number of A.I. startups and total overall funding.
- 50% of semiconductors in the world is produced by the U.S.
- Silicon Valley companies are dominated by a diversified culture.
- The "AI Potential Index" of U.S. is 33.

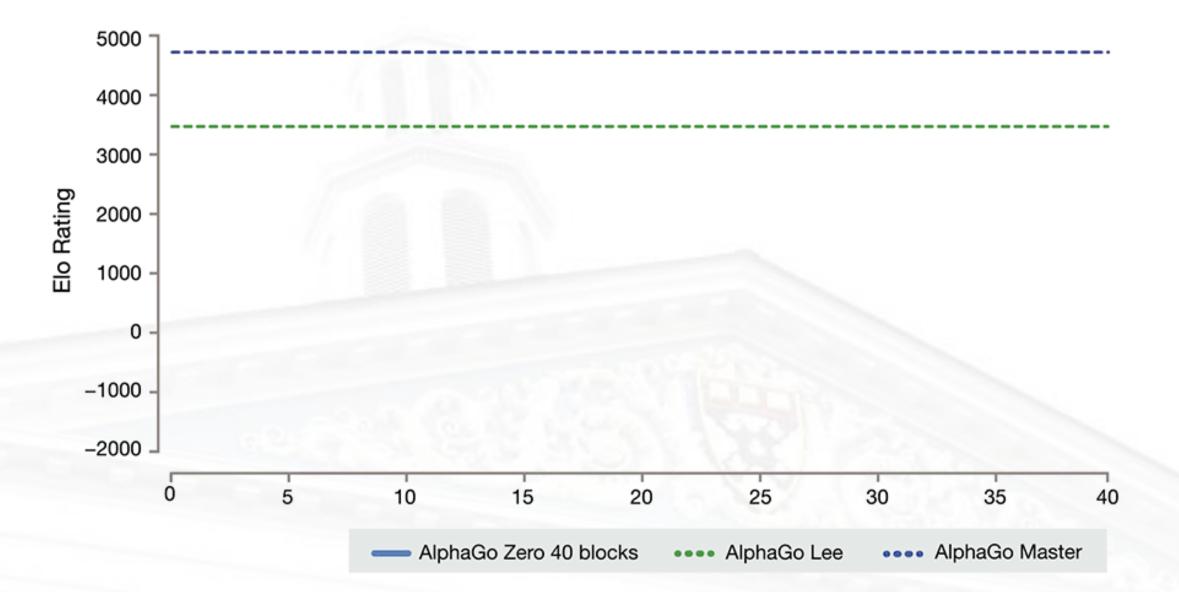
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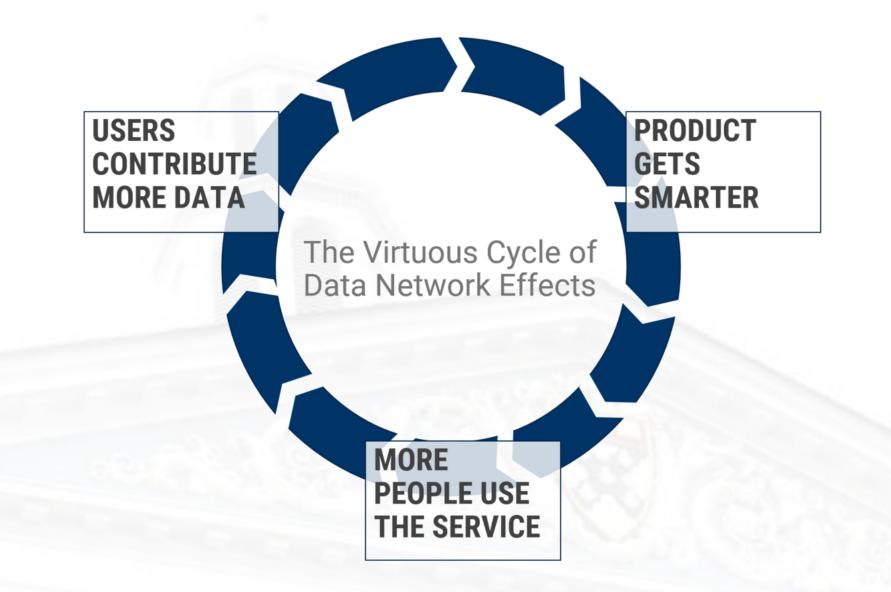
## **Industry Structure**

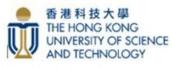
- ranked No. 2 in the world in terms of capital raised. Most funds were raised from domestic sources.
- China overtook the U.S. in terms of A.I. startup funding, with the former contributing 48% of the world's total A.I. startup funding in 2017. But in terms of individual deals, China only accounted for 9% of the total.
- Chinese production of semiconductors is only 4% of the total global market share.
- · Most Chinese companies tend to only hire Chinese people, focus on the China market, and may lack an international vision.
- The "AI Potential Index" of China is 17, almost half of that of U.S., according to an analysis at the University of Oxford.

