

CCST 9080

FinTech: Financial Inclusion, Emerging Markets, and Social Value

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Course web page

<http://moodle.hku.hk>

CCST9080 [Section 2A, 2024]



Course Structure

Lectures/Guest
lectures/seminars (f2f)



[10%]
Tutorials
(~10 sessions, f2f)



[20%]
Assignments and/or
Essay, report writing [30%]



Consultation
& Help channels



[40%]
Group project





Tutorial groups

- 10 tutorial groups (Mon/Tue)
- Registration/Tutorial group selection
 - * Go to Moodle, **we will open the selection page by 00:00 on 23 Jan to 23:59 on 26 Jan.**
 - * Each student should only select **ONE** tutorial group
 - * **FIRST COME FIRST SERVE**
 - * Each tutorial group is limited to about 13 students
 - * You can change your choice of session as many times as you want before the deadline.
 - * Note that **you MUST complete the registration by Jan 26 (Sun) 23:59.**

What to learn in this course?

CLO1. [Technologies driving FinTech]

Describe the technologies that drive FinTech applications

CLO2. [Issues in traditional financial services]

Understand the issues of traditional financial services, e.g. unbanked, underbanked, gender issues, in particular, in developing countries.

CLO3. [How FinTech helps?]

Describe how FinTech can help to solve some problems of traditional financial services

CLO4. [Cyber security & regulation]

Understand issues (e.g., cyber security, regulations) introduced by new FinTech applications.

CLO5. [New FinTech applications]

Propose new FinTech applications to help improving the financial services of the society.

Finance is critical to a country's (city's) economy! 35 rank



Q: Ranking of HK's financial center in the world?

#1: <u>New York</u>	(763)	#1
#2: London	(750)	#2
#3: Hong Kong	(749)	#4
#4: Singapore	(747)	#3
#5: <u>San Francisco</u>	(742)	#5
#6: <u>Chicago</u>	(740)	#9
#7: <u>LA (Los Angeles)</u>	(739)	#1
#8: Shanghai	(738)	#6
#9: Shenzhen	(732)	#11
#10: Frankfurt	(730)	#13

In fact, HK always among top 5 in the past few years! And usually 1st or 2nd of Asia (also this time)!!

Beijing? #18 #15
Guangzhou? #35 #30

Others:
Seoul #11(-1)
Tokyo #20(-1)

Other mainland cities: Qingdao, Chengdu, ...

* The Global Financial Centres Index 36 (September 2024)

https://www.longfinance.net/media/documents/GFCI_36_Report_2024.09.24_v1.1.pdf

How about FinTech

FinTech (Financial Technology) - Technology underpins the transformation and growth of the financial service industry

Trend
The application of information and communications technology (ICT) in the field of financial services

6 US centers (Boston #12) and 6 Chinese centers (HK #9, Beijing #11, GZ #14, Shanghai #15, Chengdu #17) are among top 20

Reflects that these cities continue to focus on the development of technology applications.

FinTech ranking?

- #1 New York (0, 737)
- #2 London (0, 725)
- #3 Shenzhen (+1, 722)
- #4 San Francisco (-1, 721)
- #5 Washing DC (0, 720)
- #6 Los Angeles (0, 719)
- #7 Chicago (+2, 718)
- #8 Singapore (-1, 717)

How about HK? **#9**
(+5, 716), #14 (Mar 2024)

Chart 49 | Most Important Elements In Generating A Competitive Environment For FinTech Providers

