KIPO's plan for AI
– Are you ready for AI? –

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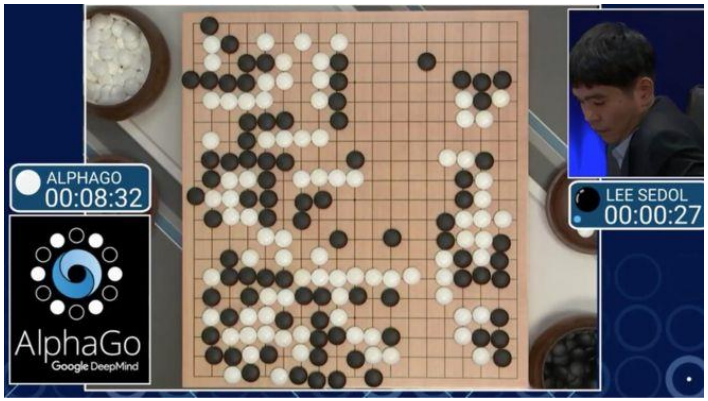
01 What is AI?

What is the first thing that comes to mind when you hear the word "AI"?



A big shock to Koreans

AI movies

Terminator, Avengers
Her, Transcendence
…

AI In daily life

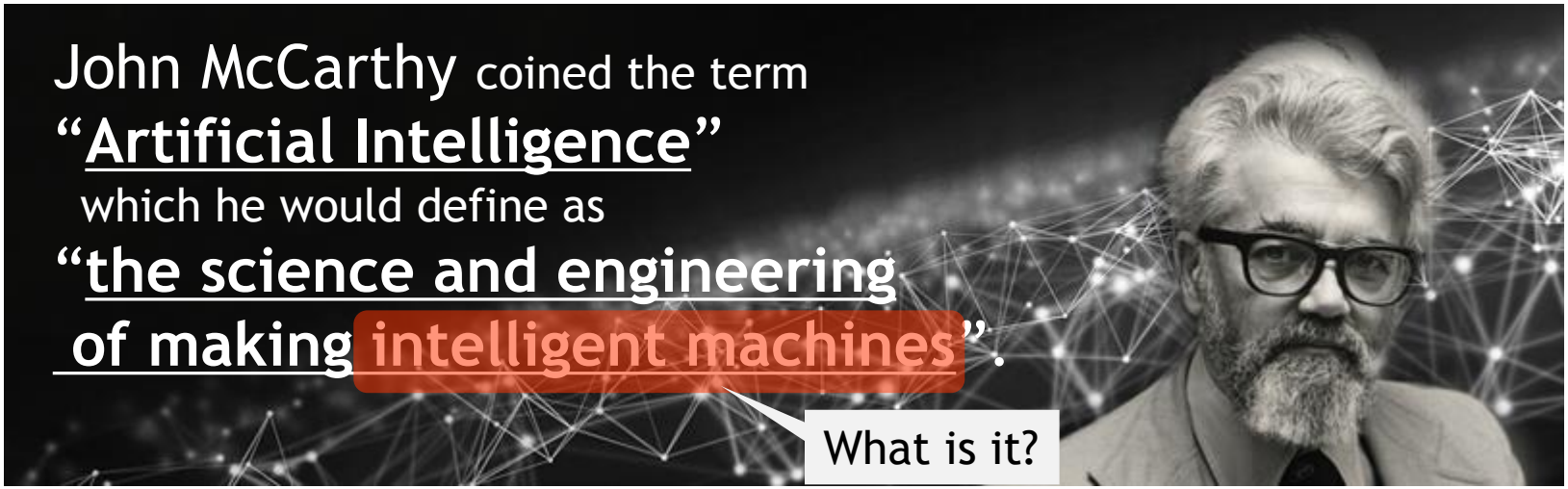
Home Appliance Manufacturers Release AI Washing Machines ...
www.businesskorea.co.kr/news/articleView.html?idxno=14635 ▾ 이 페이지 번역하기
2016. 5. 11. - **AI Washing Machine** ... According to industry sources on May 10, LG Electronics' new Signature ... Starting with Bubble drum washing machine "BubbleShot," **Samsung** Electronics has also adopted the automatic detergent ...

