

Gateway to IP Success in Korea & Beyond

How to Obtain a Patent
to an Artificial Intelligence related
Invention in Korea

2019

MUHANN
Patent & Law Firm



1. AI Patent Landscape in Korea
2. AI Patent Practice in Korea
3. Tips on Drafting Claims for an AI Invention

AI Patent Landscape in Korea





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AI Patents

S. Korea Files Third-largest Number of AI Patents, Seventh-largest of AI Dissertations in World

By Cho Jin-young | © December 22, 2017, 02:00



Over the past 12 years, among patent applications and dissertations related to artificial intelligence (AI) technology, the **third-largest number of applications have been filed** and the **seventh-largest number of dissertations** have been published in South Korea, according to a state-run information and communications promotion agency. The country's AI industry has the base it needs to take off, terms of sheer bulk.

According to information technology (IT) industry sources, on December 21, the Institute for Information and Communications Technology Promotion (IITP) said its finding is based on AI-related technologies patent applications filed in the United States, Japan, China, the European Union and South Korea from January 2005 to September of this year. The U.S. ranked No. 1 in terms of AI patents, followed by Japan, South Korea, Germany, China, France, the Netherlands, Canada, the United Kingdom and Taiwan.

The agency said Samsung Electronics Co. filed the most AI-related patent applications among South Korean organizations with 3,188 over the period. LG Electronics Inc. followed with 899 such patent filings, trailed by Electronics and Telecommunications Research Institute (ETRI) with 865, LG Display Co. with 350 and Samsung Display Co. and Samsung Electro-Mechanics Co. with 207 each, Hyundai Motor Co. with 113, Korea Advanced Institute of Science and Technology (KAIST) with 91 and SK Telecom Co. with 75.

Samsung 3rd in Global Race for AI-Related Patents

Korean tech giant **Samsung Electronics** has been ranked third in the world in terms of the number of patents related to artificial intelligence.

According to a recent report by German market research firm IPlytics, **Samsung owned 11,243 AI-related patents** as of January this year.

The top patent holder was U.S. software giant Microsoft with 18,365 patents, followed by U.S. information technology firm IBM with 15,046 patents. Qualcomm and Google were also among the top five.

WIPO
Technology Trends 2019

Artificial Intelligence

...and many AI patents include inventions that can be applied in different industries...

AI-related inventions are booming, shifting from theory to commercial application

Since artificial intelligence emerged in the 1950s, innovators and researchers have filed applications for nearly 340,000 AI-related inventions and published over 1.6 million scientific publications.

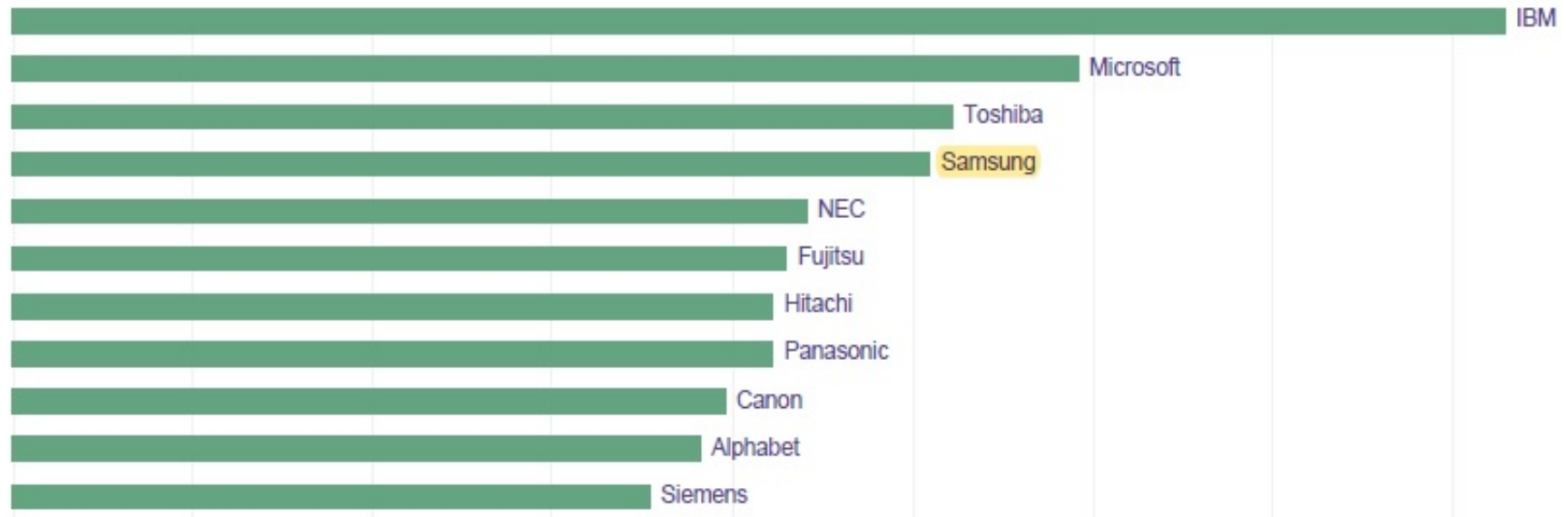
Looking first at trends in AI techniques, machine learning predominates, representing a massive 89 percent of filings mentioning this AI technique and 40 percent of all AI-related patents.

