Citizenship and Social Development
Theme 3: Interconnectedness and Interdependence of the Contemporary World
Topic: Technological development and information literacy

Learning focus:

Brief introduction to the latest technological development around the world: artificial intelligence, big data, cloud storage of data

June 2023
(Translated Version)

Learning objectives

Knowledge

- To learn about the application and impact of artificial intelligence (AI), big data, and cloud storage of data in social life

Skills

- To be able to explore technology-related issues from multiple perspectives based on facts analyse different views with critical thinking skills
- To be able to make legitimate and reasonable judgments and decisions on social, moral and ethical issues from the perspective of new technology development

Values

- To recognise the value of technological progress and become citizens with spirit of exploration, good information literacy and humanistic spirit

Lead-in

If ancients travelled through time and space to today, what do you think would be the most surprising new technology for them?

It should be the smartphone, with which one can make real-time video calls with people from different countries through human face recognition, and also remotely control home appliances.

As long as we connect to cloud storage, we can download e-books, check corrected assignments, and browse study notes and e-books shared by other classmates for self-study, anytime, anywhere.

……
What is the most surprising new technology for you?

Global technological development trends

Based on the following short videos clips, describe how our lives benefit from new technological developments.

Video 1:
Innovative Technology Creates Quality Life

Source: The Hong Kong Productivity Council ("HKPC")
(https://www.youtube.com/watch?v=PDcYZgYad5k)

Click on the image to watch the video

Video 2:
"Wisdom China"- Episode 36: Intelligent industry and intelligent manufacturing in China

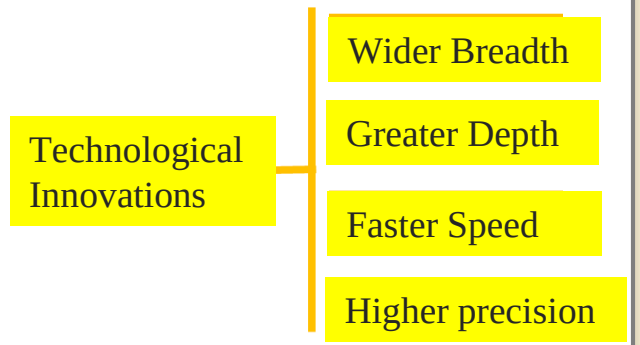
Source: Our Hong Kong Foundation
(https://www.youtube.com/watch?v=zbWZTHnt57o)

Click on the image to watch the video

Global technological development trends

Since the beginning of the 21st century, science and technology have developed by leaps and bounds. Mainly based on modern information technology, the development of science and technology has turned the technology industry into a new driving force for economic development. The development of new technologies has penetrated extensively into all areas of social life and can improve people's livelihood. But it also brings some hidden worries at the same time. For example, privacy leakages and offences resulting from the illegal or unethical use of information technology all merit attention.

Currently, technologies are continuously expanded and deepened worldwide, and the breadth, depth, speed and precision of technological innovations are unprecedented.



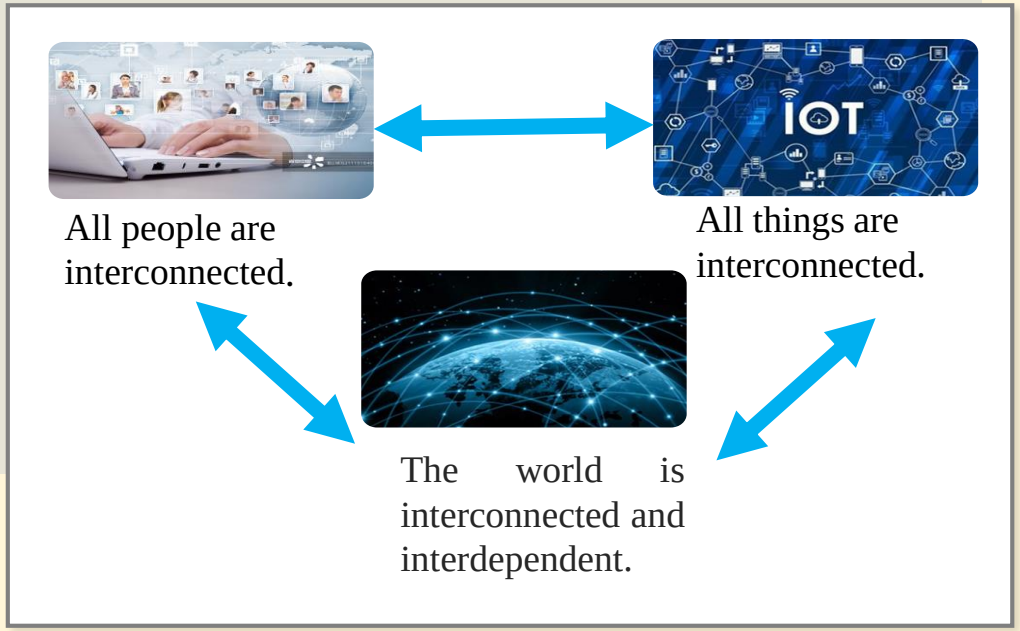
Global technological development trends

The rapid development of science and technology has profoundly changed the world

In recent years, new technologies have also kept emerging, such as the rapid development of information technology represented by artificial intelligence (AI), big data, cloud computing, the Internet of Things (IoT), and blockchain, etc., which are widely used in daily life, and have brought multi-faceted changes to our lives, such as:

- The continuous development of technological innovations has accelerated the digital transformation of the economy and society.
- The rapid development of information technology has resulted in increasingly closer links between people and between people and things.
- The world tends to become a whole, and is entering an era of intelligent interconnection of all things.
- Human life is constantly improving with convenience.
- Broaden the scope of human cognition and scientific knowledge.

And so on.....

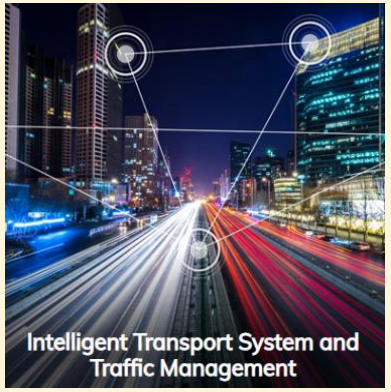


Global technological development trends

The rapid development of science and technology has profoundly changed the world

AI, big data and cloud computing, among others, have become the new focuses of technological development, and countries/regions around the world are trying hard to develop. For example:

- Our country is promoting the development of the AI industry at a faster pace, introducing a range of relevant policies which cover multiple areas including government affairs, healthcare, industrial Internet and manufacturing, and facilitating the development and application of technologies for the related industries.
- As early as back in 2017, the Smart City Blueprint for Hong Kong set out the policies and measures to be implemented in six major areas: “Smart Mobility”, “Smart Living”, “Smart Environment”, “Smart People”, “Smart Government” and “Smart Economy”.
- Big Data & AI World was held in London in 2022. Many participants of the event believed that digital transformation and big data analytics will bring new business advantages and better investment returns to enterprises.



Source: Smart City Blueprint for Hong Kong (https://www.smartcity.gov.hk/vision-and-mission.html)

Source: HKTDC

For more details, please refer to:

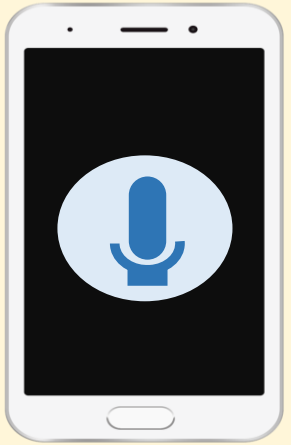
- www.gov.cn (http://www.gov.cn/xinwen/2020-06/25/content_5521854.htm)
- www.people.com.cn (http://finance.people.com.cn/BIG5/n1/2021/0528/c1004-32115575.html)
- Data at the Legislative Council Secretariat (https://www.legco.gov.hk/research-publications/english/1920in01-study-of-development-blueprints-and-growth-drivers-of-artificial-intelligence-in-selected-places-20191023-e.pdf)
- HKTDC (https://research.hktdc.com/en/article/MTA0MDUzOTUxMA)

Lead-in

The connotation of AI

When it comes to AI, people most likely think of robots. In fact, apart from robots, smartphones, voice input, voice assistants, translations, drones, biometric identification, etc. in daily life are all related to AI applications.

- Try to share the applications of AI in daily life.
- Have you ever used AI? Please share your experience.