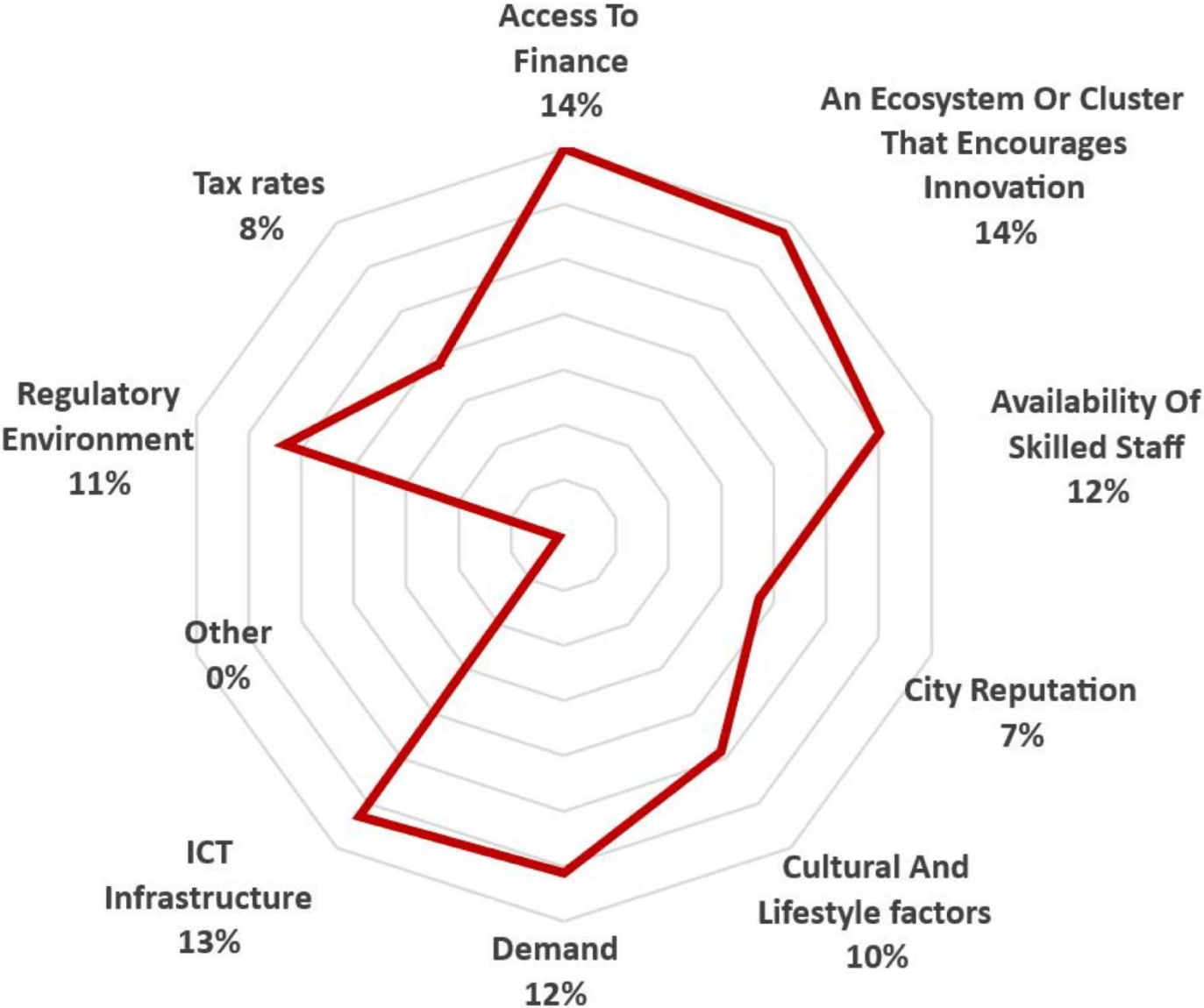