...but filings are increasingly international

Many patent applications are extended to more than one jurisdiction. One-third of all AI patent applications are filed in additional jurisdictions after their first filing and 8 percent are filed in five or more jurisdictions.

Deep learning is the fastest growing technique in AI, with an 175 percent increase between 2013 and 2016.

Figure 4.1. Top 30 patent applicants by number of patent families
Companies represent 26 of the top 30 AI patent applicants worldwide



Of the top 20 companies, 12 are Japanese conglomerates; however, the two biggest AI portfolios belong to U.S. companies (IBM, with 8,920 patent families, and Microsoft, with 5,930 patent families). The top 20 also includes two companies from the Republic of Korea (Samsung and LG Corporation) and two from Germany (Siemens and Bosch). The portfolios of the top patent applicant companies are examined in more detail below.

The Republic of Korea's Electronics and Telecommunications Research Institute (ETRI) stands out as second in patent filing among universities and public research organizations and ranks among the top 30 patent applicants overall.

Looking at first filings, the top 10 main offices account for 97 percent of all AI patent filings (with 328,935 patent families) and the top four offices (China, Japan, Republic of Korea and the U.S.) together account for 86 percent of the total of first filings for all patent families (see figure 5.4).

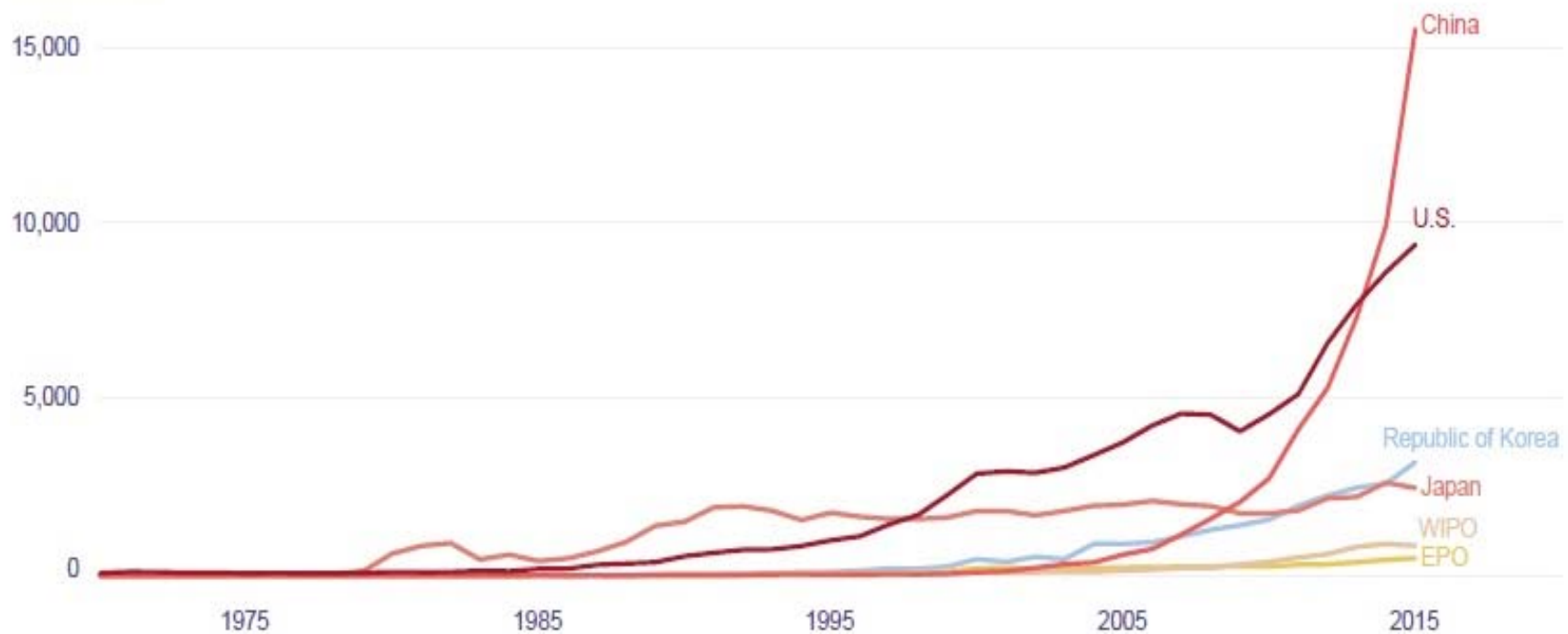
The total number of filings of the top Chinese and Korean universities and public research organizations is high compared with the U.S., Japanese and European institutions (see figure 4.2). AIST (Japan) had the highest average annual growth rate, however it only filed five patents in 2016. The filing activity of Chinese organizations continues to grow, with each organization having an average annual growth rate of more than 20 percent from 2013 to 2016 (see figure 4.13).