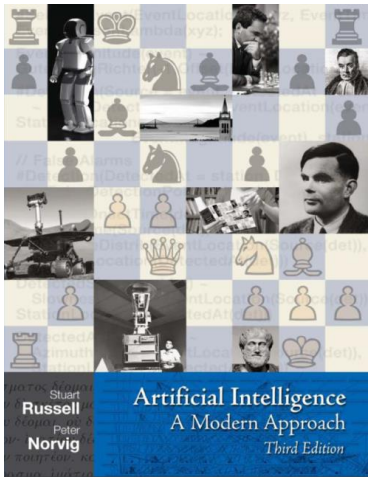
CES 2018: LG and Samsung battle for the smart home, introduce 8K ...
https://www.smh.com.au › Technology › Innovation - 이 페이지 번역하기
2018. 1. 9. - From TVs to vacuum cleaners, every appliance around your home is set to ... LG's new OLED TVs are made smarter with a touch of **AI**, and with ...

* http://www.bbc.com/news/technology-35785875
* Google search

AI, difficult to define

That's partially because the notion has changed over time

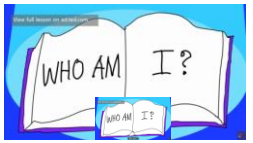




- Thinking Humanly: new effort to make computers think
- Acting Humanly: the art of creating machines that perform functions that require intelligence
- Thinking Rationally: the study of the computations that make it possible to perceive, reason and act
- Acting Rationally: computational intelligence is the study of the design of intelligent agents

* https://www.artificial-solutions.com/blog/homage-to-john-mccarthy-the-father-of-artificial-intelligence
* "Artificial Intelligence A Modern Approach" 3rd Edition 1~2page, Stuart Russell, Peter Norvig, Prentice Hall

Difficult to define because



- **AI effect: Concept of AI has changed over time**
  - Once something becomes commonplace, it's demystified. And it doesn't feel like the magical intelligence that we see in humans. (ex. search engine, OCR)
- **AI has two categories**

The concept varies from person to person

  - AI (Artificial Intelligence): Try to imitate human brain or express human thoughts in algorithms
  - IA (Intelligence Augmentation): It's impossible for a computer to imitate human intelligence and it should be focused on technologies that help strengthen human intelligence. (ex. IBM Watson, Google)
  - Today, AI = IA + AI

KIPO's target

* WHO AM I? https://www.youtube.com/watch?v=UHwVyplU3Pg, edited partially
* AI effect http://www.businessinsider.com/misconception-artificial-intelligene-2015-10 / AI vs IA https://iac.nia.or.kr/board_files/70/download

Levels of AI

When plan to adopt AI,
Need to determine the level
based on business characteristics

[Book title: AI and Deep Learning]

- **[Level 1]** Simple control program
  - Advertise a simple control program of a machine as "AI applied" (washing machine, vacuum cleaner)
- **[Level 2]** Complex control program
  - The relationship of input and output is large and complex (traditional puzzle game, expert system with knowledge base)
- **[Level 3]** AI with Machine Learning
  - The performance of level 2 machine can be improved to level 3 by machine learning . But feature extraction is done by human
- **[Level 4]** AI with Deep Learning
  - The input features are extracted not by human but by machines

* "인공지능과 딥러닝", 마쓰오 유타카, 동아 엠엔비 ["AI and deep learning", Yutaka Matsuo, Donga M&B]

