Roadmap to Artificial Intelligence and Intellectual Property

IP Conference 2020

Jyh-An Lee

The Chinese University of Hong Kong

July 31, 2019

CUHK LAW
THE CHINESE UNIVERSITY OF HONG KONG
香港中文大學

- ✓Introduction
- Trade Marks
- Patents
- Copyright
- Concluding Remarks

https://www.vox.com/future-perfect/2019/5/31/18645993/ai-deepfakes-gan-explained-machine-learning

Poem generation

First AI-authored poem collection

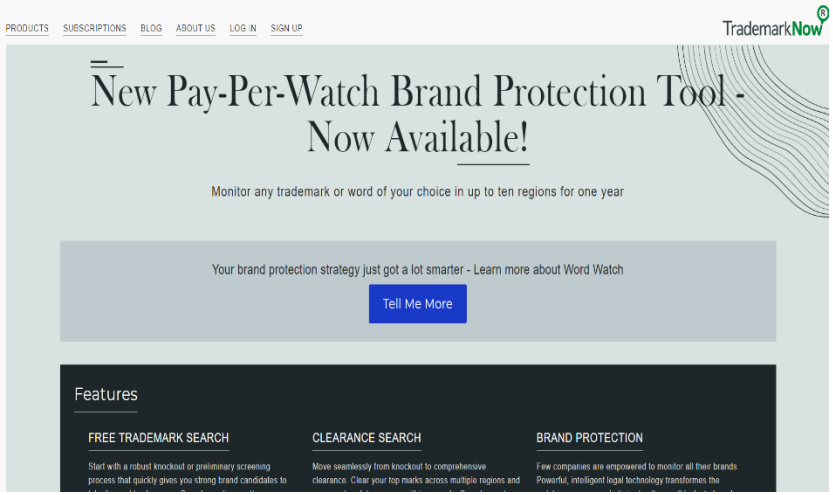
Where Are You, My Love?
Quick, hold up the light.
The beautiful sky is there.
Ask the sound of the stream
in the village
Where are you, my love?
For my red light keeps
changing
Like a beautiful secret.
She is a song of a child
The distance of time.

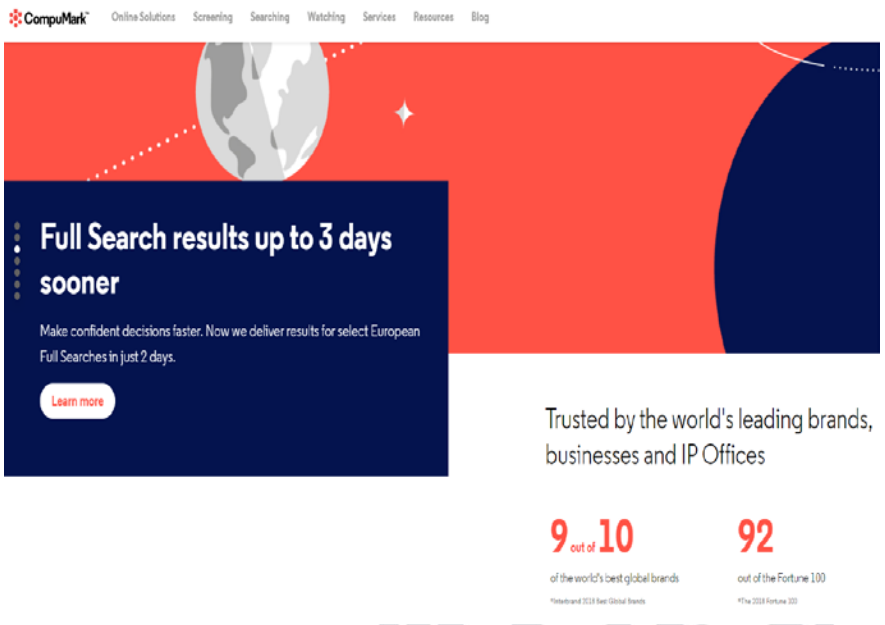
— Poem composed by Xiaoice, Microsoft's artificial intelligence chatbot

Wings hold rocks and water tightly
In the loneliness
Stroll the empty
The land becomes soft
– Poem composed by XiaoIce

- Introduction
- ✓Trade Marks
- Patents
- Copyright
- Concluding Remarks

Trade Mark Search





- As of the end of July 2020, no court has used AI as a tool to adjudicate trade mark cases.