The biggest filers of oppositions to AI patents are Siemens, Daimler and Giesecke+Devrient, while the main defendants in oppositions are Samsung, LG Corporation and Hyundai.

Other organizations with a positive growth rate include KAIST (Republic of Korea, up 9 percent) and the National Institute of Information and Communications Technology (NICT) (Japan, up 21 percent). The filing rates of the other organizations listed are either stable or declining.

Figure 5.6. Number of first filings for selected patent offices by earliest priority year

China is the top office of first filing, overtaking the U.S., with an average annual growth rate of 29 percent since 2006

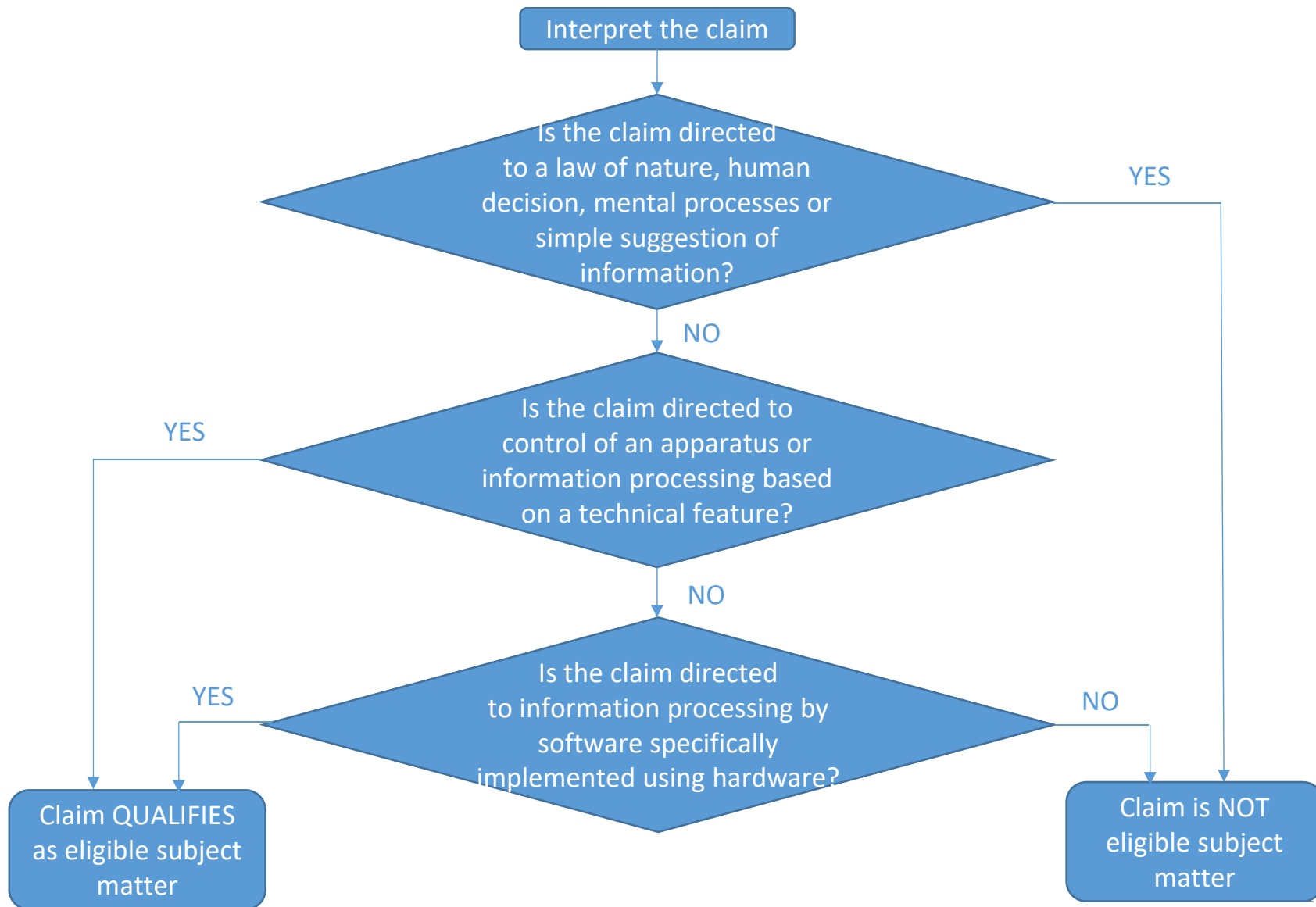


Note: EPO is the European Patent Office. WIPO refers to PCT applications.

AI Patent Practice in Korea



Patent Eligibility Test



- No need to worry about subject matter eligibility for AI related inventions in Korea
- Most claimed software inventions are found to be patent eligible at the KIPO
 - On-line Business methods
 - Software algorithms
 - On-line financial inventions (fin-tech)
 - AI related inventions
- Patent Court, 2009Heo351, October 16, 2009
 - Invention related to a comic book



Patent Eligible Subject Matter

- Method, Apparatus/Device/System claim (✓)
- Computer-readable (storage) medium claim (✓)