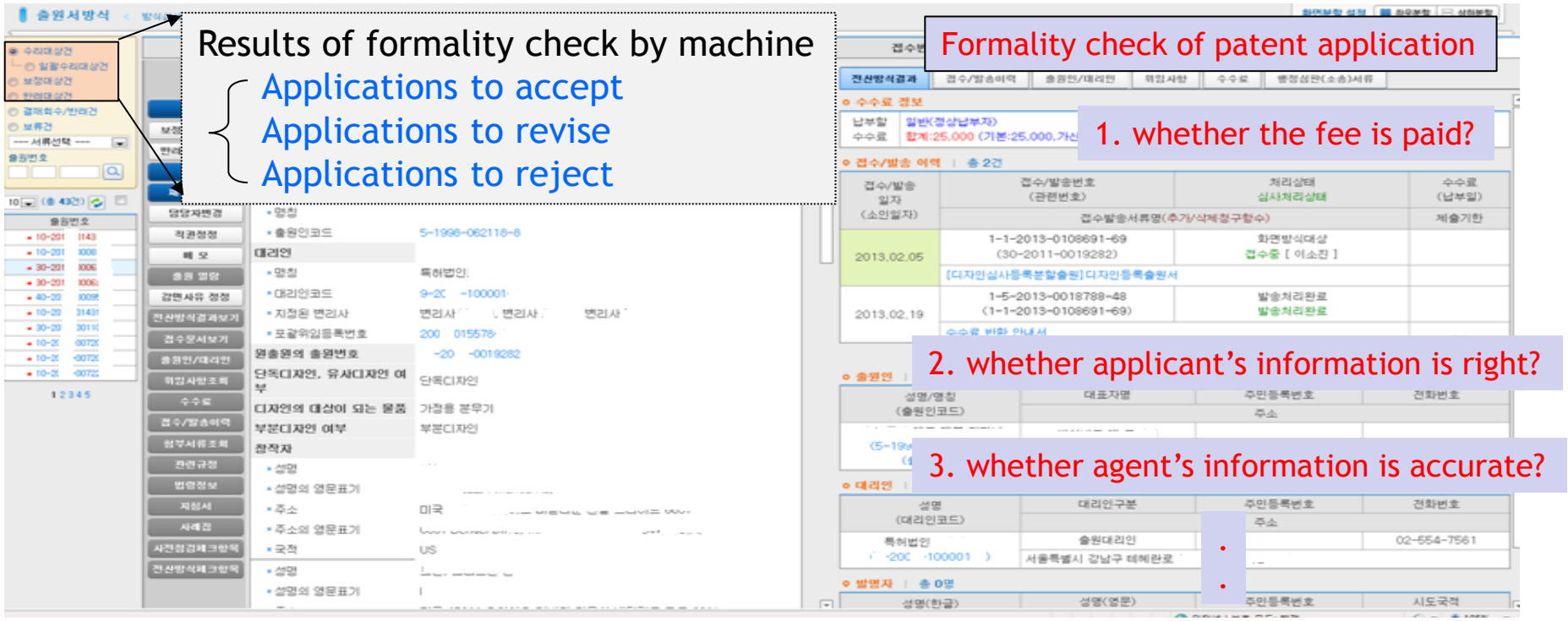
KIPO CASE

Pre-formality checking system

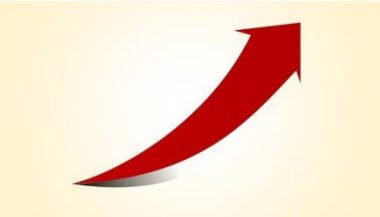
Level 2

■ KIPO uses formality check assisting system

- ▶ Formality examiners review the result of the system and conduct more checks which are not covered by the system. KIPO wants to enhance the quality in “Level 2”



02 Why AI is necessary?



To enhance the efficiency and performance

■ **In information age, basic digital life achieved**

- ▶ Offline→Online, Analog→Digital, Process reengineering
- ▶ KIPO has developed KIPOnet system, accumulated data

■ **In AI era, expect more advanced life**

- ▶ Enhance the quality and precision, Process automation

KIPO CASE

Patent auto search system

Level 2

Level 3,4

■ KIPO has been using auto search system

- When patent application is inputted, the system extracts keywords from the application documents and searches prior arts automatically
- KIPO wants to enhance the quality by applying machine learning

Input application number → Extract keywords and Search → Display prior arts in order of ranking