- A few trade mark offices (WIPO, EUIPO, IPA, IPOS) are already applying AI tools to assess trade mark applications.

  – The AI tools currently used do not have decision-making capabilities and are predominantly focused on very specific and often simple tasks, such as assessing similarity of signs with prior registered marks and classifying goods and services.

  – Only used for traditional marks, not for non-traditional marks.

Online Platforms & Counterfeits

- Automated Detection System for Counterfeits
  - eBay: Fraud Engine (part of the Verified Rights Owner (VeRO) Program)
    - Words like “knock off”, “counterfeit”, “replica” combined with IP address, and transaction history of the seller, user feedback and ratings, etc.

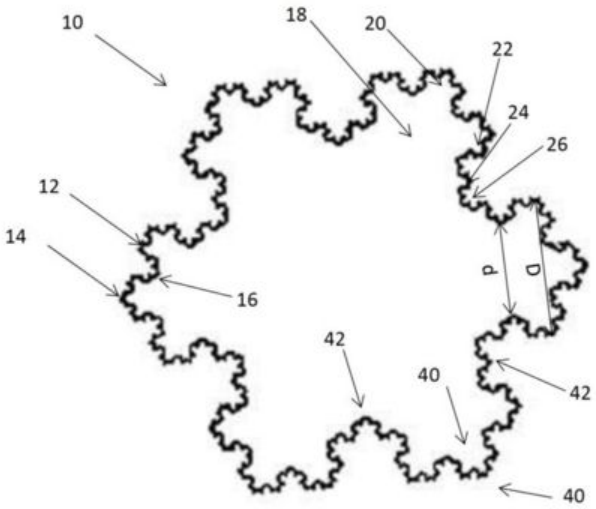
Online Platforms & Counterfeits

- Intelligent Detection System for Counterfeits
  - Amazon: Project Zero
    - Automated system scanning over 5 billion daily listing to look for suspected counterfeits, using machine learning to learn from existing takedowns.
  - Alibaba:
    - uses “product intelligence, image and semantic recognition algorithms, real-time monitoring and interception, bio-identification, and algorithms to detect abnormal merchant behavior.”
    - 96% of Alibaba of listings removed before a single sale took place.

- Introduction
- Trade Marks
- ✓Patents
- Copyright
- Concluding Remarks

Artificial Inventor

- An US patented invention called DABUS (US 10,423,875) owned by Imagination Engines Inc. covers the mechanics by which vast swarms of neutral nets join to form chains that encode concepts gleaned from their environment.



Artificial Inventor

FINANCIAL TIMES

US COMPANIES TECH MARKETS GRAPHICS OPINION WORK & CAREERS LIFE & ARTS HOW TO SPEND IT

cial intelligence

cial recognition needs a wider licy debate

Bias of algorithms can only be beaten by humans

Start-ups use matchmaking mindset to aid those in need

Artificial intelligence + Add to myFT

Patent agencies challenged to accept AI inventor

Legal experts submit two machine-designed products in landmark test of patent law

Patent applications have been made by a team of legal experts for two designs by a machine called Dabus. The designs, for a plastic food container and a flashing light, represent a landmark challenge to the international patents regime

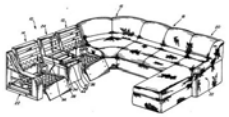
Martin Coulter in London AUGUST 1 2019 36

- DABUS invented (1) a food container with special functions, and (2) a flashing light.
- The European Patent Office (EPO) published its decision on January 27, 2020 rejecting DABUS as the patent applicant because the inventor designated in a European patent must be a natural person.
- On April 22, 2020, the United States Patent and Trademark Office (USPTO) rejected the application for an invention by DABUS and stated that inventorship under U.S. patent law is limited to natural persons.

Patentibility

- **Written Description Requirement**
  - A patent must describe the technology that is sought to be patented.
  - Challenges to the written description requirement brought by AI
    - "Black box" in machine learning occasionally occurs when even their designers cannot explain why the AI arrived at a specific decision.
    - Explainable AI (XAI) is an emerging field in machine learning that aims to address how black box decisions of AI systems are made.

The Written Description Requirement



Gentry Gallery, Inc. v. Berkline Corp., 134 F.3d 1473 (Fed. Cir. 1998).