 - A computer-readable medium storing(recording) a program to cause a computer to carry out the steps of –ing, ing, and -ing.
 - A computer-readable medium storing(recording) data, comprising structure A, structure B, and structure C.
- Computer program claim
 - A computer program stored on a computer-readable (storage) medium for causing a computer to carry out the steps of –ing, ing, and -ing. (✓)
 - A computer program for causing a computer to carry out the steps of –ing, ing, and -ing. (X)
- Computer program product, program product, data carrier, data carrier medium, program signal (X)

Eligible for Expedited Examination

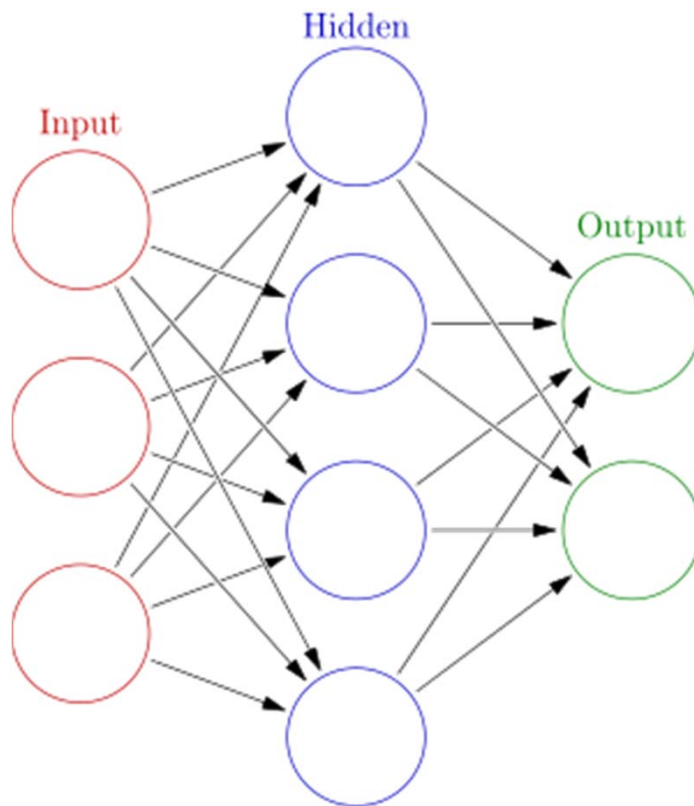
- Any application can be eligible for expedited examination
 - by having a prior art search done by one of the KIPO-designated prior art search authorities.
 - official fees (about USD 200) + prior art search fees (about USD 650) + attorney fees
 - 1st Office Action issued within 3 months from the date the request for expedited examination is filed
- AI-related patent application
 - **Patent applications pertaining to AI**, IoT, 3D Printing, Autonomous Driving, Big Data, Clouding Computer, Intelligent Robot, Smart City, Virtual/Augmented Reality, Recycled Energy, Customized Healthcare, Drone, next-generation communication, and intelligent semiconductor.
 - Still need to submit a prior art search report to the KIPO, but doing this is inexpensive