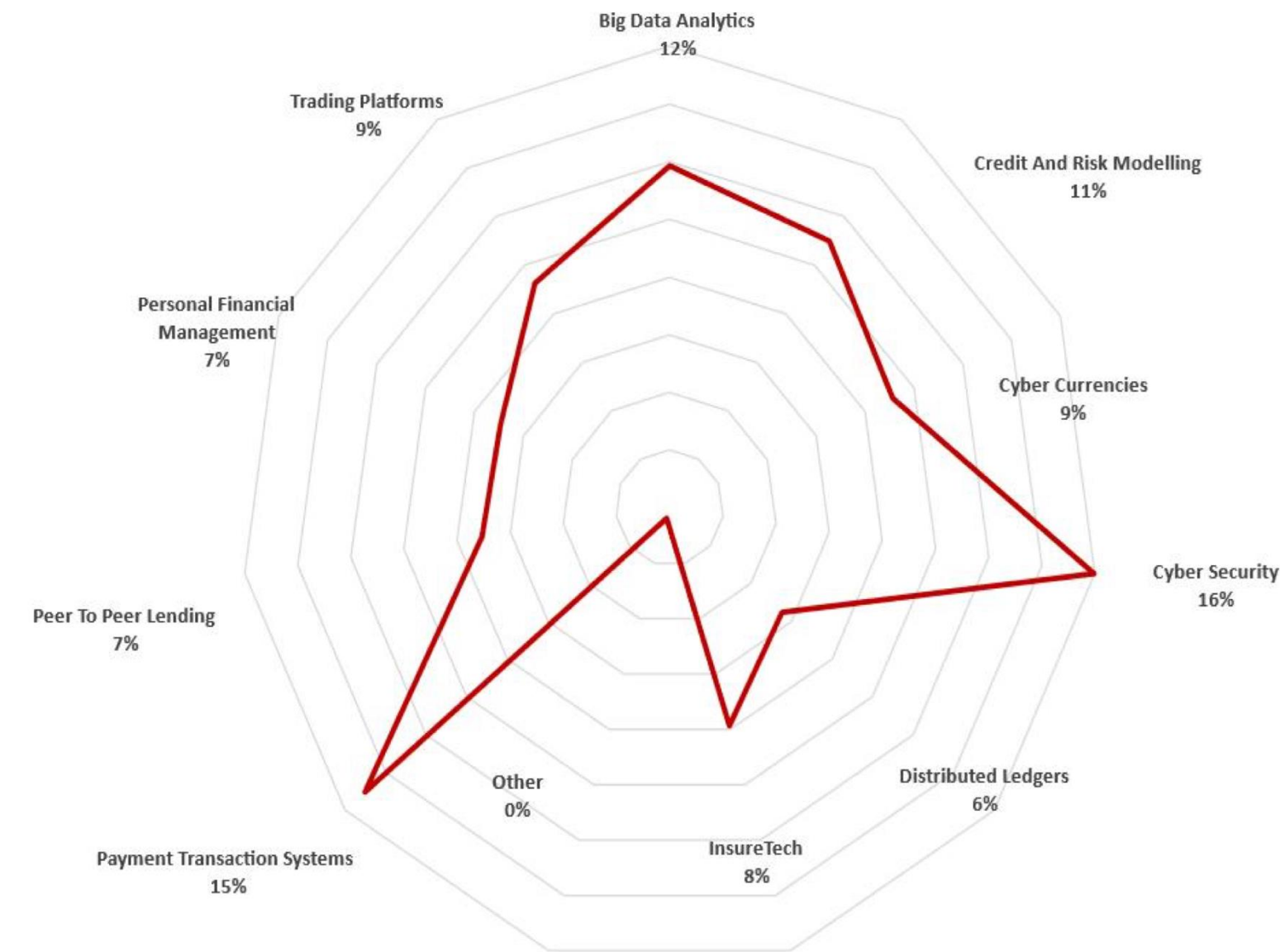