Gentry's Patent: Gentry was granted a patent for a sectional sofa comprised of a pair of reclining seats that faced the same direction. Claim 1, the broadest claim, identifies a "fixed console" between the pair of seats. Claims 9, 10, 12-15, and 19-21 are directed to a sectional sofa in which the control means are specifically located on the console.

Description Requirement : Case Example 46

SUGAR CONTENT ESTIMATION SYSTEM

Claim 1: Violation of the enablement requirement

A certain correlation among each data in a training data is not supported by the description and is not a common general technical knowledge at the time of filing. Therefore, the description requirement is not satisfied.

[Claim 1]

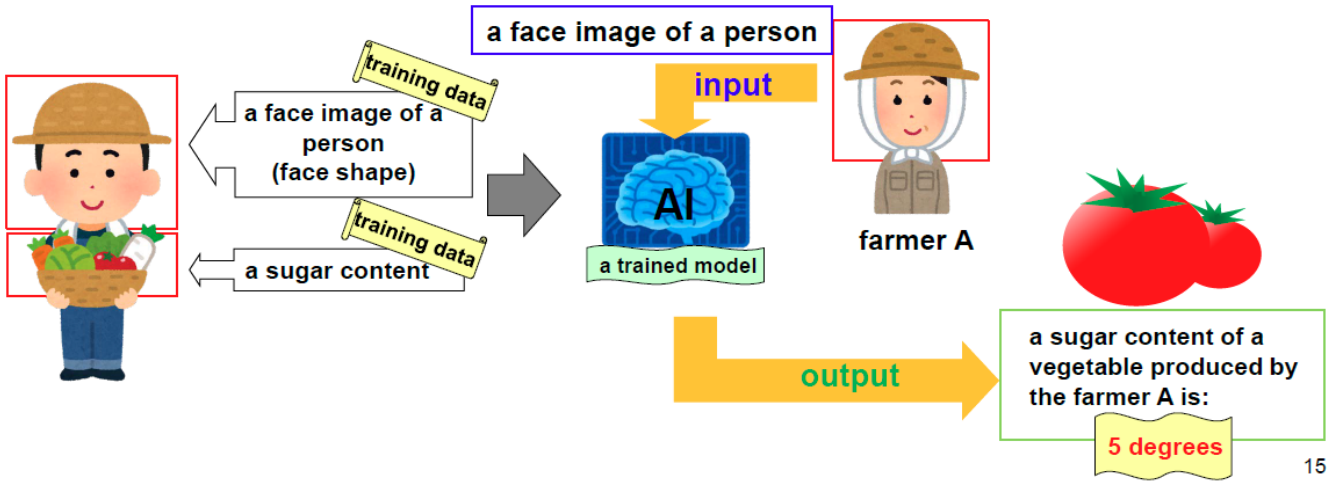
A sugar content estimation system comprising:

a storage means for storing face images of people and sugar contents of vegetables produced by the people;

a model generation means for generating a determination model through machine learning, to which a face image of a person is input and from which a sugar content of a vegetable produced by the person is output, using training data containing the face images of the people stored in the storage means and the sugar contents of the vegetables,

a reception means for receiving an input of an face image; and

a processing means for outputting, using the generated determination model that has been generated by the model generation means, a sugar content of a vegetable produced by a person that is estimated based on the face image of the person inputted to the reception means.



15

https://www.jpo.go.jp/e/system/laws/rule/guideline/patent/document/ai_jirei_e/jirei_tsuika_e.pdf

Description Requirement: Case Example 46

SUGAR CONTENT ESTIMATION SYSTEM

特許庁 JAPAN PATENT OFFICE

[Overview of the Description]

It is an object of the present invention to provide a system that estimates a sugar content of a vegetable produced by a person based on his/her face image, taking advantage of the existence of a certain correlation between a face feature of a person and a sugar content of a vegetable produced by the person. For example, a face figure is characterized by a head length, face width, nose width, and lip width as shown in the figure. Here, a "sugar content" of a vegetable means a sugar content at the time when a certain period predetermined for each type of vegetables has passed after seeding. With this system, it is possible to estimate which person can produce a vegetable with a highest sugar content in a community.

A sugar content estimation system of the present invention firstly receives an input of a face image of a person by a user. A sugar content of a vegetable produced by a person is obtained using a determination model, to which a face image of the person is input and from which a sugar content of the vegetable produced by the person is output. The determination model is generated through a supervised machine learning using a known machine learning algorithm such as a convolutional neural network (CNN) by learning correlation between a face image of a person and a sugar content of a vegetable produced by the person.

