

maum.ai

MAKE YOUR OWN **AI SERVICE**





Make your own AI Service

Written by MINDs Lab

Edited by MINDs Lab

First published : 2019. 07.

Telephone : +82-31-625-4340

Website : <http://maum.ai>

Email : hello@mindslab.ai

Copyright © Minds Lab. All rights reserved.

maum.ai

Make your own AI Service



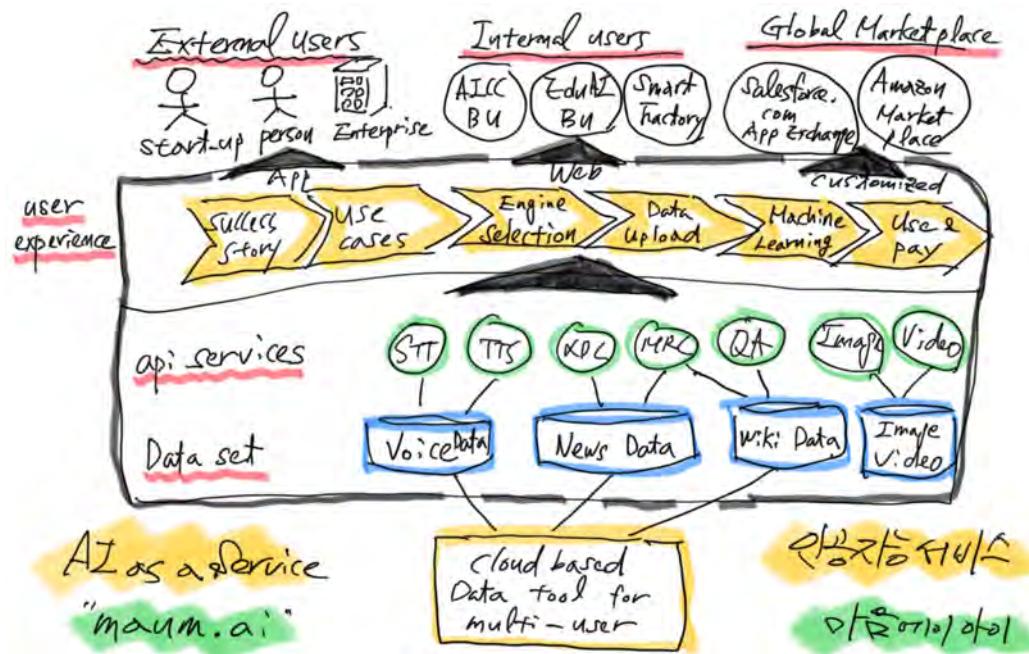
Table of Contents

Framework	Background and Framework	10
Success Stories and Use Cases	2.1 Smart Factory	19
	2.2 Smart City	25
	2.3 Video Search & Analysis	41
	2.4 Smart Office	47
	2.5 EduTech AI	55
	2.6 FinTech AI	79
	2.7 InsurTech AI	85
	2.8 Service Robot	101
	2.9 Defense Industry	115
	2.10 BIO AI	121
	2.11 Customer Service	125
	2.12 Big Data Analysis	153
	2.13 Customized TTS	161
	2.14 OCR-Based Business Automation	169

Products and Services	
3.1 Services	177
3.2 Applications	209
3.3 Platform	245
3.4 Engines	249
3.5 Data	287
3.6 Algorithms	299
Mindslab Introduction	
History	316
Award	322
Organization and Global Presence	324
Partnership with EcoMinds	328

maum.ai

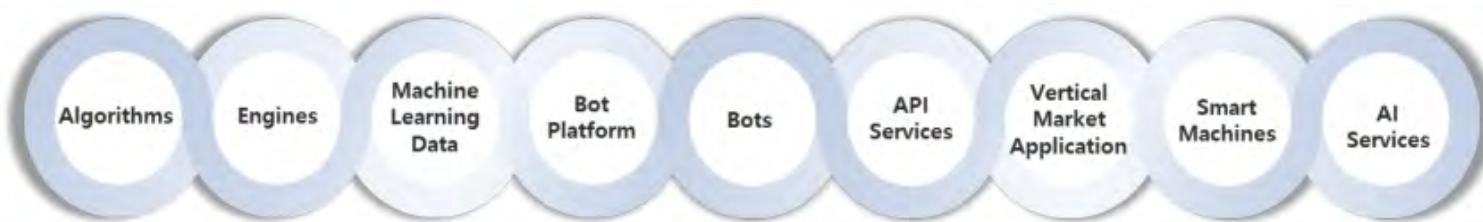
Make your own AI Service



Background and Framework

1

Background and Framework



The Supply Chain of the Artificial Intelligence Industry

The artificial intelligence industry, which is just in its infancy, is connected to a long supply chain with a large front-back effect.