Chart 50 | Most Important Areas Of FinTech Activity



Major focus of HK Government

Maintain HK as a leading financial center

=> **Develop HK as a global FinTech hub.**

Facts:

- Home of about 1,000 FinTech companies & startups
- Dec 2022, listing of the first Bitcoin futures ETF and Ether futures ETF in HK (an important milestone for the virtual asset ecosystem in Asia)

Q: What is ETF (Exchange-traded fund)?

Q: What is futures ETF?

Q: What is Bitcoin futures ETF?

- New platforms (e.g. FINI).....

- As at Oct 2023, 175 **ETPs** listed, including first metaverse-themed ETF, carbon futures ETF, first blockchain ETF, and Asia's first crypto asset ETF....

Why computing is so important in FinTech?

What technologies are behind FinTech?

Examples

Digital payment



Robot advisor

- Already exist for beginners to advanced level users

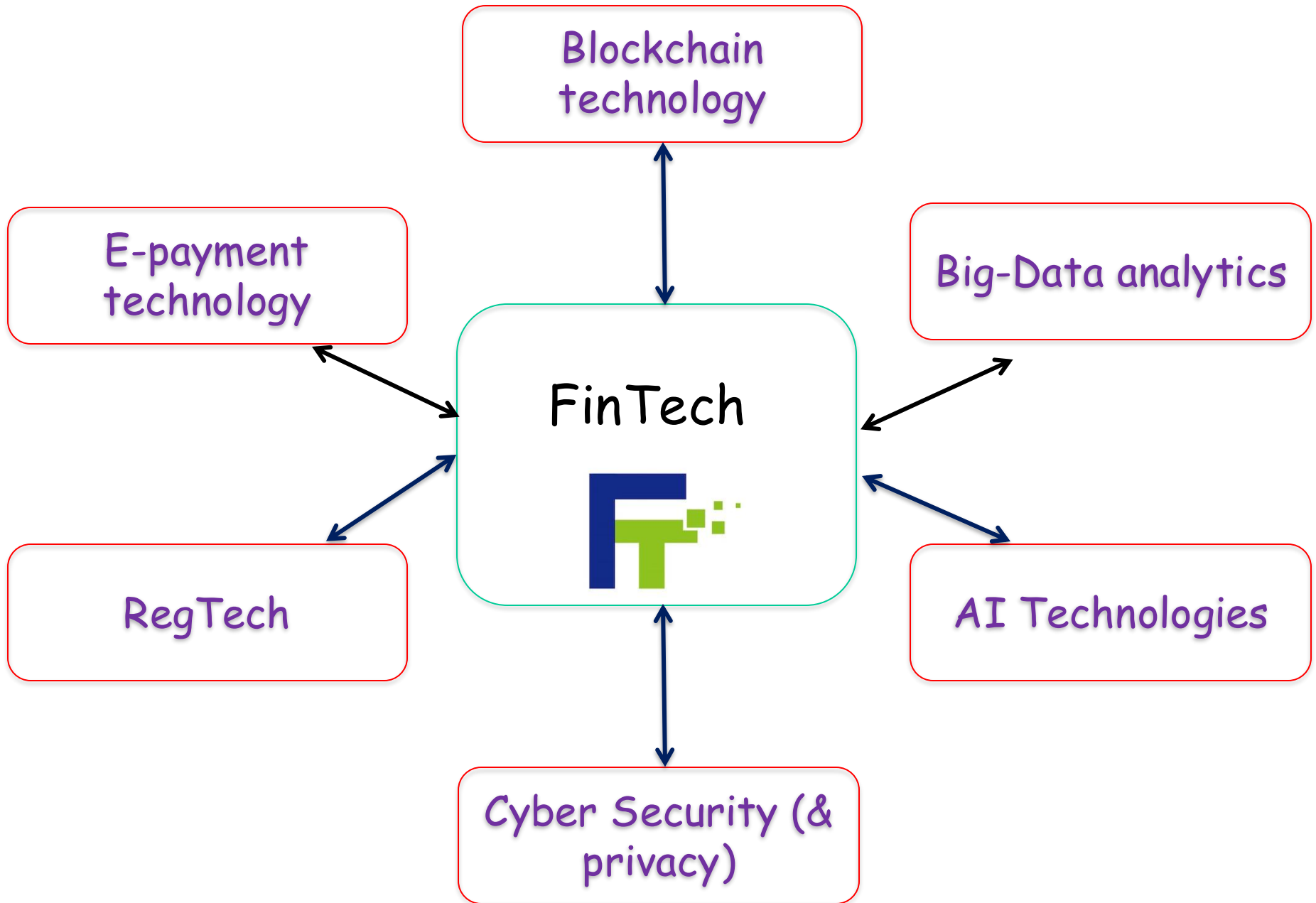
E.g. Automatic chatbot providing portfolio management advice.



Blockchains?

Regulatory Technology (RegTech)?

What else?



E-payment

- Most of us have experience on using it
(e.g. PayMe, Alipay, Apple Pay....)



⇒ Business on digital wallets

⇒ Cross-over on different e-payment platforms?