순번	구분	IPC분류	새창열기	발명의명칭	출원번호	출원일자	공개번호	공개일자	랭킹
					1019930003089	19930303	1019930020815		
					1019860003691	19860513	1019870011645		
3	공개	H01L27/10	+	공진 터널링 구조를 포함하는 디바이스	1019980014355	19981102	1019990009006	19990713	77.45%
4	공개	G11B15/02	+	구동장치	1019950002544	19950211	1019960032376	19960917	77.39%
5	공개	B60S1/08	+	자동차의 와이퍼와 콘루프의 동시 작동 장치	1019960005711	19960305	1019970065236	19971013	76.26%
6	공개	F04B27/00	+	유압펌프	1019870013759	19871203	1019890010418	19890808	76.2%
7	등록	D04B39/00 D04B35/00 (A)	+	대환기의 이동 사도간 또는 침도 작동 장치	1019720000349	19720309			76.13%
8	공개	F02D17/00	+	에어베어스 작동시의 아이들 상승 장치 및 방법	1019950049999	19951214	1019970044752	19970726	76.12%
9	공개	F24C3/12	+	그릴 제어장치	1019900014861	19900919	1019910012612	19910731	76.08%
10	공개	G06F11/30	+	프로세서의 상태 감지장치	1019890007305	19890531	1019900018815	19901222	76%
11	공개	B60Q1/34	+	자동차의 방향 지시등 작동 구조	1019950071351	19951228	1019970037562	19970724	75.97%
12	공개	G11B7/09	+	포커스 서어보의 포커싱 제어 방법	1019870015058	19871228	1019890010820	19890810	75.87%
13	등록	B67D7/32 F04D7/04	+	작동유 자동 공급 장치	1020090068470	20090727			75.85%
14	공개	B21J5/02	+	폐새 단조 프레스	1019790002708	19790807	1019830000996	19830429	75.84%
15	공개	A61H23/02	+	지압겸용호자손구동장치	1019950023195	19950731	1019970005257	19970219	75.78%
16	공개	B62D53/08	+	전자 제어되는 유체 분리 제오름 기구	1019910011884	19910712	1019920002381	19920228	75.76%
17	공개	B60Q1/08	+	와이퍼작동시 전조등 자동 작동장치와 그 방법	1019960006159	19960308	1019970065128	19971013	75.69%
18	공개	B23K10/00	+	플라즈마 절단 장치	1019900014293	19900911	1019910007617	19910530	75.63%
19	공개		+	기기의 안전장치	1019890003899	19890328	1019890016345	19891128	75.63%
20	공개	G06F11/30	+	정보 처리 장치의 특정 부분 실행 능력 감시 장치	1019890020518	19891230	1019910012923	19910808	75.55%
21	공개	B21D1/02	+	로울러 레벨러(roller leveler)	1019910013692	19910808	1019920019437	19921119	75.44%
22	공개	F23Q3/00	+	가스기기의 점화 방법	1019950056460	19951226	1019970047017	19970726	75.36%
23	공개	H03F3/04	+	직류 차단 증폭기	1019900006441	19900508	1019900019343	19901224	75.35%
24	공개	B60K17/00	+	수동 변속 차량의 변속레버 조립체	1019950035276	19951013	1019970020601	19970528	75.32%
25	공개	B23Q11/14	+	유온 히터를 이용한 유온 자동 조절 시스템	1019930023902	19931227	1019950017084	19950720	75.32%
26	공개	F16J9/08	+	유압발생장치	1020090131367	20091226	1020110074815	20110704	75.32%

KIPO CASE

Machine Translation

Level 2

Level 4

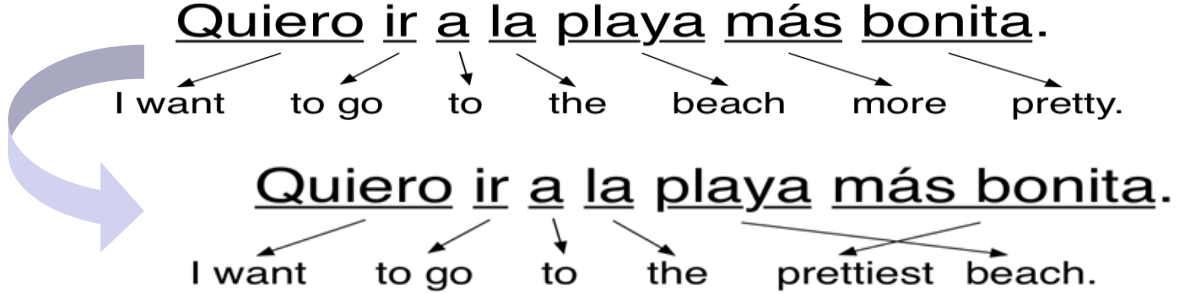
■ KIPO uses RBMT for English, Japanese, Chinese

- ▶ Google and WIPO started NMT(Neural Machine Translation) and the quality is better than that of RBMT
- ▶ KIPO wants to enhance the quality with NMT