Smartphone voice input and voice translation are the applications of AI-based technologies.

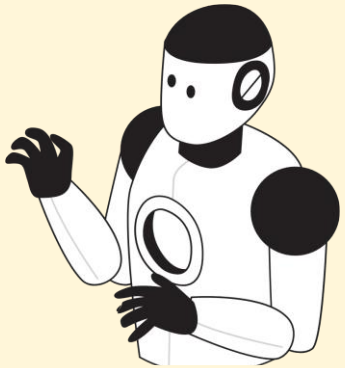
On 9 March, 2016, a man-machine battle in Seoul, Korea, attracted the attention of the world. It was a battle between the world's Go champion Lee Sedol and AlphaGo, an AI agent. Do you know the result of the game? Click on the image to learn more.

Sources:

- Cyberspace Administration of the People's Republic of China (http://www.cac.gov.cn/2016-07/21/c_1119259015.htm)
- www.xinhuanet.com (http://www.xinhuanet.com/science/kshztj/zt1.htm)

The connotation of AI

The term AI itself has many meanings, but in general AI refers to a machine-based system (especially a computer system) that can accomplish tasks requiring skills and abilities associated with human intelligence, such as visual and speech recognition, reasoning, learning and problem solving. AI enables machines to mimic various human behaviors, which is a process and ability to serve data analysis for learning and analysis.



AI can identify patterns from complex data and make predictions in various forms. For example:

- Enterprises use AI to assist in responding to customer questions and providing answers.
- AI can automatically recommend relevant products based on users' consumption habits.

And so on.....

Click on the image to watch RTHK's video "Artificial Intelligence, Robotics" to learn more about its development.

Source:

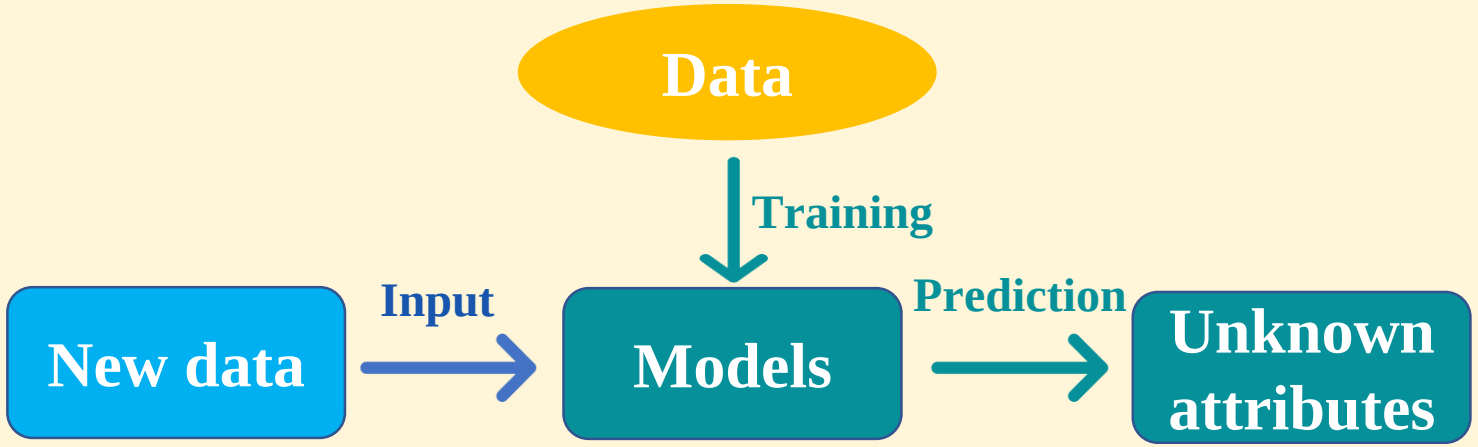
- The Legislative Council Secretariat (https://www.legco.gov.hk/research-publications/english/1920in01-study-of-development-blueprints-and-growth-drivers-of-artificial-intelligence-in-selected-places-20191023-e.pdf)
- RTHK: https://podcast.rthk.hk/podcast/item.php?pid=1807&eid=189316&lang=zh-CN

Reference

The connotation of AI

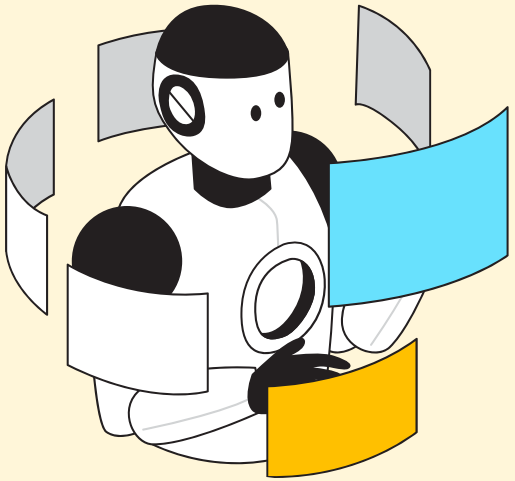
Machine learning

- Machine learning involves the study of how computers start from data observation, then look for patterns, and use these patterns to make predictions, so as to analogise or realise human learning behaviors.
- Machine learning is used in speech recognition and image recognition, etc. Machine learning is fulfilled through data storage in computers and application of relevant algorithms to process the data; this process is called “training” in machine learning. The results of processing can be used to predict new data, and are generally called “models”.



Applications of AI

The impact of AI is enormous. The application scenarios of AI have become very extensive, and those such as human-machine interaction, image recognition, biometric identification, and machine translation have changed our lives without noticing them, helped us explore unknown areas, and greatly changed industrial and agricultural production, livelihood, learning, commerce, society, international trade, etc., bringing significant and far-reaching impact.

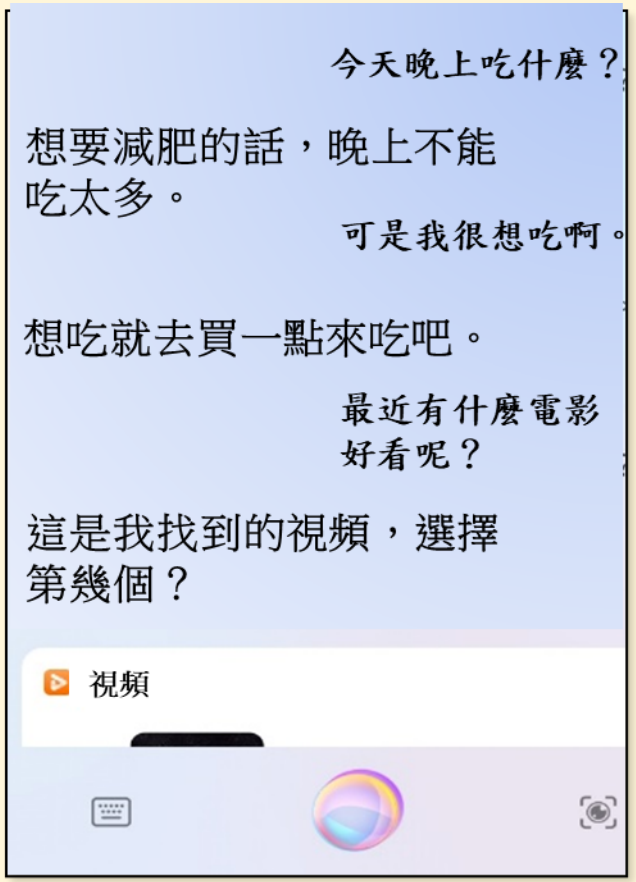


Applications of AI in daily life

Human-machine interaction

The human-machine interaction technology mainly involves the study of information conversion between people and computers. Among which, man-machine dialogue (i.e. voice interaction) is a common interaction mode, involving speech acquisition, speech recognition, semantic understanding and speech synthesis. Today's smartphones and a lot of navigation software can achieve that.

Have you ever talked to a robot on your smartphone? Try to feel the difference between human-machine dialogue and chatting with real people.



Screenshot of a human-machine dialogue recording, with AI on the left side of the dialog box

Applications of AI in daily life

Voice recognition

Most smartphones have an AI voice input (speech-to-text) function, and the built-in speech recognition program in the smartphones allows users to input text through speech. Currently, most smartphones can also support users to input voice commands, for example:

- Access information from the calendar
- Search the Internet for information such as restaurant reservations, weather, news, etc.
- Set up an appointment and send messages
- Initiate apps on smartphones and so on...