[Overview of Reason for Refusal]

・Article 36(4)(i) (Enablement Requirement)

According to the description, a human face image is used for an input to a determination model that estimates a sugar content of a vegetable produced by the person. The description says that a face feature is characterized by a head length, face width, nose width, and lip width, for example.

However, the description only discloses that there is a certain correlation between a face image of a person and a sugar content of a vegetable produced by the person and does not disclose any correlation or the like between them, though disclosing that a face feature is characterized by a head length, face width, nose width, and lip width, for example. It cannot be presumed that there is a correlation or the like between them, even if a common general technical knowledge at the time of filing is taken into consideration. Further, there is no performance evaluation result of an actually generated determination model shown in the description.

Accordingly, it is not possible for a person skilled in the art to derive a sugar content estimation system that outputs an estimation of a sugar content of a vegetable produced by a person based on an input of a face image of the person, even if the disclosure in the description and a common general technical knowledge at the time of filing are taken into consideration.

16

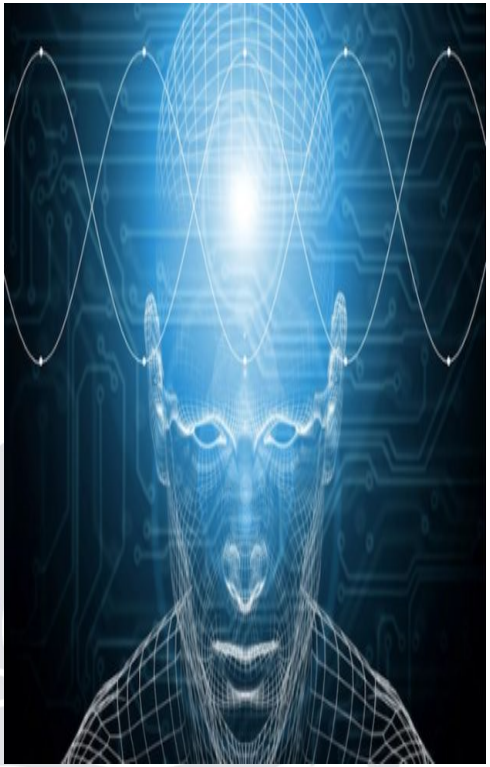
https://www.jpo.go.jp/e/system/laws/rule/guideline/patent/document/ai_jirei_e/jirei_tsuika_e.pdf

Patentibility

- **Inventive Step (Non-obviousness)**
  - A patent may not be obtained if it contains only obvious differences from prior art in the eyes of a person having ordinary skill in the art (PHOSITA).
  - Whether PHOSITA is able to use AI is critical to determine the standard of inventive step (nonobviousness).

Patentibility

- **Inventive Step (Non-obviousness)**
  - *e.g.* the claimed invention is not obvious because it is one of more than 20 million alternatives of the general formula (Japan IP High Court, April 13, 2018, 2016 (Gyo-Ke) 1082, 1084.
  - More than 20 million alternatives is enormous for humans, but not for AI.



Patentibility

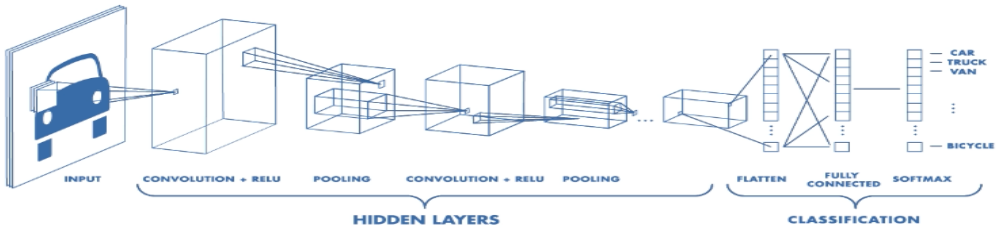
- The US government, in partnership with IBM, launched a COVID-19 High Performance Computing Consortium, granting researchers across the globe access to supercomputers in the US to model the disease and improve understanding of the pandemic.

- Supercomputers provided by IBM and others have significantly accelerated the research process.