- Cross-border (cities/countries) transactions
- Multi-currency issues
- Security/privacy problems
- Regulation (legal) issues

- Survey on market shares
- How the companies make money

Remark: You should have heard about Mainland's
"Central Bank Digital Currency" (CBDC, e-CNY)?
And how about HK's eHKD?

Interestingly, there are many/different reasons behind a country's study of CBDCs:

Fake paper money issue

Better surveillance

Inefficiency of using cash

Internationalization of currency

Financial inclusion

.....

Q: Why these motivate a country to go for CBDC?
What else?

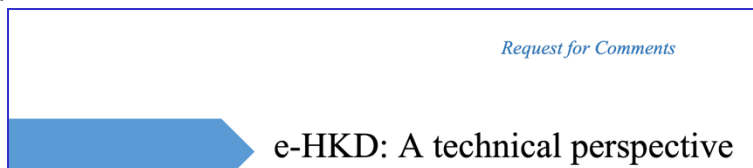
Q: Besides China, do you know what other countries have started their studies on (retail) CBDCs?

Sweden, Bahamas, Eastern Caribbean Currency Union, Marshall Islands

In fact, HKMA is also actively doing studies on CBDC (e-HKD)



E-payment, CBDC, cryptocurrency
(Q: how are they related?)



AI Technologies

- Most of us have a brief understanding on this.

Treasury & Capital Markets

Almost 90% of Hong Kong banks are adopting artificial intelligence

Drivers of AI adoption include improving customer experience, staying cost-effective and managing risk, according to HKMA report

⇒ Robot advisor, customer services (now even ChatGPT)

Algo-trading (AI assisted)

E.g. Apr 2020 - negative crude oil price? (\$0 to **-\$40** per barrel) [**1st time ever**]

Some companies actually predicted it using AI technology!!

- **Big data analysis**
- **Automatically provide investment advice/instruction**
- **RegTech related too**

损伤已成功识别
(Damage identified)

566元 Cost

ZL201610032808.7	车用尿素溶液生产系统及控制方法	珠海格力智能装备有限公司, 珠海格力电器股份有限公司	董明珠, 曾威, 张秀峰, 龚轲, 翟新春
ZL201610046584.5	基于多张图片一致性实现保险理赔反欺诈的方法及服务器	平安科技(深圳)有限公司	王健宗, 李虹杰, 肖京
ZL201610080151.1	一种激光能量调节装置及激光微加工设备	广东正业科技股份有限公司	余廷勋, 徐地华, 郭明祖, 梅领亮, 陈伯平

[An invention award]

From: <https://tech.pingan.com/en/news/392513296486.shtml>

- AI system: 智能閃賠系統 (平安車保)
- Owner only needs to upload photos, system will quickly calculate the cost.

Ping An Property & Casualty
Insurance Company of China, Ltd

Just in 2017, profit: 8,000M;
auto-cases: 99.7%; manpower:
-30%; time to determine damage:
increased by 4,000 times

Big data analytics (大數據分析)

- Applied to many other areas (marketing, COVID-19 analysis,)

For FinTech

- Investment
- News/reports automatic analysis (natural language processing) etc. <= a very hit topic now (e.g. ESG)

Do you know what is ESG?
An example project in ESG....

New business

Q: Do you know what is virtual bank? How many licenses HKMA has issued? 8

E.g.

Infinium (Tencent, ICBC, HKEX, Hillhouse Capital)

SC Digital (Standard Chartered, Ctrip, HKT, PCCW)

Insight FinTech (Xiaomi, AMTD group)

Ant SME (Ant Financial)

.....

Heavily involve
Tech
companies

.... The development of virtual banks will promote the application of financial technology and innovation in Hong Kong.... virtual banks can help promote financial inclusion

....

Q: Virtual bank vs e-banking?

普惠金融: For those unbanked or underbanked entities to access financial services, e.g. individuals with limited salary (~20% underbanked in US) , SMEs not able to meet lending requirements etc.

E.g. how much loan a bank can lend to a start-up?