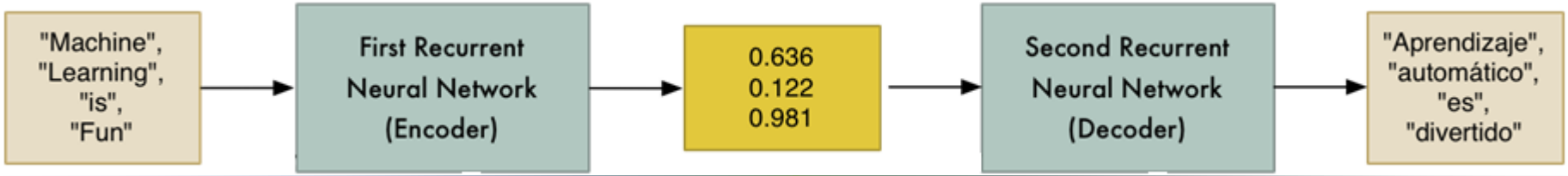
RBMT(Rule Based Machine Translation) algorithm

Replace each Spanish word with the matching English word

Change the order of nouns and adjectives



NMT(Neural Machine Translation) algorithm



* https://medium.com/@ageitgey/machine-learning-is-fun-part-5-language-translation-with-deep-learning-and-the-magic-of-sequences-2ace0acca0aa

03 Where and How to apply?

- **Customer Service**
  - Chabot, Voice-based customer service system
- **Classification**
  - Patent, Trademark, Design
- **Patent Prior art Search**
  - Automatic search system
- **Image Search**
  - Trademark, Design
  - Patent drawing
- **Machine Translation**
  - Neural Machine Translation (NMT)
- **Legacy system**
  - Apply machine learning and deep learning

General approach for AI

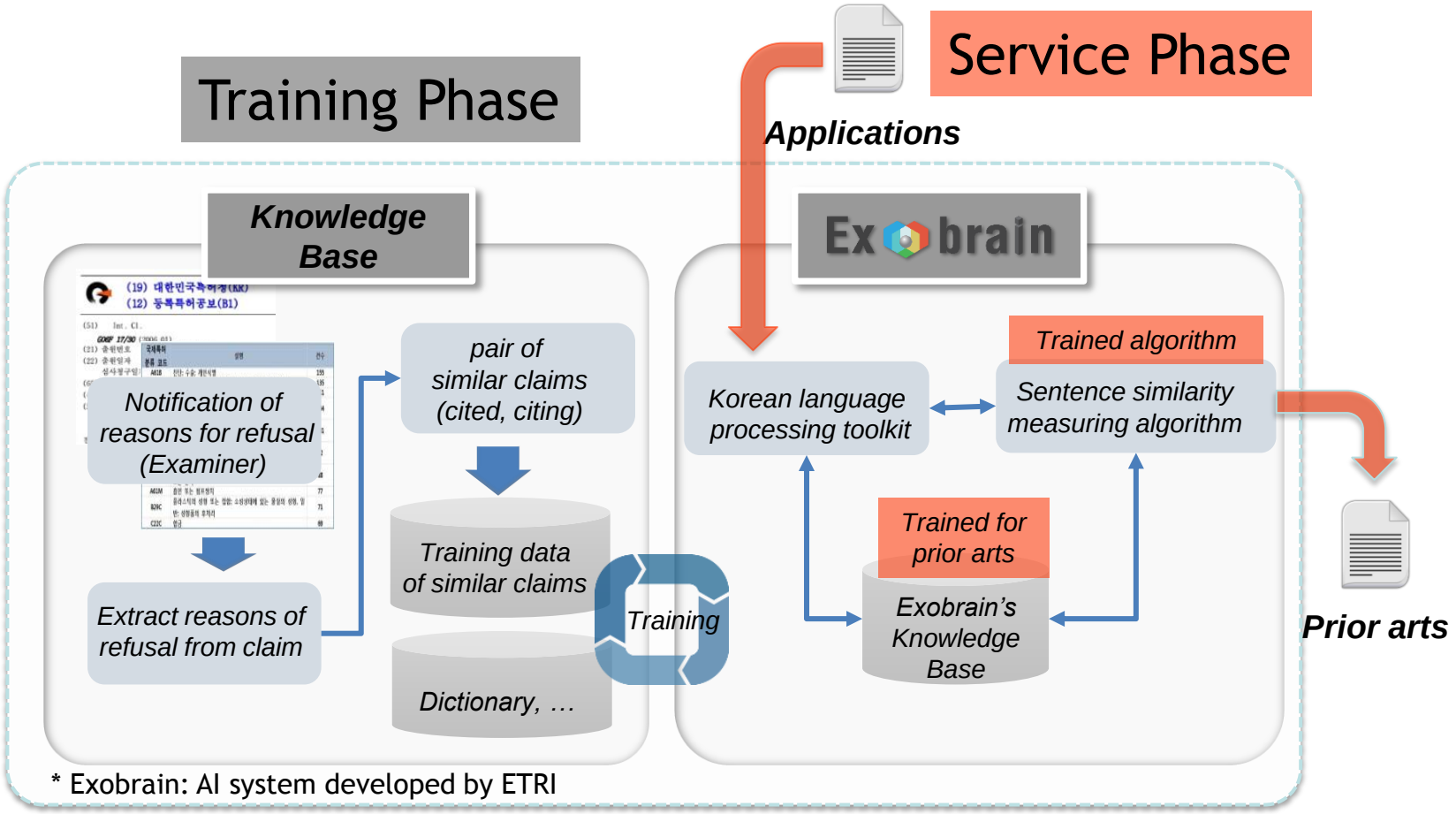
Knowledge Base for AI		AI algorithm		AI-based service
Dictionary	+	Exo-Brain	→	Prior art Search
Technical Component		Watson		Image Search
Training Data	Training	AlphaGo		Machine Translation
General Knowledge		AI Models		Customer Service
. . .		. . .		. . .