Voice input

Applications of AI in daily life

Image recognition

Image recognition refers to the technology of using computers to process, analyse, and understand images to identify different patterns of targets and objects. Every image has its own features, and the biometric identification technology is developed on the basis of image recognition.

Use AI image recognition to identify flower names

In daily life, we can use software with the AI-based image processing technology to help us identify the things around us. For example, search for plant varieties and the related data.

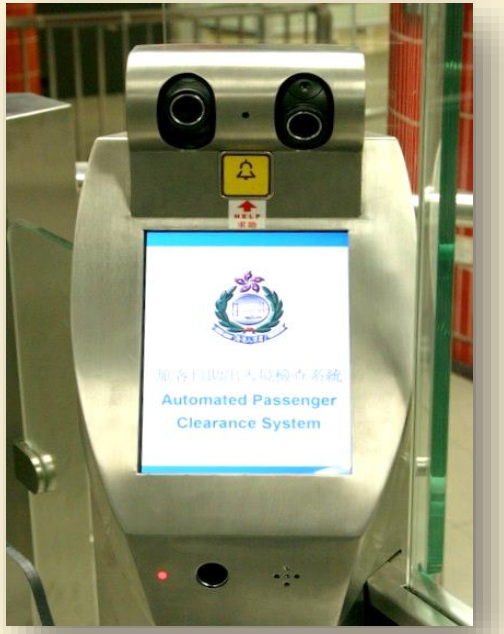
Read related reports: "Smart plant recognition software helps you become a plant expert easily"

Source: www.people.com.cn (http://kjsh.people.cn/BIG5/n1/2017/0920/c404389-29545988.html)

Applications of AI in daily life

Biometric identification

Biometric identification technology involves a wide range of contents, including fingerprints, palm prints, pupils, faces, pulses, gait and other biometrics.



“ e-Channel ” uses pupils and fingerprints to automatically match Hong Kong residents to make entry records.

Immigration Department
The Government of the Hong Kong Special Administrative Region of the People's Republic of China

Biometric identification can be seen everywhere in real life to help confirm the identity of users, such as unlocking smartphones through face recognition; and “fingerprint payment” in mobile payments.

Source:

- The Office of the Government Chief Information Officer (“OGCIO”) (https://gia.info.gov.hk/general/202012/29/P2020122900235_357494_1_1609241317879.pdf)
- Immigration Department of the HKSAR (https://www.immd.gov.hk/eng/services/echannel_residents.html)

“ iAM Smart” uses the fingerprint and face scanning biometric identification functions to confirm users.

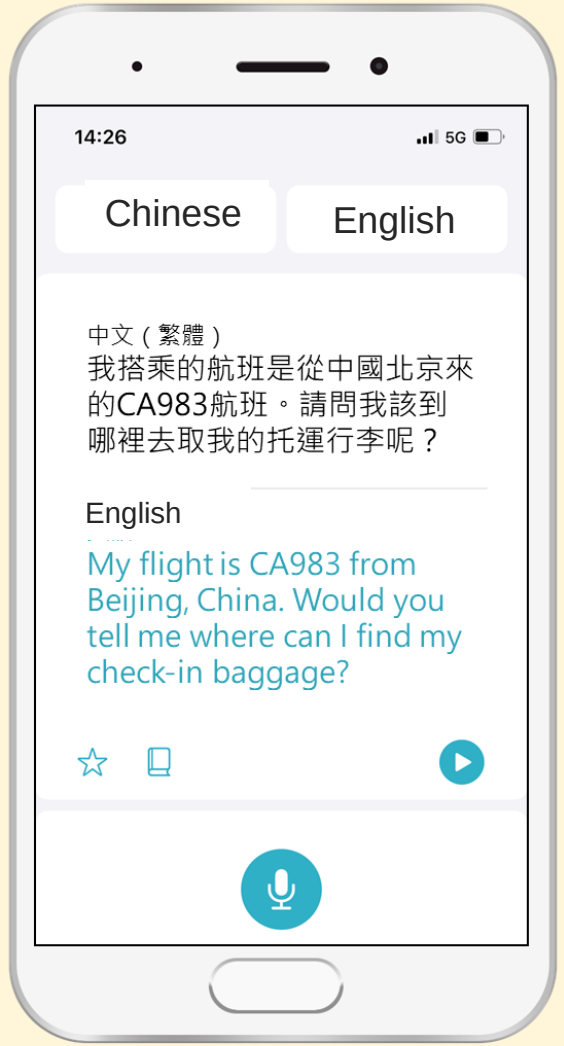
政府資訊科技總監辦公室
Office of the Government Chief Information Officer

Applications of AI in daily life

Machine translation

Machine translation is the use of computing and specific techniques to translate one language into another.

When we travel abroad, the use of AI translation technology can facilitate our communication without understanding the local language. With speech translation, after a user speaks a sentence, the software can instantly translate it into the local language and play the voice.



An example of machine translation

Applications of AI in daily life

Smart sports and smart facilities

Watch the video:

“Wisdom China”, Episode 25: Smart Sports and Smart Facilities

- China set “Fitness for All” as a national strategy in 2009. By 2020, 700 million people across the country did exercise at least once a week, and technology had become an important pillar in promoting sports.
- By now, many provinces and cities such as Beijing, Jilin and Fujian have set up smart sports parks, which employ AI to enable citizens to have healthier living habits. There are intelligent information system devices in the parks, whereby citizens can register on the screen through face recognition before using them, and then they can check their exercise time, running distance, and even the calories consumed, etc.; the system will also provide tailor-made exercise advice according to the age, height and gender of citizens to enhance the quality of exercise.

Click on the image to watch the video

Source: Our Hong Kong Foundation (https://www.ourhkfoundation.org.hk/en/event/90/our-hong-kong-foundation/%E3%80%8A%E6%B1%9F%E5%B1%B1%E5%A4%9A%E6%99%BA%E6%85%A7%E3%80%8B%E7%AC%AC%E4%BA%8C%E5%8D%81%E4%BA%94%E9%9B%86%EF%BC%9A%E6%99%BA%E8%83%BD%E9%81%8B%E5%8B%95%E5%8F%8A%E6%99%BA%E8%83%BD%E8%A8%AD%E6%96%BD)

AI is reshaping all walks of life

AI has brought wide-ranging influence on human society, not only affecting individual lives, but also having an important impact on socioeconomic development, such as altering the ways of various sectors including industry, agriculture, commerce, and healthcare. After years of development, AI has taken on new features such as deep learning, interdisciplinary integration, human-machine collaboration, and autonomous control, which have a significant and far-reaching impact on socioeconomic development. Hence, AI is expected to usher in a new wave of high-speed development in all walks of life as a basic technology framework.

Rice seedlings are raised through fully automatic smart factories in a modern agricultural science and technology demonstration park.

Source: www.gov.cn (http://big5.www.gov.cn/gate/big5/www.gov.cn/xinwen/2019-04/02/content_5378964.htm)

Application of 5G in smart healthcare.

Source: Cyberspace Administration of the People's Republic of China (http://www.cac.gov.cn/2019-10/08/c_1572065328428008.htm)

Some companies have established their Asia-Pacific headquarters in Hong Kong and entered the Mainland to expand their operations, providing AI application solutions to more than 1,000 major enterprises and government agencies in the Mainland.
Source: InvestHK (https://www.investhk.gov.hk/en/case-studies/integrate-ai-technology-our-daily-lives.html)

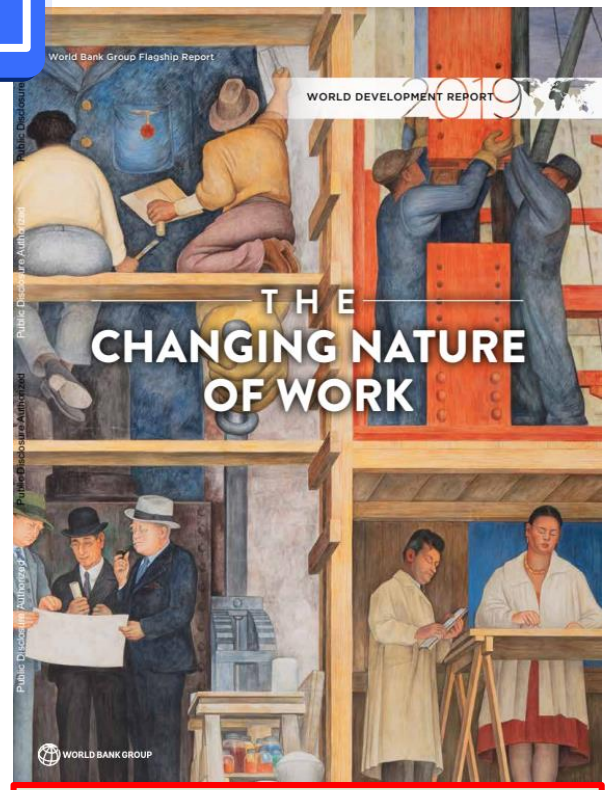
AI is reshaping all walks of life

AI can help enterprises enhance the level of the industry.