Tips on Drafting Claims for an AI Invention



In 1992

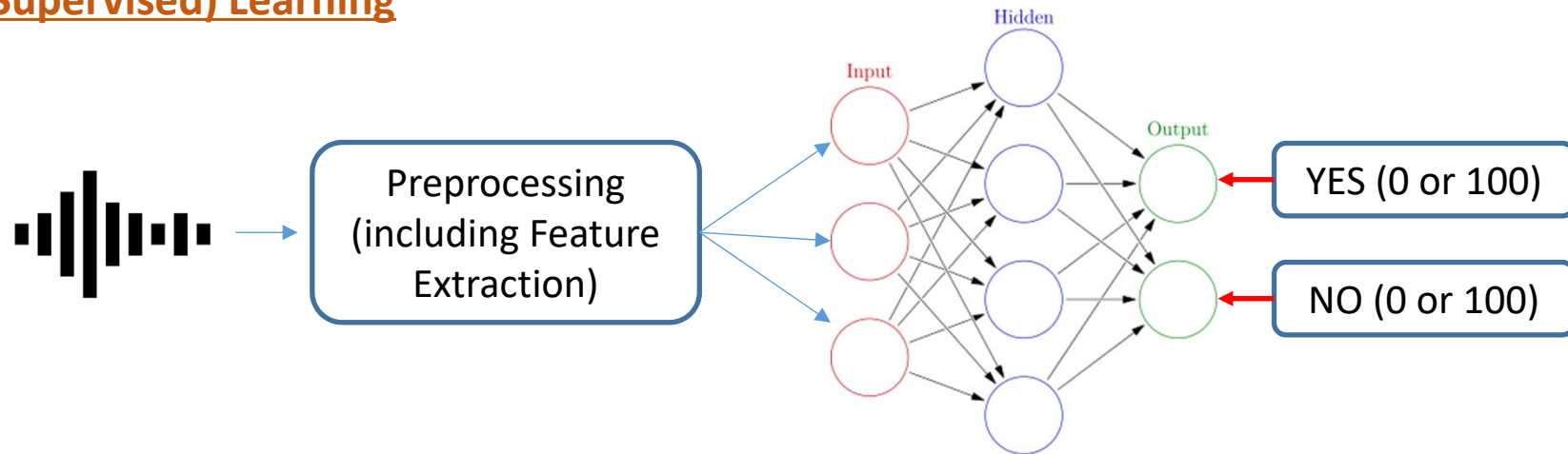
In 1992, Peter was a 4th year university student majoring in computer science and engineering. At the time, AI and neural networks were hot technology, and he decided to develop a speaker recognition system using a neural network for his term project.



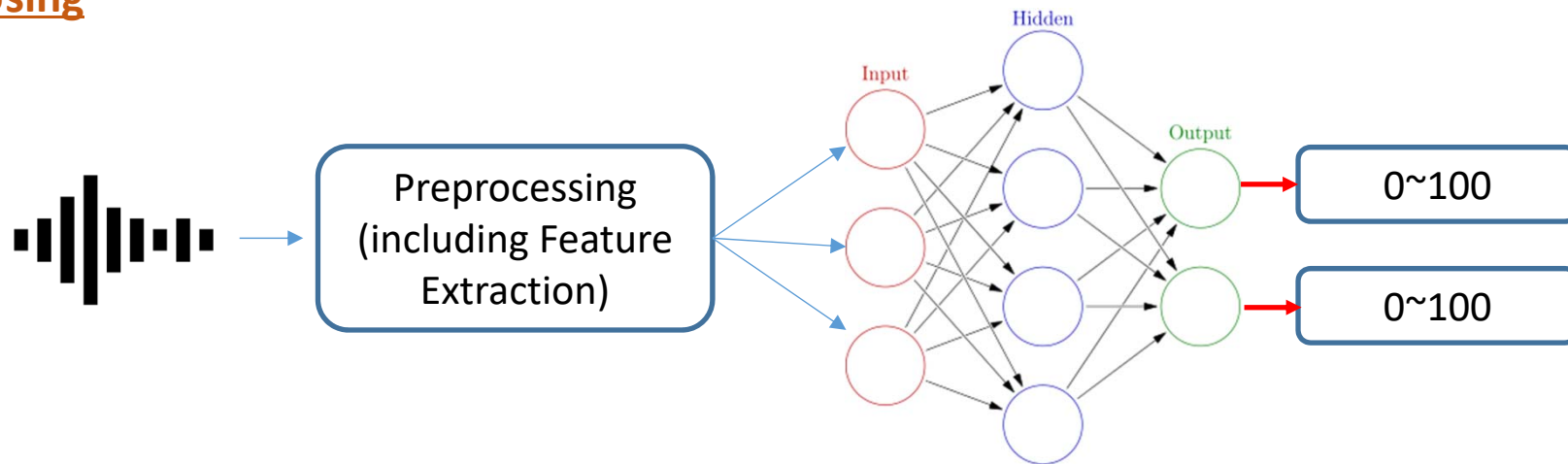
Neural Network is Very Powerful when
input and output are related