# A.I. Implementation Matrix









## MAFS6010U: Artificial Intelligence in Finance

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Team leaders should collect the completed forms from the whole team and e-mail them to course TA Mr. Yifei Huang at aifin.hkust@gmail.com on or before February 22, 2019 (Fri).

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**Basic Information** 

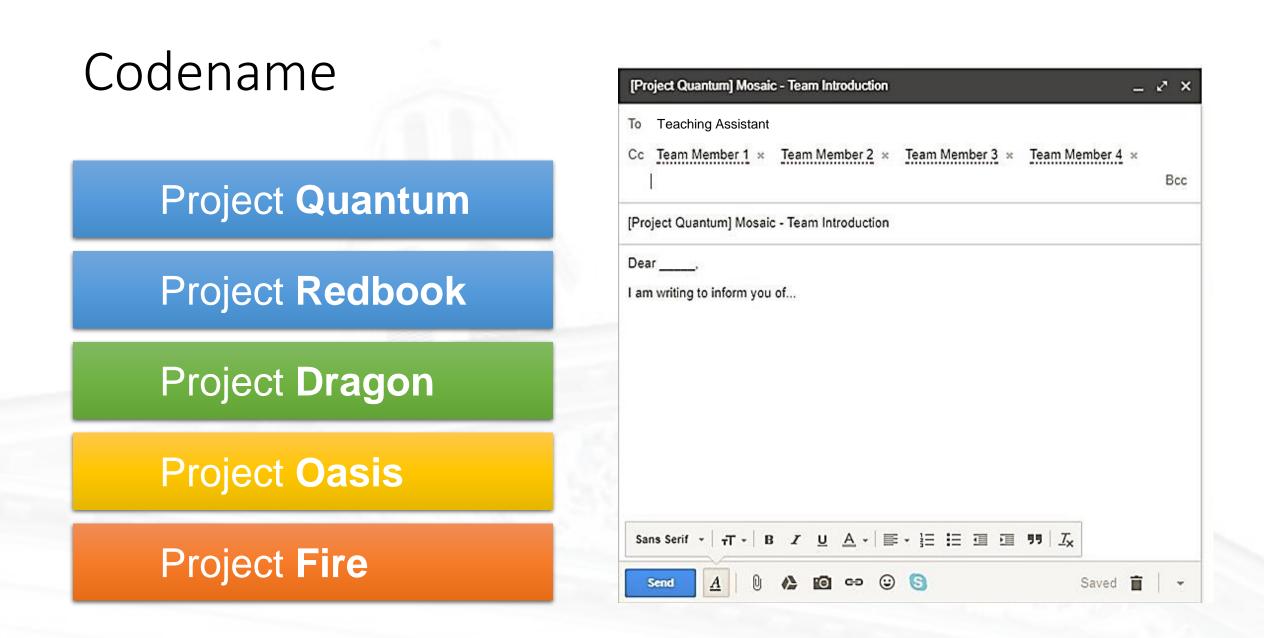
English Name	Chinese Name	Photo
Name you prefer to be called:		
Program at HKUST:		
E-mail:		
Student ID:		

## Academic & Professional Background

What is your undergraduate university and major?

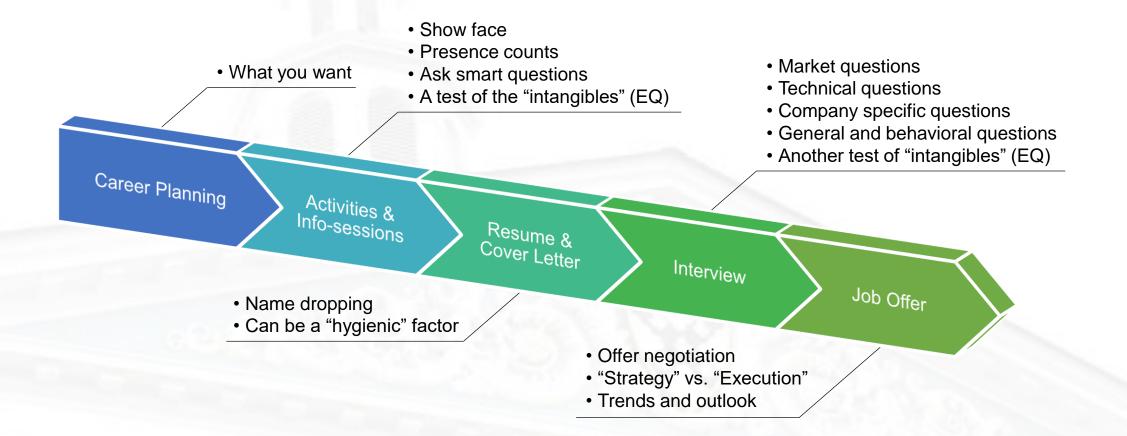
Brief description of recent work experience (including internships):