AI machines can work continuously for a long time, which greatly improve work efficiency. Robots can assist humans with some dangerous, heavy, monotonous, or repetitive work that lasts long hours.

In its 2019 report on the changing nature of work, the World Bank noted:

- Robots are assisting with repetitive tasks and will eliminate many low-skilled jobs in both advanced economies and developing countries. But at the same time, technology has opened a path to job creation, higher productivity and the provision of effective public services whereas new jobs require employees to have interpersonal skills such as problem-solving, communication, and collaboration.
- Governments can invest more in education, with a particular emphasis placed on early childhood development, so as to lay a solid foundation for them to acquire higher-order cognitive and socio-behavioral skills in the future.



Click on the image to read the report.

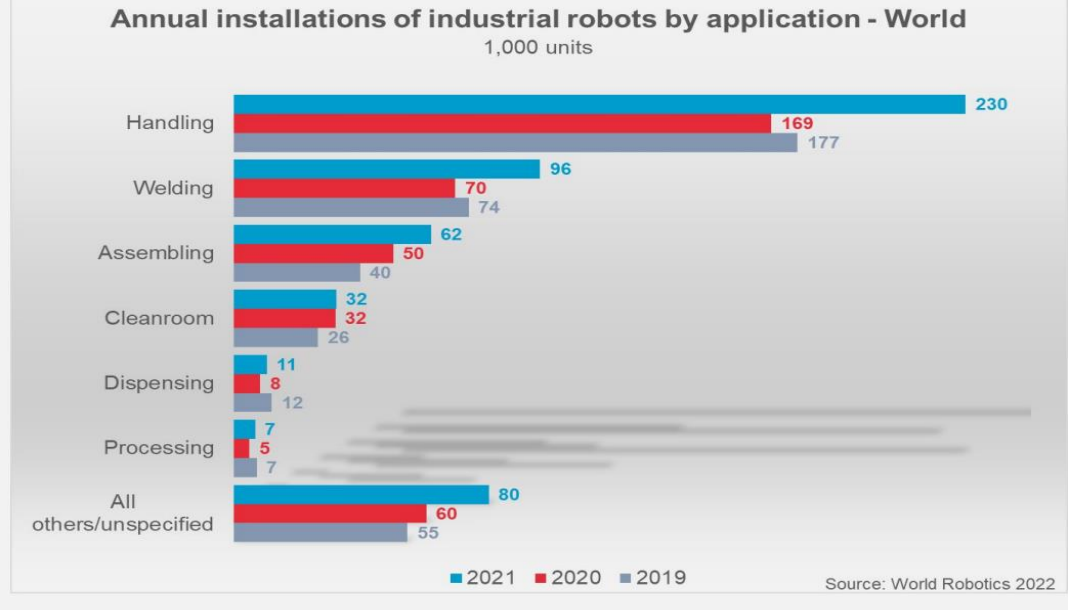
Learning activity: Search for examples of companies using robots to assist with production.

Source: World Bank Group (https://documents1.worldbank.org/curated/en/816281518818814423/pdf/2019-WDR-Report.pdf)

AI is reshaping all walks of life

Read the information below to learn about the development of AI robots and how to improve industrial efficiency.

Data



Source: International Federation of Robotics (https://ifr.org/downloads/press2018/2022_WR_extended_version.pdf)

Report

Click on the image to read the "World Robotics 2020" by the International Federation of Robotics.

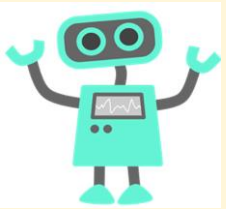
Video

Activity: Watch the video - Intelligent Robots Can Do Anything

Click on the image to watch the video

Question:

How can intelligent robots help enterprises to improve their working efficiency?



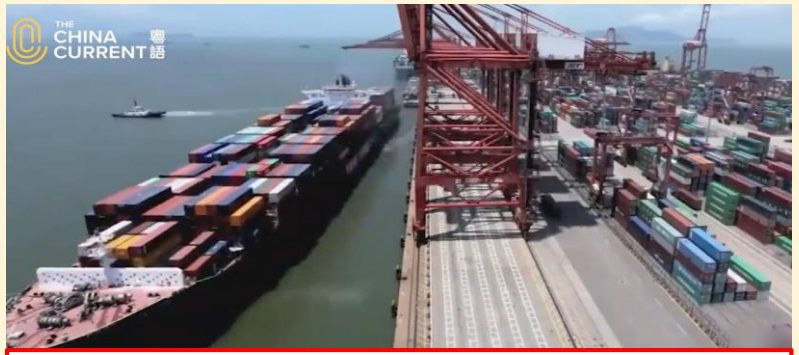
Source: HKPC (https://www.youtube.com/watch?v=v-FO3lp_gcM)

AI is reshaping all walks of life

Smart terminals

Our country's research, development and application of AI improving the efficiency of port container terminals has become a focus of media coverage both at home and abroad. Following are some examples.

The operations of the Phase-IV of Yangshan Deepwater Port in Shanghai are precisely automated, with all the core technologies independently developed and operated by China. The fully automated terminal production, management and control systems used by the Phase-IV of Yangshan Port are all independently developed by domestic enterprises.



Click on the image to watch the video about the Phase-IV of Yangshan Deepwater Port

In June 2021, Beidou navigation unmanned intelligent guided vehicles were transporting containers at the first fully automated terminal in the Guangdong-Hong Kong-Macao Greater Bay Area (Guangzhou Port Nansha Phase-IV Project).

Source:

- The Ministry of Transport of the People's Republic of China (https://www.mot.gov.cn/jiaotongyaowen/202104/t20210408_3558865.html)
- The China Current (https://chinacurrent.com/hk/story/22111/shanghai-yangshan-fully-automated-terminal)
- www.chinanews.com (http://big5.locpg.gov.cn/jsdt/2021-06/03/c_1211184825.htm)

AI is reshaping all walks of life

Example - Application of AI at the Beijing Winter Olympics

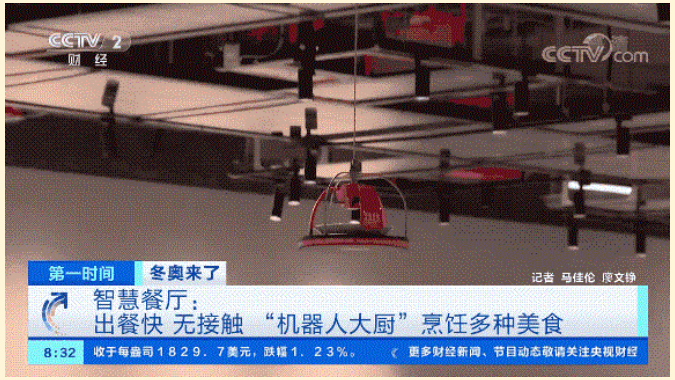
There have been extensive applications of AI in the Mainland.

Take the Beijing 2022 Winter Olympics as an example, the “smart restaurant” at the Main Media Center of the Winter Olympics became the focus of media, as it fulfilled “unmanned” operations from the preparation to the delivery of dishes.

AI was applied in intelligent disinfection robots which were used to sanitise the venues of the Winter Olympics Games.

Source: ThePaper.cn
(https://www.thepaper.cn/newsDetail_forward_16686624)

Smart restaurants



A disinfection robot is at work

AI is reshaping all walks of life

Example - Application of AI at the Beijing Winter Olympics

AI sign language anchor

CCTV and Baidu AI Cloud jointly launched the first AI sign language anchor to provide viewers with professional and accurate sign language translation, with the specifications of the sign language vocabulary it mastered all coming from the *National Universal Sign Language Dictionary*.