Trend: risk analysis + big data analysis (related social media analysis)

A lot technical challenges for virtual bank

(i) AI - face recognition



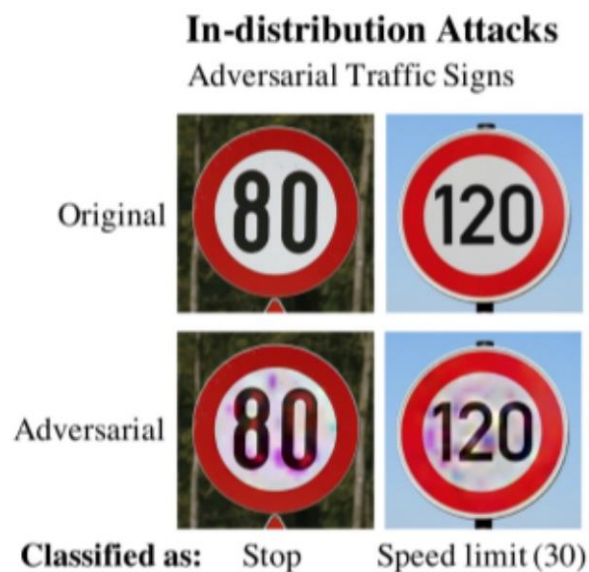
Which one is real,
which one is fake?



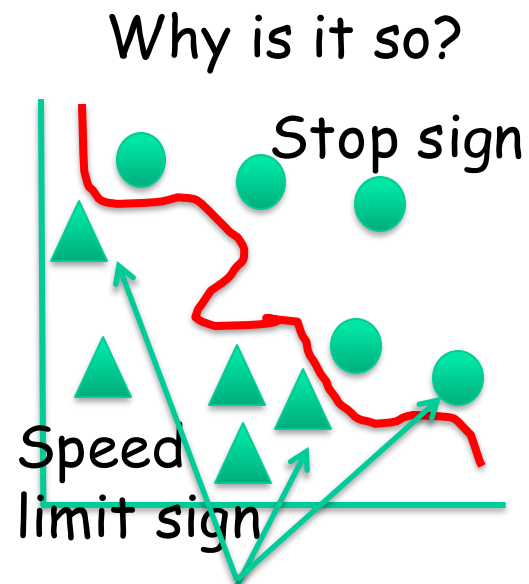
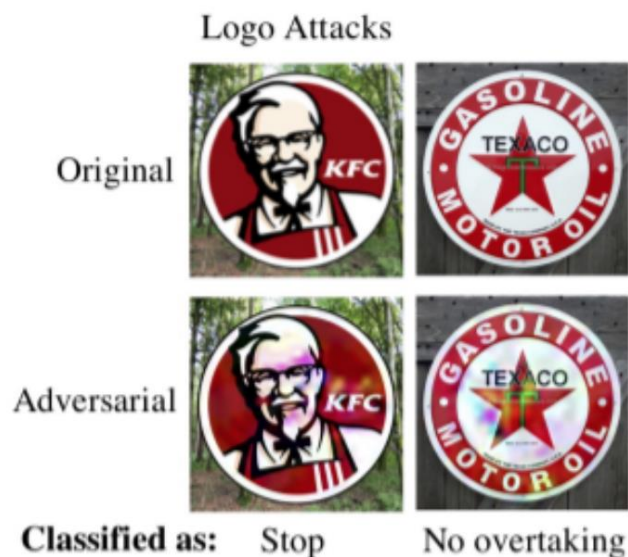
A lot of "attacks and defense" going on

- Fool AI system (adversary examples)
- Actively corrupt training data

More example: Researchers from US demonstrated that only a little bit modification to a road sign (e.g. Speed limit of 80m/hr sign => STOP sign)



<https://arxiv.org/pdf/1802.06430.pdf>



A small modification in the image may make it cross the classification line!

(ii) Voice recognition?
There are attacks too:

Little modification to original audio file can fool AI system to recognize a completely different transcript



[Reveal Transcription] “okay google browse to evil dot com”



[Reveal Transcription] “without the dataset the article is useless”

https://nicholas.carlini.com/code/audio_adversarial_examples

(iii) Special facial expression?



.....