In 1992, Speaker Recognition

(Supervised) Learning



Using



In 2016, AlphaGo vs. Lee Sedol

- 4 Wins vs. 1 Win



Google DeepMind
Challenge Match
8 - 15 March 2016

AlphaGo vs Lee Sedol

Match 1 - Livestream
9th March 13:00 KST, 04:00 GMT
-1 day (8th March) 20:00 PT, 23:00 ET

Live from the Four Seasons Hotel Seoul!

Go Game

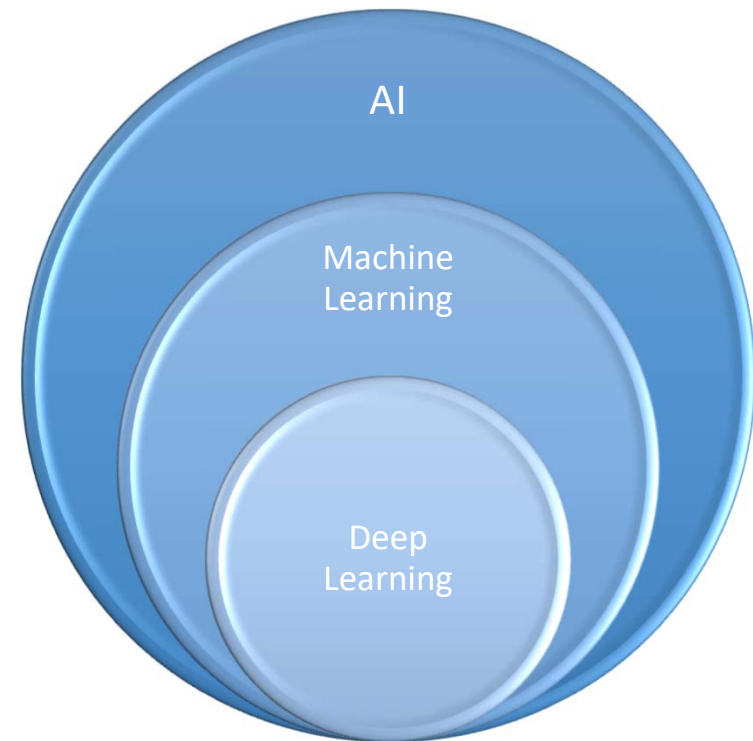
- Big Search Space
- $3^{19 \times 19}$



From: <https://deepmind.com/alpha-go>

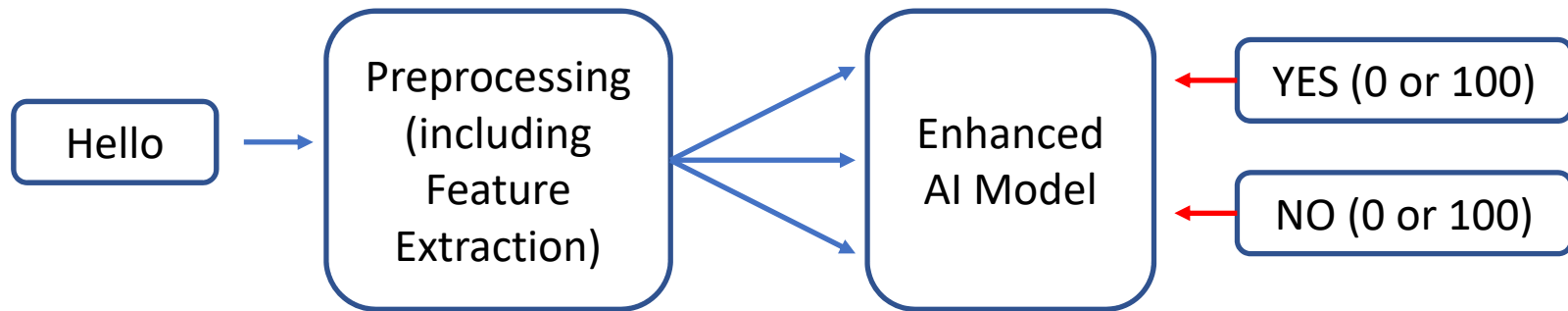
What Has Happened Over the Last 24 Years?