KIPO CASE

Patent auto search system (R&D)

AI based

with ETRI, KIPI



* ETRI: Electronics and Telecommunications Research Institute / KIPI: Korea Institute of Patent Information

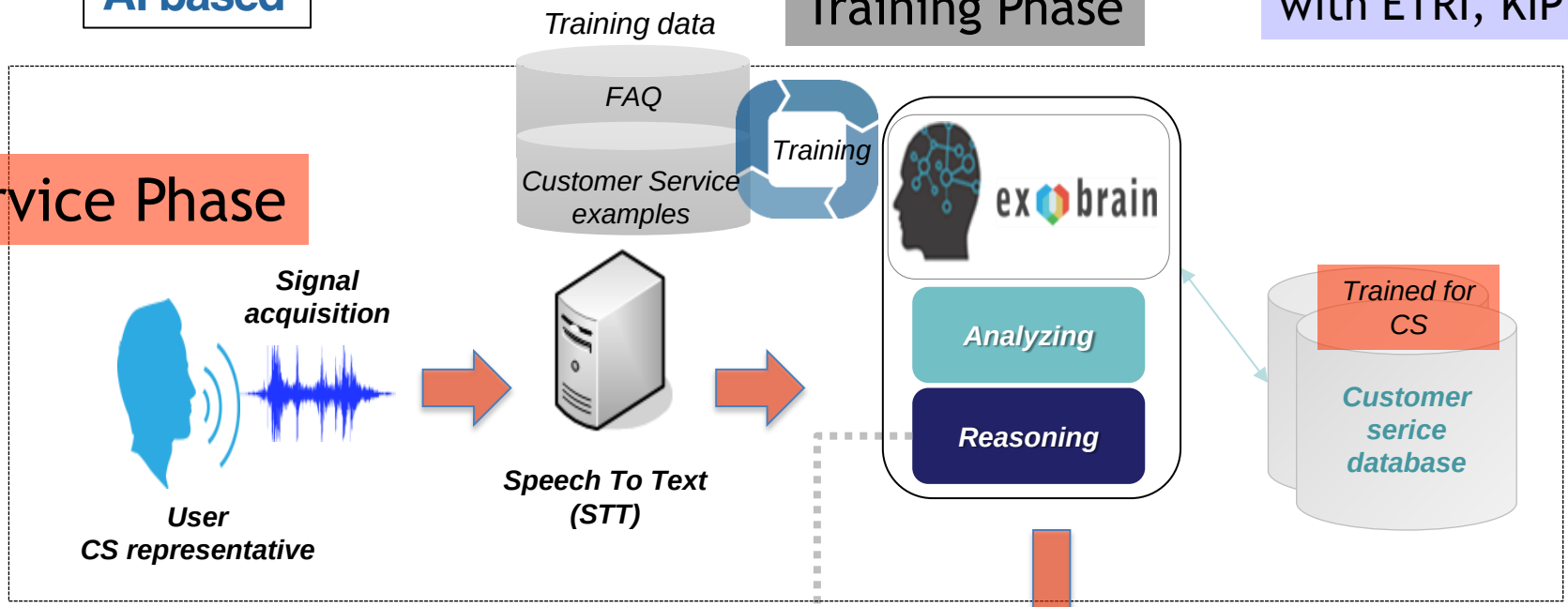
KIPO CASE

Customer service assist system (R&D)