Note: A tool (Zao's deepfake face-swapping app) replaces movie star face by yours => critical security issues?



***** Cyber security *****

- Very important topic
- Quite a bit fraud cases

Simplest ←-----→ Complicated

As simple as account password
(e.g. enable 2-factor authentication).

As complicated as anti-money
laundry, cryptocurrency frauds,
security of cryptocurrency
exchange, investment frauds.

E.g. Crypto fraud cases

(JPEX: lot of persons, at least 60+ arrested, 2000+ victims, loss of HK\$~1.6billions); many other cases in overseas too

RegTech

- New emerging area (Law + technology)

Blockchain

- bitcoin

Q: how many cryptocurrency we have?

Around 20,000* *According to CoinMarketCap

E.g. How to incorporate regulatory requirements in new FinTech apps

Top 20 cryptocurrencies make up 90% of market!!

Q: Except cryptocurrency, what else blockchain can help?
In particular, for FinTech?

A lot: music, e-certificate verification, data trading,

More recently, Web3, NFT



HKU FinTech Professional Certificate Program

HKU's [interdisciplinary FinTech Professional Certificate Program](#) compiles 3 courses:

- (1) Introduction to FinTech;
- (2) FinTech Ethics and Risks; and
- (3) Blockchain & FinTech: Basics, Applications and Limitations

Learners can earn professional FinTech certification upon completion of the three FinTech courses.

By Aug 20, the three courses have a total of 78,000+ enrolled learners who are engaged in the FinTech learning journey.

[Introduction to FinTech](#) began the rerun course on May 15 and now has 45,000+ enrolled learners. Graduates of Introduction to FinTech will be recognised 'Certified FinTech Professional' by The [Global Academy of Finance and Management \(GAFM\)](#).

The 2nd course [FinTech Ethics & Risks](#) launched on May 15, is the first FinTech ethics and risks MOOC in the world.

The 3rd course [Blockchain and FinTech: Basics, Applications and Limitations](#) will start on Aug 27.

The course already has 11,500 pre-enrolled learners. Have you signed up yet?

https://hkuesd.hku.hk:8000/enotice/notice/12961/_notice.html?timestamp=1602282490603

3 more HKU MOOC courses on FinTech:

- How advanced technologies are driving FinTech forward? [just released]
- Digital currency: The technologies, challenges, and opportunities
- E-payment and regulations

Remarks:

Besides investment on cryptocurrency, have you heard about **ICO (Initial Coin Offering)**? (vs IPO, Initial Public Offering)

Roughly speaking, attract people to invest on a new cryptocurrency so as to collect money for a project

However, many fraud cases (no regulations)
=> China stopped it in 2017!

But still possible in other regions of the world,
including HK

=> Research projects: can we evaluate and value an ICO proposal to advise investors?

Canadian cryptocurrency fund boss Gerald Cotten died – and US\$190million of his investors' money may be encrypted forever

- Investors in QuadrigaCX, Canada's largest cryptocurrency exchange have been unable to access funds since founder Gerald Cotten died in December, aged 30

Q: What it is for?

- His widow says she does not know his passwords – leading some angry investors to question whether Cotten really died while opening an orphanage in India

[Dec 2018]

About US\$190M cannot be accessed since they claimed that only the founder (died in Dec 2018) has the access key.

However, according to a report by Ernest & Young (court appointed monitor):

The company made a mistake transferring another 103 bitcoins to a wallet that they cannot access in Feb 2019 after the founder died!

Interestingly, some investigators claimed that all money in those wallets were emptied 8 months before CEO's death!

=> rumor: CEO faked his death and stole all money?

First tutorial:

- Start the week of 10 Feb (10 Mon/11 Tue)

A simple task

- In each tutorial group, we will form smaller groups of about 3 students.
- Each smaller group will be given a simple question, e.g. a terminology (what is a "cryptocurrency exchange"?) or a simple statement (do you think it is easy to open a bank account for anyone?) [The exact question to investigation will be announced later!]
- Each smaller group will try to investigate the question and come up with a brief presentation, TAs will observe and score your contribution as "tutorial participation".

<< Happy CNY and see you after CNY holiday >>