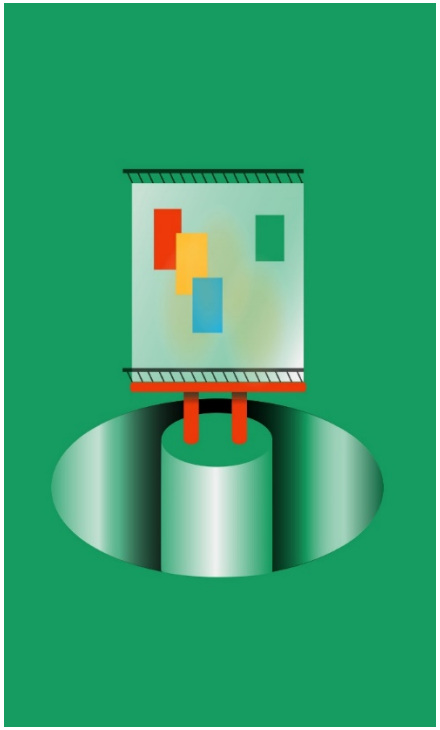
- What would have taken months or weeks to model and run in a standard and traditional computing environment can literally be done in minutes.

The Case of China on AI Patentibility (1)

- Patentable: deep learning – convolutional neutral networks (CNNs)
  - Claims of "A Network Training Method of Hand Gesture Detection"
    - (1) trains the first CNNs with sample images including marked human hands and gets predictive information in the candidate region,
    - (2) then modifies such predictive information, and
    - (3) trains the second CNNs with the modified information and sample images
  - In this process, the first and second CNNs share the same layer of characteristic extraction, and the parameters of this layer remain the same in the process of training the second CNNs
  - CNIPA: approved, because of 1) it could increase the accuracy rate of detecting hand gestures by the second CNNs, and 2) could also reduce their calculated amount in the process of training



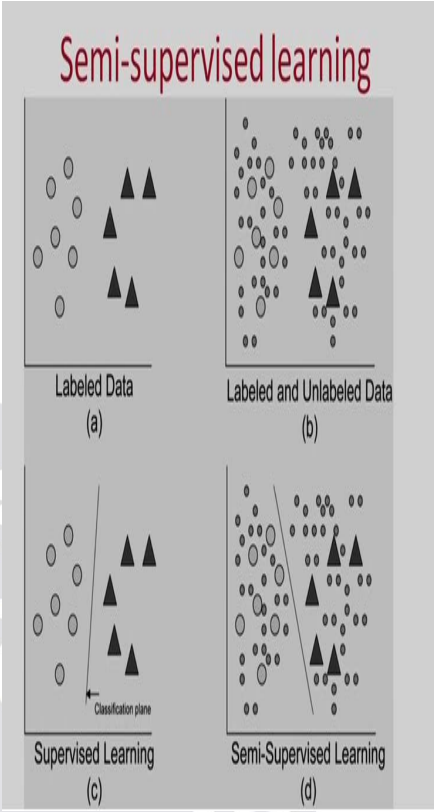
The Case of China on AI Patentibility (2)



- Patentable: technical solution requirement satisfied—big data
  - Claims of "A Method for Targeted Advertising Based on the Big Data of User Habits in a Region"
    - an intelligent system consisting of several data processing modules
    - the system, via invoking those modules, can remind merchants of stocking up on the products that customers will buy in a short time period and also notify customers of buying those products before they are used up
    - the system functions based on the big data collected which includes target customer data (location information and transaction records), merchant data (location and products information) and other customer data (the frequency and quantity of buying the products)
- CNIPA: approved based on the understanding that it is a technical solution and could achieve technical effects (extended interpretation)

The Case of China on AI Patentibility (3)

- Non-patentable: semi-supervised learning
  - Claims of "A Training Method for the Classifier of Support Vector Machine based on Semi-Supervised Learning"
    - using some marked sample sets to train an SVM classifier
    - the SVM classifier, after identifying the characteristics thereof, will then single out and mark high confidence sample sets from those unmarked ones
    - low-information quantity will be removed from the high-confidence sample sets and put back to unmarked ones, while high-information quantity will be marked and added to marked sample sets - the classifier will be further trained by the updated marked sample sets
  - CNIPA: rejected on the basis of rules and methods for mental activities
  - PRB: affirmed, no technical effect and specific application field, just a mathematical function to classify set elements on a sample set, even if it could reduce manual workload (Decision No.120841)