AI based

with ETRI, KIPI

Training Phase



Service Phase

Final Goal model: Speech to Speech service

KIPO CASE

R&D with NIA, KIPI

Knowledge Base (R&D)

Study with KIPI

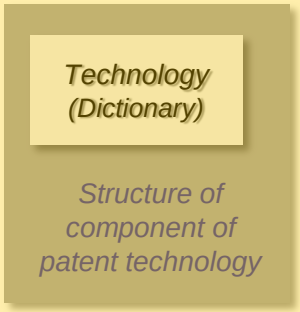
Dictionary

- Dictionary

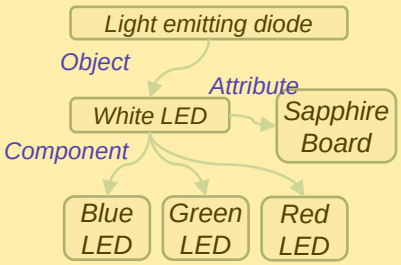
Title : 반도체
Definition : A substance used in electronics whose ability to conduct electricity increases with greater heat.
Equivalence : Semiconductor
Relevance :Diode, Conductor

Build dictionaries of technical terms

Knowledge base

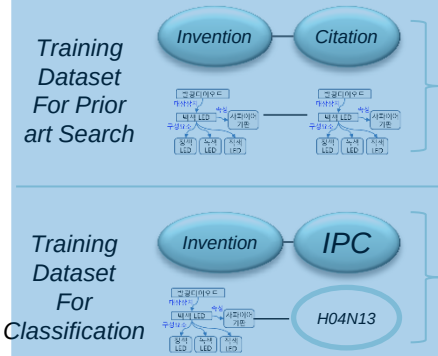


- Component of technology

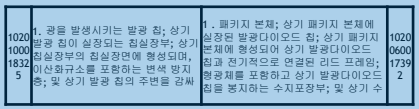


Structuralize components of patent technology

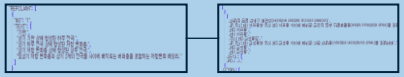
Training dataset



- Training dataset of claims

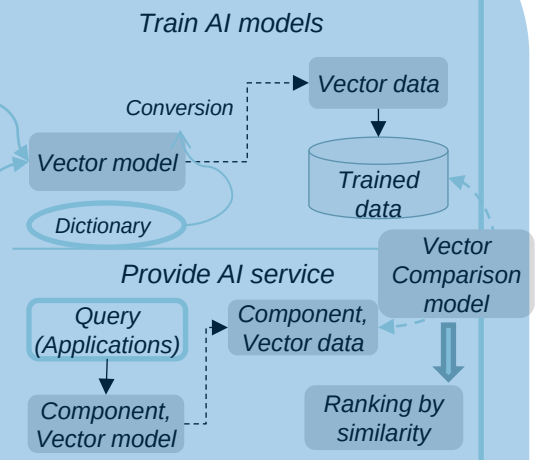


- Knowledge base set

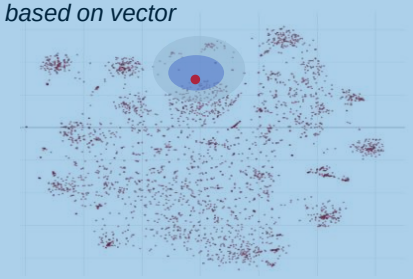


Build training dataset

Machine learning & AI service model



- Retrieve similar patent based on vector



Train AI model and Provide the service

04 With whom?

■ With AI in early stage, things are not clear

- R&D before developing
  - KIPO **cooperates** with ETRI, NIA and KIPI for R&D

COOPERATION

WIPO

- International cooperation is needed
  - Data exchange for machine learning (ex. language corpus)
    Share skills for adjusting open source algorithms
  - KIPO plans to **cooperate** with WIPO for NMT