Therefore, when companies want to introduce AI technology, it is very important to understand the AI supply chain.

When there is a clear understanding of the AI supply chain and the company's needs in terms of AI capability, meaningful changes can be made.

The Artificial Intelligence Supply Chain has a long and diverse range that covers basic algorithm research to actual business models.

1. Fundamental Research

Algorithm research area such as deep learning

2. Development of Artificial Intelligence Element Engines

An area where the algorithm developed through basic research is developed as an element engine

3. Acquisition / Cleansing of Learning Data and Engine Learning

Acquire and cleanse vast amounts of learning data to teach element engines and increase performance level

4. Development and Operation of Artificial Intelligence Platform

Develop and operate a platform that can learn various elements of developed and learned element engines

5. Development of Artificial Intelligence Application

Plan an application that combines AI and connect the element engine with the platform developed earlier

6. Development of Artificial Intelligence Service

Plan, develop and operate just AI or various service models in which AI and humans work together

7. AI-based Business Model Innovation

The area where a traditional business is transformed into a completely new business model through AI products and services

Therefore, the competencies required in each area are also completely different. Basic research requires high competence in mathematics and computer science, and business skills are needed toward the end of the AI supply chain.

When companies say "Let's apply AI into business", it is helpful to use the concept of the AI Supply Chain to clarify the specific area they want to implement it in.

What is an AI as a Service Platform and why is it necessary for an enterprise?

Generally, when companies want to introduce artificial intelligence, they often want to develop, use, or provide AI products or services to customers. The ultimate goal is to innovate business models based on AI.

Some large corporations that are rich in funding will be able to run their own research institutes for artificial intelligence basic research, but most small and medium-sized enterprises do not have enough funding to support this.

Researchers with AI research capabilities require a very high annual salary, but research areas that can be covered by a single researcher are very limited. In addition, new research papers and algorithms are pouring out each and every day. In this situation, how can companies introduce and develop artificial intelligence into their own companies to innovate business models and survive in the intense competition?

Companies need an artificial intelligence service platform that can easily introduce the artificial intelligence technology that is necessary for the company. In other words, there is a need of a service platform that they can use to easily implement artificial intelligence technologies for the AI based application or service that they design.

This service platform is called the AI as a Service Platform.

Artificial Intelligence Service Platform "AI as a Service Platform, maum.ai "

For this reason, MINDsLab has developed an AI service platform with enterprise-wide capability for a long time.

In maum.ai,

1. Success Stories and Use Cases

You can find out the success stories of customers using AI.

Because we have introduced AI to various industries and areas, you can find out and compare what benefits we offer our customers to achieve success. You can also find out in what area the AI was used in each success story. In addition, you can see how we processed the customer experience and organized applications, and where and how artificial intelligence is used.

2. Products and Services

Then you can see what AI products and services you can introduce to create your own success stories and use cases. AI Service Platform maum.ai has optimized these processes to be very easy and fast to apply.

All the algorithms, engines, data, learned models, applications and services developed by MINDsLab can be easily purchased from maum.ai website and applied quickly. Also, you can use your own data to create your own customized AI service.

These customized AI products and services support both On-Premise and Cloud-based, and provide stable operational services to customers who want Cloud-based services.

Composition of this book, Make your own AI Service!

This book is based on the order of service of maum.ai so that customers can create their own AI Service. Therefore, readers can easily identify and search various success stories, use cases, as well as various AI engines and application services that they can utilize.

Success Stories and Use Cases

2

2.1 Smart Factory

2.2 Smart City

2.3 Video Search & Analysis

2.4 Smart Office

2.5 EduTech AI

2.6 FinTech AI

Insurtech AI ^{2.7}

Service Robot ^{2.8}

Defense Industry ^{2.9}

BIO AI ^{2.10}

Customer Service ^{2.11}

Big Data Analysis ^{2.12}

Customized TTS ^{2.13}

Optical Character Recognition ^{2.14}



Success Stories & Use Cases

2.1 Smart Factory

POSCO

- Breakthroughs in manufacturing productivity through Smart Factory that increase efficiency and reduce cost.
- Real-time data analysis and optimization solutions using deep learning algorithms
- Innovation driven by AI in manufacturing with Maum MAAL, which can be applicable to most production processes.