Baidu AI Cloud employed AI technologies, such as speech recognition and machine translation, to build complex and accurate sign language translation, realising the conversion from text, audio and video to sign language, and then adding natural movements especially developed for sign language to create avatars.

For other examples of AI applications at the Beijing Winter Olympics, read the information below.

Source:

- www.xinhuanet.com (http://www.news.cn/tech/20220218/ae40f75bbb0840d8870dc33817e1ac5c/c.html)
- ThePaper.cn (https://www.thepaper.cn/newsDetail_forward_16686624)

CCTV's first sign language AI anchor

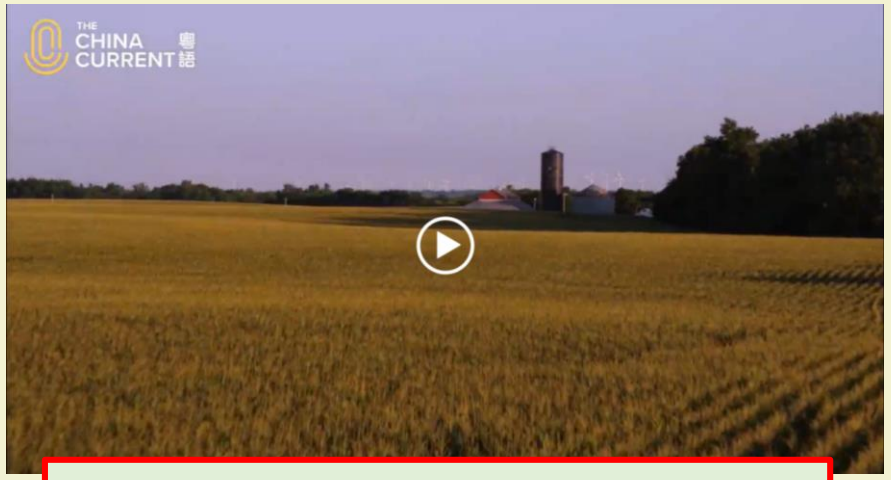
AI is reshaping all walks of life

Agricultural planting and breeding are integrated with AI and other technologies

AI applications in agricultural breeding can promote the development of agriculture and the breeding industry. Robots can automatically identify the type of crops and their stage of growth, and also determine whether the spacing between seedlings is appropriate; whether weeds should be removed; when to apply fertilisers; whether there are diseases and pests; and determine countermeasures based on these conditions. A number of large-scale technology companies in the Mainland have successively applied AI to the pig farming industry to promote the development of digital rural areas.

An UAV is carrying out seeding operations.

Video: New Trends in Smart Agriculture



Click on the image to watch the video

Source:

- www.xinhuanet.com (http://www.xinhuanet.com/politics/2021-03/21/c_1127236833.htm)
- The China Current (https://chinacurrent.com/hk/story/21006/ai-in-agriculture)

AI is reshaping all walks of life

AI has changed business operation models

The applications of AI in the finance industry are mainly focused on investment options and customer services.

In the retail industry, AI can analyse customers' previous purchase records and offer customers advice on purchases (such as recommending healthy menus and clothes of similar styles).

Many banks are starting to use online services and chatbots to provide customers with a variety of services. Chatbots are able to interact with customers around the clock, changing the operation model of banks.

Example of AI applications in a local bank

AI can bring convenience to our daily lives and consumption.

AI is reshaping all walks of life

AI applications in the healthcare industry

AI is promoting “ smart healthcare”. Following are some practical examples in the Mainland and Hong Kong.

- “ HA Go ”, the mobile application of the Hong Kong Hospital Authority, aims to help patients manage their medical appointments and healthcare arrangement in the public healthcare system. A number of public hospitals and private medical institutions in Hong Kong have already offered a video consultation service, which offers patients the benefit of being able to get medical advice via a video consultation in the comfort of their own home. The diagnostic reports and prescribed drugs can be delivered to the address provided by the patient via the app.

- Hong Kong’s first smart hospital, the Chinese University of Hong Kong Medical Centre (CUHKMC), opened in January 2021. The medical centre uses a fully electronic medical records system, mobile information technology, real-time data, and internet of things (IoT) applications to facilitate treatment, provide seamless medical services and integrate the services of different specialist medical teams.

Click on the image to watch the video

In the Mainland, 5G networks are integrated with telesurgery so that doctors can complete surgical operations through 5G-enabled computers, taking advantage of the characteristics of low latency and multiple connection points of 5G networks to complete complex surgeries.

Sources:
- Hong Kong Government Press Release (https://www.info.gov.hk/gia/general/202204/06/P2022040600401.htm?fontSize=1)
- HKTDC (https://research.hktdc.com/en/article/ODQ5NjEzNDA1)
- The China Current (https://chinacurrent.com/education/article/2020/04/21964.html#eng)

AI is reshaping all walks of life

Application of AI in education

Besides the fact that more and more enterprises are scrambling to develop AI products, the application of AI in education is also drawing increasing attention. For example, the Education Bureau organises a number of professional development programmes for teachers on different topics on innovative technologies such as drone programming, robotics and AI to promote the development of information technology education.

Source: The Legislative Council (https://www.legco.gov.hk/yr20-21/english/panels/itb/papers/itb20210913cb1-1294-2-e.pdf)

The Mainland and Hong Kong have made a lot of efforts and attempts on enhance learning efficiency in schools with AI, and accumulated valuable experiences. Following are some practical examples.

- www.people.com.cn - China ’ s exploration of AI-enabled education http://it.people.com.cn/BIG5/n1/2020/1214/c1009-31965210.html
- www.huanqiu.com - AI promotes innovation in education reform https://china.huanqiu.com/article/4AyNKsz3Vwp
- EdPost of the Hong Kong Education City (https://www.edcity.hk/hq/zh-hant/content/ai%E6%95%99%E8%82%B2%E3%80%81%E6%95%99%E8%82%B2ai)

中华人民共和国教育部 Ministry of Education of the People's Republic of China

EdPost 教城電子報

Reference

AI is reshaping all walks of life

Our country attaches great importance to AI, and continues to study and formulate AI plans at the national level. Set out below are some examples of the related policies.

In July 2015, the State Council issued the *Guiding Opinions on Actively Promoting the "Internet Plus" Action Plan*, lifting the development of AI to the national strategic level.

In 2017, the State Council issued the *New Generation Artificial Intelligence Development Plan*.

In March 2016, the *Outline of the 13th Five-Year Plan* included the application of AI in various fields as an important national development strategy in the next few years.

The *Outline of the 14th Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Long Range Objectives Through the Year 2035* released in March 2021, which stated that it is essential to strengthen the development of AI.

Sources:

- *The Guiding Opinions on Actively Promoting the "Internet Plus" Action Plan* (http://www.gov.cn/xinwen/2015-07/04/content_2890205.htm)
- "*13th Five-Year Plan*" the *National Plan for the Development of Strategic Emerging Industries* (http://www.gov.cn/zhengce/content/2016-12/19/content_5150090.htm)
- *New Generation Artificial Intelligence Development Plan* (http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm)
- *The Outline of the 14th Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Long-Range Objectives Through the Year-2035* (http://www.gov.cn/xinwen/2021-03/13/content_5592681.htm)

Reference

AI is reshaping all walks of life

Our country is promoting digital economy

In addition to emphasising the cultivation and strengthening of AI, the "14th Five-Year Plan"* also pointed out that it is necessary to accelerate the promotion of emerging digital industries, such as big data, cloud computing, and cybersecurity to match digital industrialisation.

- According to the "14th Five-Year Plan", the State Council formulated the *14th Five-Year " Plan for the Digital Economy Development* , with a view to focusing on strategic forward-looking areas, such as big data, AI and blockchain, improving the basic R&D capabilities of digital technology, accelerating the digital transformation of industry, continuously raising the digitalisation level of production equipment of industrial enterprises, and enabling more enterprises to move onto the "Cloud".
- Besides, our country has also worked to enhance the government' s digital governance capabilities and improve the accuracy, coordination and effectiveness of digital economy governance through technologies, such as big data and AI.