- Hardware Developed
 - in 1993 a high-end PC had a 65~250MHz CPU and 4MB memory
 - in 2016 a high-end PC had a 3.0~4.0GHz CPU and 16GB memory
- Data Storage Developed
- Network Developed (ex. Internet)
- Much More Digital Data Produced and Stored (ex. Big Data)
 - Large volume of Learning Data
- AI Technologies Developed
 - Deep Learning, RNN, CNN, etc.

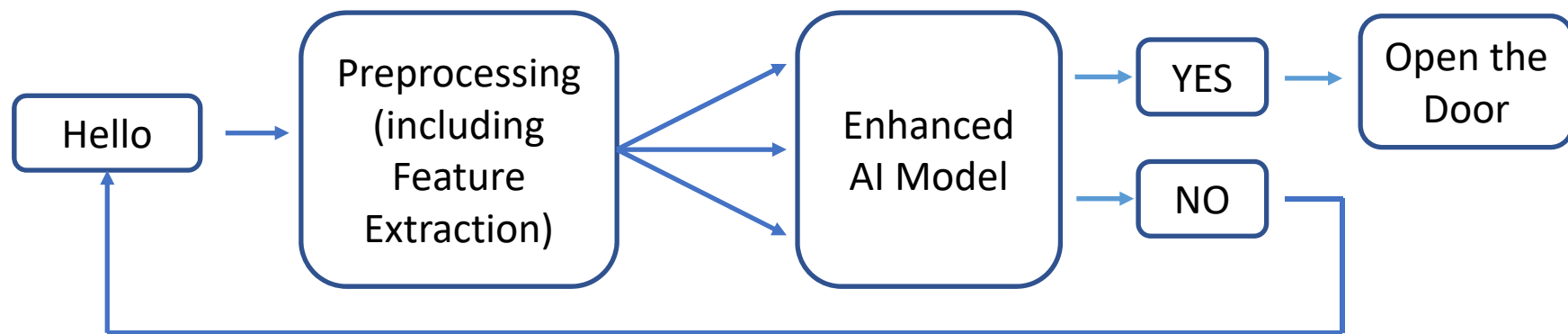


New Speaker Recognition System Using AI

Machine Learning

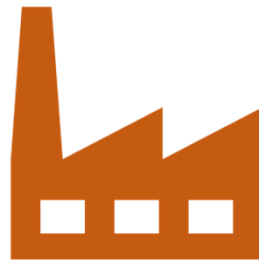


Product



- Claim Learning

- In many cases, learning is done at a laboratory or inside a company, not by a consumer product
- Difficult to find and prove infringement



- Claim Product/Service

- The claim is directed to consumer products and a bigger market
- Relatively easy to find and prove infringement



- Try to include claims in your patent application that cover a **product/service** using the AI aiming to secure broader protection
- Some products/services used by consumers include a learning function

What to Claim – Model (Model Patent)

- Structure of Neural Network
 - Number of layers
 - Connection between layers
 - Enhanced Modification of the existing Model
 - New functions and formulas
- Very Technical and High Inventive-step
- Many AI patents are directed to Model Patents
- There are some Models particularly effective for the specific application (ex. excellent for determining lung cancer)
- When same models are used between learning stage and product stage
- When different models are used between learning stage and product stage