POSCO

POSCO Implemented smart factory with optimal production environment through maum MAAL

POSCO, the world's leading steel manufacturing company, has implemented Smart Factory through maum MAAL (Manufacturing Analysis, Automation and Learning). It is a technology to implement an intelligent factory with an optimized production environment by introducing it into production and manufacturing processes. First, through the IoT sensor, data is collected, and the collected data is analyzed through a deep learning algorithm to automatically monitor the production process. The appropriate amount of input, output, temperature, speed, etc. are presented. As a result, POSCO can identify and reduce inefficiency and cost burdens. By laying the groundwork for the smart factory, we were able to ultimately add to the overall competitiveness of the manufacturing process.

This project, which has been carried out for two years since 2017, is aimed at optimizing processing time through analysis of operation pattern, optimizing process speed based on AI speed control algorithm and improving productivity, automatic control of the cold rolled and cold rolling process, and the development of a temperature prediction model and system.

Maum MAAL is developed to be applicable to any manufacturing plant by learning the knowledge of various industries. POSCO, a global steel company, worked on a large-scale artificial intelligence project over two years. MINDsLab is actively pursuing overseas market penetration through technology and know-how.

How did AI Smart Factory Change the Paradigm of Manufacturing?

Smart Factory card news



Real Time Monitoring

MINDsLab's AI Smart Factory is able to monitor field environment real-time which is comprehensible for capacity utilization of product. It saved \$200 million for production cost.

Minimize Energy Consumption

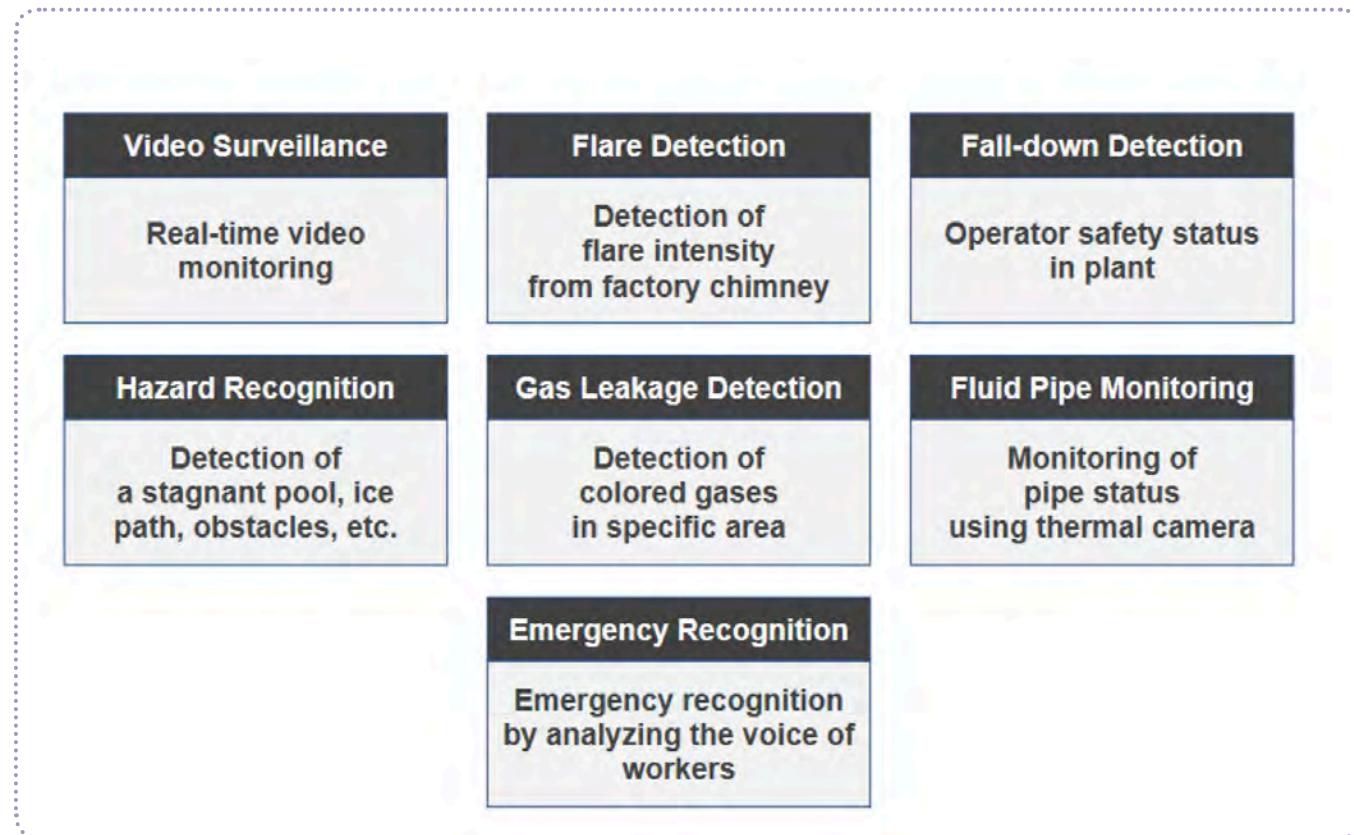
AI Smart Factory uses real-time accumulated data to analyzes the condition of raw materials. (coal/iron ore) Overall production increased more than 5% and energy cost decreased by 4%.