**The Outline of the 14th Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Range Objectives through the Year 2035*

Source:

- *The Outline of the 14th Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Long Range Objectives Through the Year 2035* (http://www.gov.cn/xinwen/2021-03/13/content_5592681.htm)
- *The "14th Five-Year " Plan for the Digital Economy Development* (http://www.gov.cn/zhengce/content/2022-01/12/content_5667817.htm)

Reference

AI is reshaping all walks of life

The National 14th Five-Year Plan has highlighted the unequivocal support for Hong Kong to develop into an international innovation and technology (I&T) hub, as well as the immense opportunities brought about by the development of the Guangdong-Hong Kong-Macao Greater Bay Area, supporting the development of I&T in Hong Kong. The establishment of InnoHK marks a new milestone in the Hong Kong Special Administrative Region (HKSAR) Government's commitment to promoting Hong Kong's I&T. As the flagship I&T initiative of the HKSAR Government, InnoHK aims to promote global research collaboration with a view to putting Hong Kong on the global advanced technology map, among which AI is one of the key development projects.

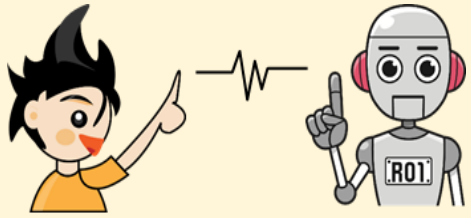
Sources:

- Hong Kong Government Press Release (https://www.info.gov.hk/gia/general/202205/25/P2022052500234.htm?fontSize=1)
- InnoHK (https://www.innohk.gov.hk/en/you-are-interested/)

Various countries around the world have also formulated policies on the development of AI. For example, the European Union and the Organization for Economic Co-operation and Development have introduced relevant policies to promote AI; please refer to the following webpages for details. Teachers can also guide students to search for relevant policies of other countries to learn about relevant developments.

Sources:

- European Commission (https://ec.europa.eu/commission/presscorner/detail/en/IP_21_1682)
- European Commission (https://digital-strategy.ec.europa.eu/en/policies/european-approach-artificial-intelligence)
- OECD (https://www.oecd-ilibrary.org/sites/cc3a9728-en/index.html?itemId=/content/component/cc3a9728-en#section-d1e29505)

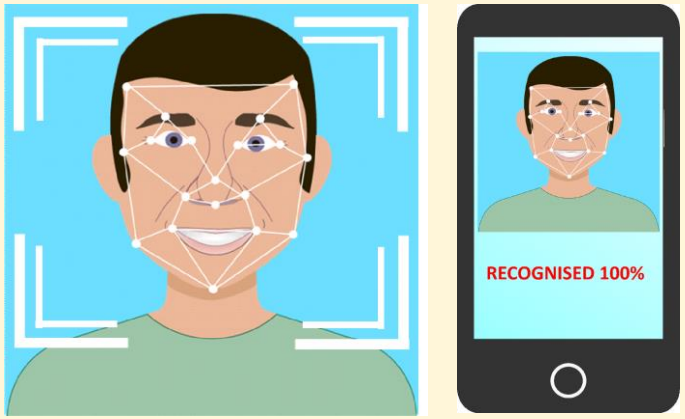


Risks posed by AI

AI has been highly developed and integrated into our daily lives. Therefore, the challenges posed by AI to social/national security, moral and ethics, privacy protection, etc. come along. We must be aware of the potential risks associated with the use of AI in order to enhance information technology security and protect the rights and interests of individuals and the public.

Social media tagging and image recognition function

- Uploading photos of yourself and your friends on social media or using the picture tagging feature on social media may reveal a lot of personal information, including location, social circle, preferences and even emotions.
- Many social media sites have also established facial recognition databases, and will recommend face tags whenever we upload photos of gathering with friends.
- Therefore, you should understand the impact of the above features on personal privacy and adopt protection strategies, such as obtaining your consent before they can tag you on the photos uploaded.

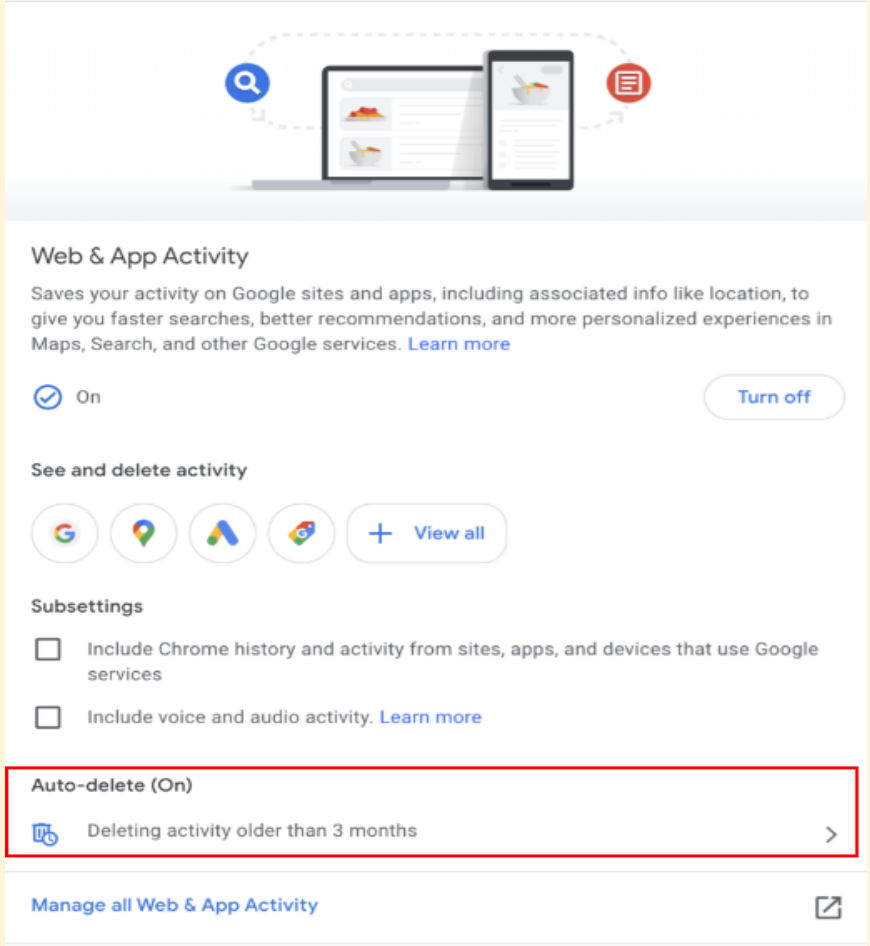


Risks posed by AI

Other controversies that AI may bring

The improper use of AI may cause some social, ethical and legal controversies.

- Data is recorded and analysed without knowledge, leading to a privacy breach;
- AI will pick information that users like to see or has a similar stance, but users may not receive information with other stances;
- AI may be subject to hacking attacks, and so on...



When website services are used, the user's voice, location, and browsing history will be collected for analysis by AI. So we can consider setting the functions of not being recorded on our own.

Learn about big data

Big data is a collection of massive volumes of data. Everyone generates a lot of data every day. When people make phone calls, track positions whenever mobile phones are switched on, chat, browse websites and shop online, make mobile payments, seek medical treatment, and make travel plans, etc., new data is constantly being generated. In the era of the digital economy, big data is gradually becoming an important part of economic and social development. However, the ubiquity of data also increases the risks of data breaches, cyber traps, and even digital crimes.

The main features of big data are:

- **"Large" Volume**
- **"Wide" Variety**
- **"High" Velocity**
- **Veracity**
- **Low Value Density**

Learn about big data

“Large” Volume

The most prominent feature of big data is the large volume of data. Now we often use gigabytes or even terabytes and petabytes as data units. A smartphone user can generate around 10-30GB of mobile data traffic per month.

Magnitude relations between different data units:

1MB=1024KB

1GB=1024MB

1TB=1024GB

1PB=1024TB

1EB=1024PB

“Wide” Variety

Big data tends to record all data. There are various data types, such as text, images, videos, and so on.

“High” Velocity

Big data features fast data generation and processing speed. Big data quickly and automatically collects and obtains various data through all types of Internets, smartphones, sensors, etc., and processes the data.

Big data processing can reach analysis results within seconds, and quickly obtain valuable information.

Learn about big data

Veracity

As the cost of data storage and acquisition falls, it is important to pay attention to the veracity of data so as to create valuable data through big data. That is to say, in addition to the volume of data, it is also necessary to confirm the veracity of data so that the results of data analysis can fulfill the purpose of accurate prediction.

Low Value Density

Big data should be used properly to create high value at a low cost. As the volume of big data continues to rise, the value density of data keeps falling, but the overall value of data is significant. Take surveillance videos for example, in a one-hour-long video, useful data may only last one or two seconds, but it can be very important.