Model

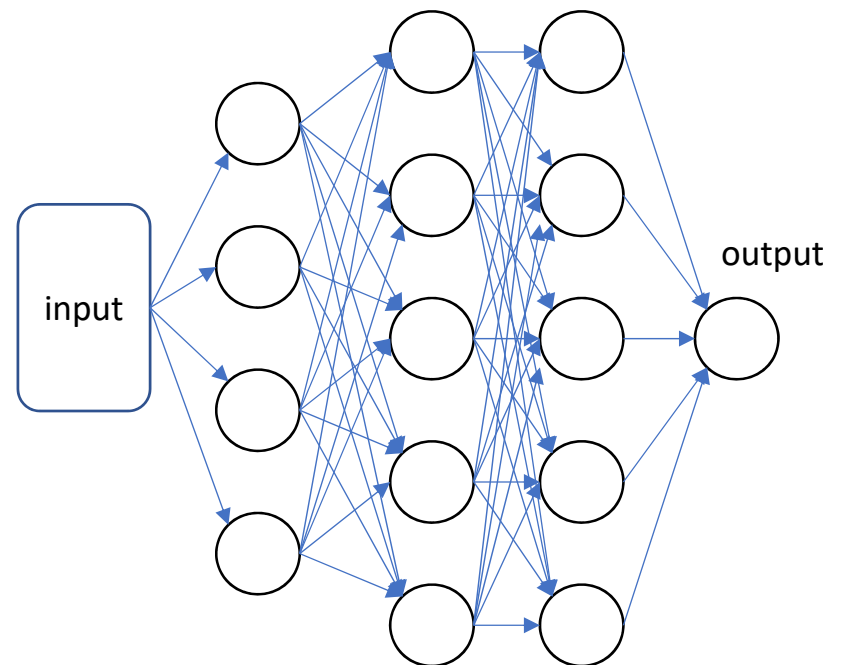
Learning

Enhanced
AI Model

Product

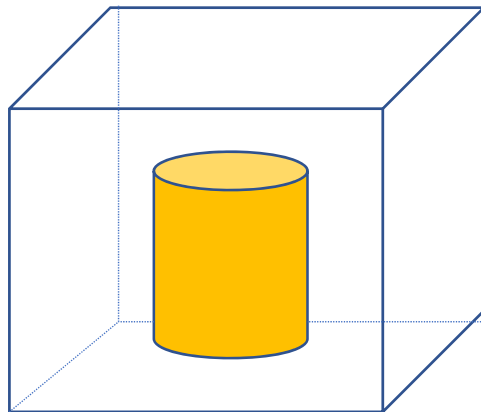
Enhanced
AI Model

- Input/Output Combination having an inventive step
 - What are the inputs/outputs to the model?
 - For example, input – eye image, output – possibility of stomach cancer
- Preprocessing can be a good aspect to claim
- Easy to find and prove infringement
- Strong Patent
 - When you claim well, it does not matter which model the infringer uses.



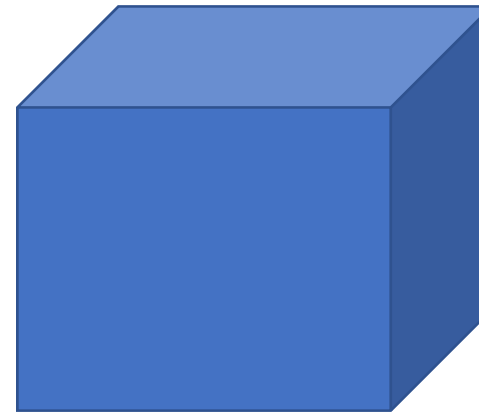
- Claim Model

- High level Inventive step
- Not seen from outside
- Difficult to find and prove infringement



- Claim I/O

- Low level Inventive step
- Seen from outside
- Relatively easy to find and prove infringement



- Established in 2002
- Located in Seoul, Korea
- Patent teams offering experience and expertise in full range of significant technologies
- Strong trademark and design teams
- 140 total staff including 45 patent attorneys
- One of the fastest growing IP firms in Korea
- 8th largest firm in Korea in terms of numbers of IP filings (Korean National Congress, 2016)
- 7th largest firm in Korea in terms of numbers of IP trials (Korean National Congress, 2016)
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Peter (Sungjin) CHUN



Peter Chun

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Founder

Education

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Engineering

Mr. Chun is a registered patent attorney with expertise in computers, networks, the Internet, software, wireless communication, semiconductors, display and visual processing. He is a managing partner and co-founder of MUHANN with more than 20 years of experience in IP practice, particularly dealing with patent prosecution, patent litigation, patent licensing, and counseling clients on a broad range of IP related matters.

Prior to founding MUHANN, Mr. Chun worked for another major Korean IP law firm as the managing attorney responsible for handling prosecution work on behalf of IBM. He has been involved in a wide variety of patent infringement lawsuits including Fujitsu vs. Samsung regarding HDD head patents. He also served as a research engineer for Samsung Electronics for several years. During that time, he developed TCP/IP protocol stacks, LAN device drivers (Fast Ethernet, ATM), and some communication programs. He also participated in developing PC servers, network switches, routers and firewalls. Mr. Chun has also been involved in projects in which he worked with UnixWare and Linux TCP/IP source code and has helped to develop many network programs, such as Web servers, mail servers and proxy servers. He also has experience in developing programs for speech recognition, neural networks, machine learning and natural language processing.

Mr. Chun received his Bachelor and Master of Science in Computer Engineering with Honors from Seoul National University. During graduate school, he participated in projects for developing natural language processing systems and machine translation systems. In 1994, Mr. Chun passed the Korean patent bar exam with the highest score of all applicants that year.

Mr. Chun is a member of the KPAA (Korea Patent Attorneys Association), APAA (Asian Patent Attorneys Association), and AIPPI. He has been serving as a board member of APAA Korea and AIPPI Korea. He currently leads the KPAA's ICT group, which includes more than 500 Korean patent attorneys. He also served as a director of the Organizing Committee for the APAA 58th Council Meeting in 2010.



Danke
Schön!