Predict Optimal Inspection Time

MINDsLab's AI checks the environment factor and cause of quality issues to prevent potential defects and figure out the optimal time to replace parts.

CASE STUDY : Safety at chemical plants

Applying MAAL's big data analytics and visual intelligence to safety and security



Intelligent Manufacturing!

AI technology that will revolutionize the manufacturing process

- Minimizing energy requirements
By predicting unusual events throughout the process, the process is streamlined and energy consumption is minimized.
- AI based demand forecast
Machine learning based on records of economic data, production demand.
- Forecasting the best time for maintenance and inspection
Use machine learning models to optimize maintenance of major equipment and machines.
- Optimize logistics costs and transport
Optimized production costs through analysis of logistics and transportation





Success Stories & Use Cases

2.2 Smart City

Seoul City Deep-Learning Vehicle Recognition

Suwon City Behavior CCTV

Daegu City Ddubot: AI Civil Affairs Consultation Chatbot

Seoul City Deep-Learning Vehicle Recognition

- Decreased traffic volume of old cars in Seoul by 30% through the identification of old diesel vehicles
- Applied center-based AI image analysis method that is cheap, scalable and maintenance-friendly
- Expects improved traffic safety through MINDsLab's AI-based recognition solution

Smart City, Deep Learning Vehicle Recognition in Seoul

Deep learning solution for plate number recognition reduces 30% of the passage of old diesel cars in Seoul

The Seoul Metropolitan Government has developed a vehicle recognition solution using road CCTVs in cooperation with MINDsLab to improve air quality and manage old diesel vehicles. It was developed with the aim of improving the air quality of Seoul City and preserving the environment by preventing the entry of old vehicles. Seoul City announced that it has cut about 30% of the passage of old diesel cars in Seoul by controlling them using the vehicle ID number recognition solution.

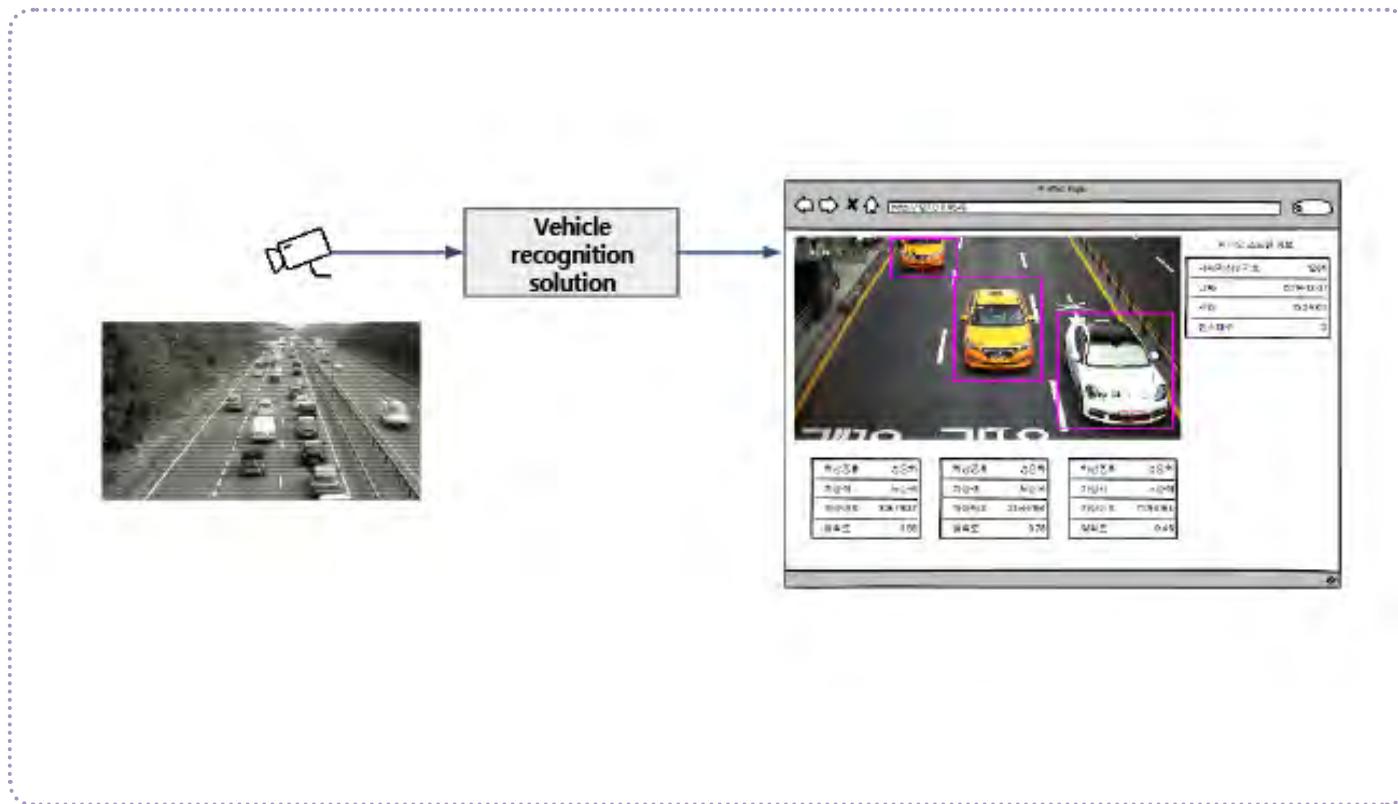
Applied center-based AI image analysis method that is cheap, scalable and maintenance-friendly