What are Cookies?

- A Cookie is a file that is stored on your computer or mobile phone and allows the server to recognise your device. The next time you visit the same website, the website will show you the content you viewed last time based on your cookie history.
- Advertising and social media Cookies are mainly created by social platforms, advertisers and market research firms to track customer preferences and browsing history, among others, to provide customers with individualised advertisements.
- Have you ever experienced often seeing sports goods advertisements on other webpages after browsing an online sports goods store?

Source: CyberDefender (https://cyberdefender.hk/en-us/whats-cookie/)

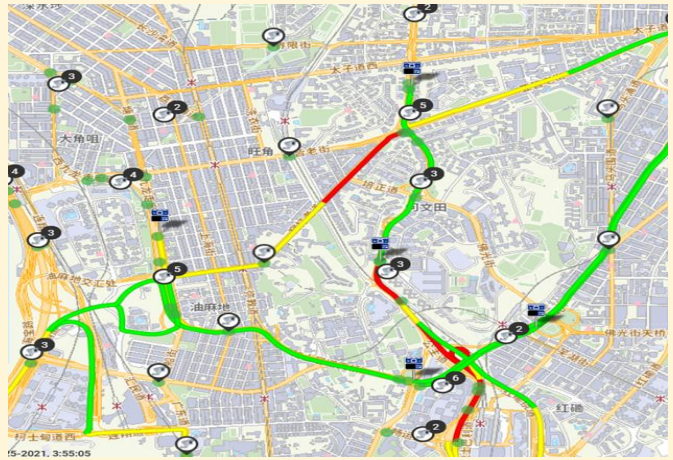
Applications of big data

Digital transformation using big data analytics

The implementation of urban management through big data , cloud computing and AI etc. has become a major trend around the world. Relevant technologies have been developed in transportation, tourism, healthcare and other areas to promote digitalisation in various places. For example:

- Plan journeys more efficiently with real-time traffic information and enjoy better traffic planning and management through enhanced use of data analytics;
- The government uses big data of traffic and environmental resources to make decisions;
- Bus companies can plan bus services based on traffic flows and population density.

Click on the image to watch the video: China's "Big" Cities Are Getting "Smarter"



Big data is employed to view real-time traffic information (partial).

Source:

- The China Current (https://chinacurrent.com/story/20418/smart-city-china)
- The Innovation and Technology Bureau, OGCIO* https://www.smartcity.gov.hk/modules/custom/custom_global_js_css/assets/files/HKSmartCityBlueprint(ENG)v2.pdf
  The Innovation and Technology Bureau was renamed to the Innovation, Technology and Industry Bureau on 1 July, 2022.

Applications of big data

Big data analytics helps companies develop their businesses

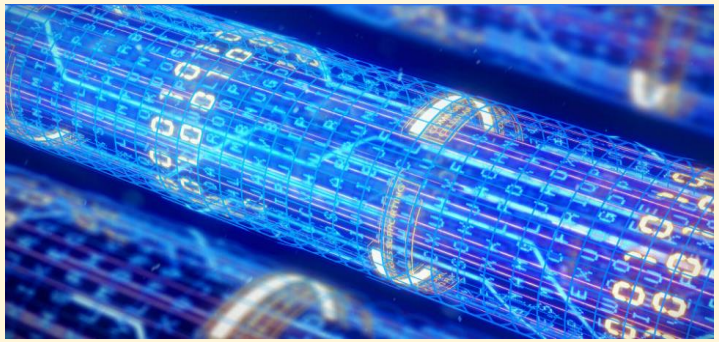
By collecting big data , enterprises can accurately predict customer behaviors, significantly step up the promotion of popular products, and reduce logistics and warehousing costs according to market needs. Data analytics companies can increase efficiency and optimise customer experience.

- Big data analytics helps the retail and e-commerce, banking and finance, logistics and transportation as well as hospitality industries etc. to improve operational efficiency and enhance customer experience.
- The HKSAR Government has endeavored to build a smart city and open data initiatives. The Data Technology (DT) Hub operated by the Hong Kong Science and Technology Parks, is equipped with a high-speed network and transmission capability to enable rapid and critical access and processing of data that meet the high demand of data-centric businesses.

Source:
Hong Kong Government Press Release (https://www.info.gov.hk/gia/general/202208/30/P2022083000589.htm)
InvestHK (https://innotech.investhk.gov.hk/en/market-opportunities/big-data-analytics.html)

Click on the image to watch the video: Whoever Seizes the Data Wins

Source: The China Current (https://chinacurrent.com/story/20794/big-data-china-ecommerce)



Applications of big data

Big Data in Healthcare

Big data in healthcare refers to the health and medical related data generated in the process of disease prevention and treatment, health management, etc.

- The National Health Commission of the PRC has established a working mechanism for the opening-up and sharing of healthcare big data , strengthened the sharing and exchange of health and medical big data , and coordinated the building of a healthcare big data reporting platform, information resources catalog system, and sharing and exchange system.
- The HKSAR Government has been strongly encouraging members of the public to join the Electronic Health Record Sharing System (eHRSS) for building lifelong electronic health records. eHRSS also helps to collect useful health records and data of citizens in the public and private healthcare systems as well as different levels of the medical system, which can be gradually developed into the healthcare database of Hong Kong. The Government is considering ways to make better use of the health information and data collected by the Department of Health, the Hospital Authority and District Health Centres, including the effective use of the relevant data for formulating protocols for disease surveillance, screening, prevention and treatment.

eHealth

An electronic platform developed by the HKSAR Government and aimed at establishing free and lifelong electronic health records for all Hong Kong citizens. Click on the image to learn more.

Source: eHealth (https://www.ehealth.gov.hk/en/whats-ehealth/index.html)

Source:
- www.gov.cn (http://www.gov.cn/xinwen/2018-09/14/content_5321983.htm)
- Hong Kong Government Press Release (https://www.info.gov.hk/gia/general/202204/06/P2022040600401.htm?fontSize=1)

Risks posed by big data

Data security and data breaches

In the era of big data , it is easy for our personal data to be collected. For example, fitness facilities can collect people's blood pressure, pulse and sleep data; online purchases record the commodities purchased; airline companies collect travel arrangement information through air ticket purchase records. Therefore, we need to raise awareness to protect and respect personal privacy, be careful when receiving or providing data online, and properly protect privacy when making good use of tools to exchange information.

Scenario

Information leakage

When installing a new app on the smartphone, it asks for authorization to access location, photos, address book, etc.; some applications even ask for open access to the address book, which may leak our personal data to others...

Case

Leakage of customer information

In 2018, a room reservation database of a major international hotel chain was hacked, resulting in the leakage of information on many customers (including names, passport numbers, phone numbers, etc.). The incident directly led to the image of the hotel group tarnished and a fine subsequently imposed by the regulator for its failure to protect customer information after an investigation.

Reference: National Cyber Security Centre (https://www.ncsc.gov.uk/guidance/ncsc-advice-marriott-international-customers)

Risks posed by big data

Privacy security risks posed by Cookies and proper management of Cookies

- Some malicious websites use Cookies on your device and are difficult to remove. This is called as “zombie cookie”. Such cookies would send your browsing history to advertisers. Furthermore, hackers can use cross-site scripting attack to steal Cookies and log in to the user account.
- To enhance your privacy protection, you should check your browser on how to change settings. For example, “Private browsing” or “safe browsing mode” normally automatic disable Cookie.

The “General Data Protection Rules” implemented in 2018 stipulate that cookies are not strictly necessary for the basic function of website must only be activated after end-users have given their explicit consent to the specific purpose of their operation and collection of personal data. When you visit a website for the first time, a statement will appear at the bottom of the page to seek your agreement for the use of cookies, which is the requirement of this rule.

Source: CyberDefender (https://cyberdefender.hk/en-us/whats-cookie/)

Learning about cloud storage

Lead-in

Imagine a scenario like this:

The data you sent me yesterday cannot be opened; please resend it, as I need to discuss it right now.

It’s okay to resend it, but can you wait till I get home? I’m not at home now, what should I do...

Many people have encountered this kind of scenarios before. Why do we need to wait to “send it till we back home”? Because that document is stored on a computer or a mobile device in our room.

We can use the cloud storage technology to solve this problem.

Learning about cloud storage

Cloud storage is a network storage model. It refers to the services made available to users on demand via the Internet from a cloud service provider's servers as opposed to being provided from a company's own on-premises servers. Examples of cloud services include online data storage and backup solutions, Web-based e-mail services, hosted office suites and document collaboration services, database processing, managed technical support services and more.