- Introduction
- Trade Marks
- Patents
- ✓Copyright
- Concluding Remarks

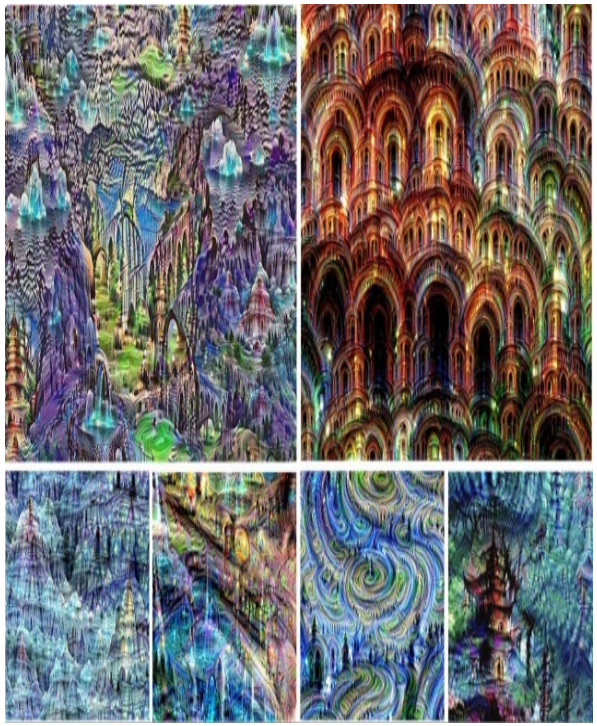
Copyrightibility of AI-generated Works

- **NO**
  - United States Copyright Office, *Compendium of U.S. Copyright Office Practices* (3rd edn, 2017)
    - "To qualify as a work of 'authorship' a work must be created by a human being…Works that do not satisfy this requirement are not copyrightable."
    - "the Office will not register works produced by a machine…that operates…automatically without any creative input or intervention from a human author."

Copyrightibility of AI-generated Works

- **NO**
  - Preamble to the Copyright Term Directive 93/98:
    - Original work is the "author's own intellectual creation reflecting his personality"
  - *Painer v Standard Verlags*, GmbH (C-145/10) EU:C" 2011: 798; [2012] E.C.D.R. 6.
    - A copyright work reflect the author's "personality and express his free and creative choices in the production of that photograph"

Copyrightibility of AI-generated Works



- **Yes**
  - UK, Ireland, New Zealand, India, and Hong Kong
  - Hong Kong Copyright Ordinance
    - s.198: a computer-generated work
      - "generated by computer in circumstances such that there is no human author of the work" (s.178 of UK Copyright, Designs and Patent Act 1988 (CDPA))
    - s.11(3) : "In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken." (s.9(3) of CDPA)

TDM Exception

- Training data of AI are often copyrighted, and the individuals who develop or deploy an AI system may not be the rights holders, or even the licensees, of the data.

- Therefore, the use of training data has created infringement risk for AI developers.

TDM Exception

- European Union's Digital Single Market (DSM) Directive of 2019
  - Art. 3 requires member states to permit certain reproductions of copyrighted materials by research and cultural heritage organizations, undertaken for the purposes of text and data mining (TDM) research.
  - Art. 4 extends that same exception to *any entity* seeking to perform TDM.
  - However, Art. 4 exception does not apply when rights holders expressly reserve their TDM rights.

TDM Exception

- Art. 29A to the 2014 UK Copyrights, Designs and Patents Act (CDPA)

- Section 60d of the German Copyright law introduces a new permission, enabling text and data mining for the purpose of scientific research. (March 2018)

- Article 30-4 of the Japan Copyright Law (amended May 2018)
  - The Copyright Act allows for the “exploitation” of any copyrighted work for the purpose of performing “information analysis,” including the “extraction, comparison, classification, or other statistical analysis of language, sound, image, or other elements of which a large number of works or a large volume of information is composed.”

- Introduction
- Trade Marks
- Patents
- Copyright
- ✓Concluding Remarks

- Challenges brought by the AI technology and data science to the IP regime.

- AI and big data technologies provide new ways for creativity, innovation and the enforcement of IP.

- Artificial Intelligence will reshape the concept of intellectual property.

THANK YOU
FOR
YOUR ATTENTION

法律 CUHK LAW
THE CHINESE UNIVERSITY OF HONG KONG
香港中文大學