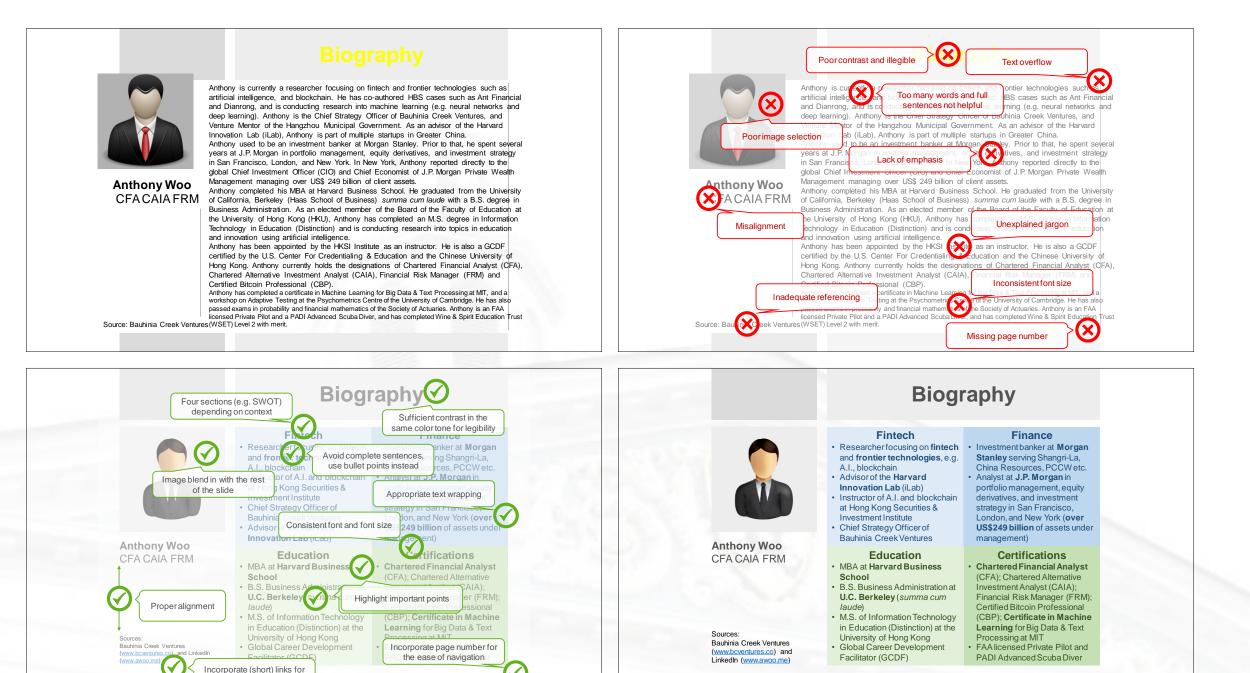
Share with us something unique about yourself that is important to you (e.g.



	Aug 2011 May 2013	<ul> <li>MORGAN STANLEY ASIA</li> <li>HO Associate, Investment Banking Division – Hong Kong Corporate Finance Coverage</li> <li>Shangri-La Asia inaugural issuance of US\$600MM under US\$3Bn Medium Term N</li> <li>Multiple senior unsecured bond offerings for Hong Kong corporates, such as Kerry E (US\$600MM), Hang Lung Properties (US\$500MM), Nan Fung (US\$300MM), and</li> </ul>	Note Program Properties
W	Summer 2010	<ul> <li>Summer Associate, Investment Banking Division – Technology, Media &amp; Telecom</li> <li>US\$272MM IPO of Dangdang Inc., China's largest B2C e-commerce company (equ</li> </ul>	-
	2006 - 20 J 2008 - 200> 2006 - 2008	<ul> <li>J.P. MORGAN CHASE &amp; CO.</li> <li>Investment Strategy Analyst, J.P. Morgan Private Wealth Management</li> <li>Sole analyst directly supporting the global Chief Investment Officer (CIO) and Chie</li> <li>Financial Analyst, J.P. Morgan Private Bank</li> </ul>	<b>NEW YORK, NY</b> of Economist of PWM <b>N FRANCISCO, CA</b>
	Summer 2007	Financial Analyst, J.P. Morgan Private Bank, EMEA Equity Derivatives Group	LONDON, UK
	Education 2015 – 20 HU	UNIVERSITY OF HONG KONG HO Master of Science in Information Technology in Education (Specialist Strand: e-Leade	<b>DNG KONG, CHINA</b> ership), <i>Distinction</i> .
E	2009 – 20 <b>HA</b>	HARVARD BUSINESS SCHOOL MBA. Co-producer, Asian Cultural Show. Advisor, Harvard Innovation Lab (iLab)	<b>BOSTON, MA</b>
	2002 – 20 <b>UC</b>	002 – 20 UC UNIVERSITY OF CALIFORNIA, BERKELEY – HAAS SCHOOL OF BUSINESS BERKELEY, CA Bachelor of Science in Business Administration, <i>summa cum laude</i> (cv. by tive GPA: 3.9, top 3% of class). Dean's Honor List (02-06). President, California Investment Associat MT as-sponsored investment fund)	
Т	Technology- related Certifications	Certificate on Machine Learning for CB e on Deep Learning and Machine Learning Intelligence Laboratory (CSAIL). Ce CB e on Deep Learning and Machine Learning Certified Bitcoin Professional (CBP). Enducted research into Probabilistic Topic Mod	with TensorFlow.

# Career Roadmap & CV Clinic





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