Source: The InfoCloud of the HKSAR government
(https://www.infocloud.gov.hk/home/10?lang=en)

Think about it:

1.Where do you usually save your photos, videos, text files and other data? Have you used some cloud storage services? Or do you adopt some other storage methods?

2.What are the benefits and risks of cloud storage?

3.What methods can be used to reduce the risks that may arise from cloud storage?

Reference

Learning about cloud storage

Cloud Computing

A computing capability that provides an abstraction between the computing resource and its underlying technical architecture (e.g. servers, storage, networks), enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction.

Source: The InfoCloud of the HKSAR Government
(https://www.infocloud.gov.hk/home/7?lang=en)

Learning about cloud storage

Cloud storage can greatly improve efficiency

- Reduction in storage cost savings
- Convenient data transfer
- Easy access to data (on condition of network availability)
- Convenient mobilisation of more resources
- Automation and smartisation...

For enterprises, the benefits from the use of cloud services include:

- Shared usage of data centres reduces operational costs through improvements in computer resource utilisation, lowered labour costs and power consumption, etc.
- Agility from on-demand computing resources increases flexibility for handling business changes and reduces lead time for providing new services.
- Take advantage of innovative provisions from cloud service provider without owning or managing the related complex IT assets.

Source: The InfoCloud-of the HKSAR government
(https://www.infocloud.gov.hk/home/10?lang=en)

Applications of cloud storage

Integrated cloud storage into people’ s lives

Cloud storage has been integrated into our lives in many ways, bringing us many conveniences. For example:

- Cloud storage has been deeply woven into people’ s lives; no matter where you are, with a smartphone, tablet or notebook computer, you can invoke the data stored in the cloud at any time, and it is also convenient to share data with others.
- The use of cloud storage not only facilitates data backup, but also greatly boosts the speed of data transmission.

Real-life examples

The data recorded by smart watches or phones is transmitted back to the big data cloud (big data database) for tracking and analysing physical health condition, so that we can manage our physical condition, such as calories consumed, sleep quality, and stress level, in order to adopt countermeasures.

Applications of cloud storage

Hong Kong Legal Cloud services

- The extensive use of technology in business transactions and expansion of e-commerce has sparked demands for legal services that are unrestricted by cultural, geographical and language boundaries over the years. In view of this, the HKSAR Government has enhanced the capability of the local legal and dispute resolution profession to harness modern technology in the provision of their services, the Hong Kong Legal Cloud services (HKLC) was launched on 1 March 2022.
- The HKLC provides safe, secure and affordable data storage services for the local legal and dispute resolution sectors, thereby enhancing the capability of the profession to harness modern technology in the provision of relevant services. The Secretary for Justice highlighted that the use of technology in the provision of legal services is an important area of development to provide safe, secure and affordable data storage services for the local legal and dispute resolution industries, so as to promote the long-term development of Hong Kong's overall legal and dispute resolution services.

Sources:

- Hong Kong Government Press Release (https://www.info.gov.hk/gia/general/202203/01/P2022030100256.htm?fontSize=1)
- Webpage of the Department of Justice of the HKSAR Government (https://www.doj.gov.hk/en/legal_dispute/online_dispute_resolution_and_lawtech.html)

Risks posed by cloud storage

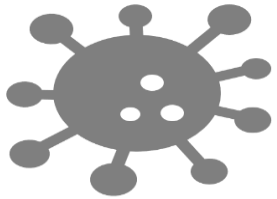
Potential risks of using cloud service include:

- Users may have security concern on the responsibility and control of their own data storing in the external storage of the cloud service provider.
- Users may be locked in to a particular cloud service provider.

Source: The InfoCloud of the HKSAR government (https://www.infocloud.gov.hk/home/10?lang=en)

Other potential risks

Computer viruses



Computer viruses can make cloud storage operators unable to manage their work normally.

Hacking attacks

Hacking attacks pose a huge risk to cloud storage, and are difficult to prevent.

Personal mistakes

Personal operation errors and simple password setting (which makes it easy to be cracked) can lead personal accounts to be stolen by others at will.

Risks posed by cloud storage

Protect data security in the cloud

What can we do to reduce the risk of data breaches caused by the use of cloud storage?

Protection of data security can start from many aspects, such as the adoption of storage means to ensure the security of data (including data backup), and effective data protection by means of encryption.

In addition, we can also

- Logout accounts after using cloud storage;
- Ensure that the downloaded data and settings in mobile devices are completely deleted before they are discarded;
- Set a strong password or adopt two-factor authentication login for cloud storage.

Enterprises or individuals may also refer to the Government' s guidelines and recommendations on the selection of appropriate cloud storage services, and read the Government' s advice on information security regarding the use of cloud services carefully.

Click on the image to learn more.

Source: The InfoCloud of the HKSAR government

- https://www.infocloud.gov.hk/home/9?lang=en
- https://www.infocloud.gov.hk/themes/ogcio/media/featuredarticles/WGCSP-4-6a_Security_Checklists_for_Cloud_Service_Consumers_EN.pdf

Risks posed by cloud storage

The protection of personal information and other data is of great significance, as it not only can protect personal privacy, but also ensure the security of our country and the public in the society.

- In response to the threats posed by information technology to national security and privacy, countries and regions all over the world are reviewing existing laws and enacting new ones. For example, the HKSAR Government passed the *Personal Data (Privacy) (Amendment) Ordinance 2021* to further protect the rights and interests of the public. *
- Often, the law already protects the rights and interests of individuals in relation to our use of information technology; but we are still the first line of defense for the protection of personal privacy, so we should raise our awareness and take countermeasures. The Office of the Government Chief Information Officer (OGCIO) has provided us with the following advice in many ways.

Guidelines for handling accounts and passwords

Notice on handling personal information

Raise our own awareness of information security

Use electronic authentication to ensure secure access

*For the existing related legislations, teachers may refer to relevant introductions of the two other Presentation Slides under Theme 3 - Topic "Technological development and information literacy".

Source: OGCIO (https://www.infosec.gov.hk/en/best-practices/person/)

Conclusion

New technologies, such as AI, big data , and cloud storage, are becoming more and more widely used in society, bringing us many conveniences and opportunities. Meanwhile, the data stored in computers and mobile devices are also important personal assets. Therefore, we need to handle and store data prudently, and take measures to reduce losses and the risk of data and privacy leakage so as to enjoy conveniences without sacrificing our privacy.

We should not only see the positive impact of technological progress on society and embrace new technologies, but also need to recognise the risks and problems these technologies may pose to national security, society and individuals, use relevant technologies in a legal and ethical manner, and prudently consider the potential risks and problems.

As responsible citizens, we need to learn about the legal regulation of the use of information technology, safeguard cyber security starting from ourselves, and protect the rights and interests of ourselves and the public.

User Guide

- **The primary users of this resource are teachers. It aims to provide teachers with content knowledge relevant to the topic to enable teachers to have a deeper understanding of teaching content when preparing for their lessons.**
- **All data, videos, photos, pictures, questions and suggested answers can be used for multiple purposes, such as teachers' teaching materials, references for curriculum planning and learning and teaching, and student assignments, etc. To align with Citizenship and Social Development Curriculum and Assessment Guide (Secondary 4-6) (2021) (C&A Guide), this resource should be adapted to cater for students' learning diversity and the needs of classroom teaching, etc.**
- **Teachers may provide appropriate supplementary notes/ explanations to enrich this resource in order to enhance students' understanding of the topic and information provided.**
- **In accordance with the curriculum rationale and aims, teachers may select other learning and teaching resources which are correct, reliable, objective and impartial to help students build up a solid knowledge base, develop positive values and attitudes as well as enhance critical thinking and problem solving skills, and various generic skills.**
- **If some information cannot be provided in this resource due to copyright issue, teachers may visit relevant websites provided.**
- **Some information may have been updated when being used by teachers, teachers may visit the corresponding websites to obtain the up-to-date information.**
- **Please also refer to the C&A Guide to understand the requirements and arrangements of the learning and teaching of the curriculum. Teachers are welcome to point out the areas need improvement, and welcome to provide updated information to enrich the content for all teachers' reference.**

Notice and Disclaimer

- Some sources were not translated into English as the official English version is not available.
- In case of any discrepancy between the Chinese and English versions, the Chinese version shall prevail.

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