05 Further things to think about

- **AI is not a goal itself.**
  - It's just one of possible solutions
- **It's not the matter of "do or do not"**
  - What matters is performance and quality
  - It's important to check "What aspects of AI are applied"

  * AI is usually used as a good marketing tool.
- **Garbage In, Garbage Out**
  - The quality of input data determines performance of AI
  - Data quality control is still very important

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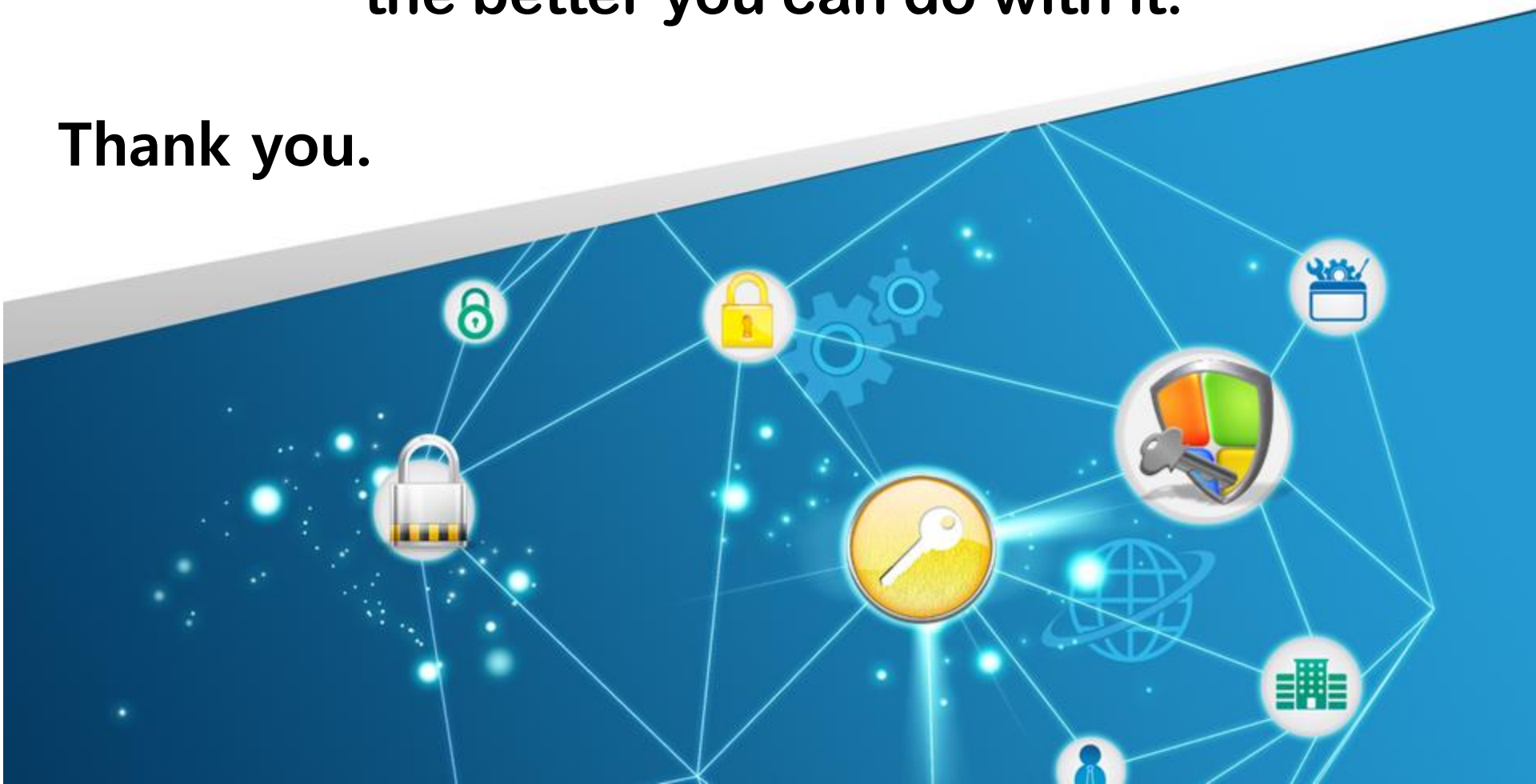
Korean Intellectual Property Office

Whether do it yourself or not,

the more you know about AI,

the better you can do with it.

Thank you.