The AI-based vehicle recognition solution consists of an AI-based vehicle recognition system and an AI-based vehicle learning system. It is a system that recognizes the position of the license plate and the plate number/letter through the video taken of the vehicle. It controls old cars by detecting the vehicle, recognizing the car type, detecting the license plate position, and recognizing the license plate. MINDsLab's vehicle recognition solution uses center-based AI image analysis, which is cheaper than other analytical platforms and machine-learning AI methods, and is advantageous for scalability and maintenance.

MINDsLab's AI-based recognition solution expects road safety benefits

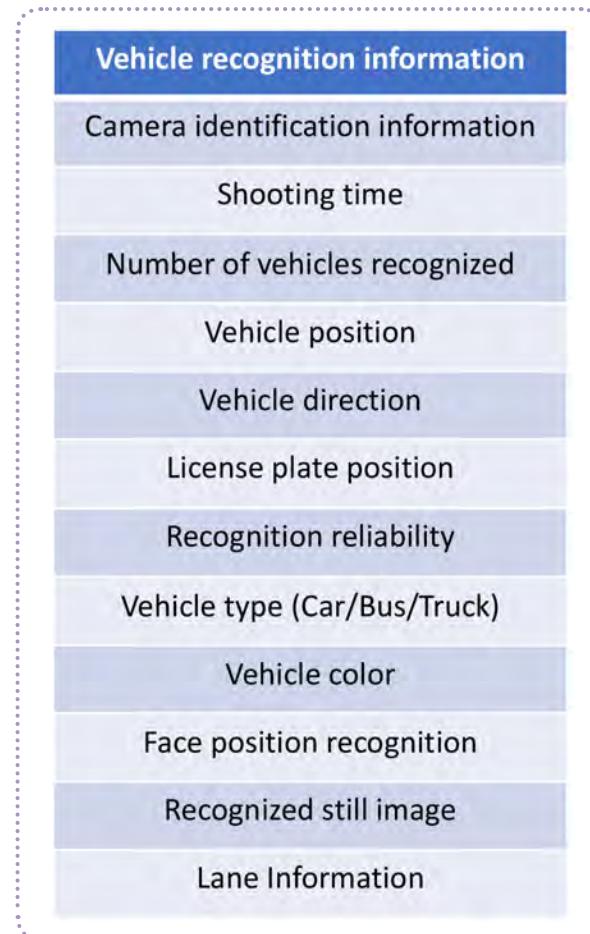
MINDsLab's center-based AI image analysis system provides an excellent advantage in scalability. It can be expanded by adding only a camera, and it can be modularly extended by various recognition systems. Such a system will be applied to road safety management including vehicle lane violation detection, pedestrian traffic violation detection, and is expected to increase road safety.

Deep Learning Vehicle Recognition in Seoul



Smart platform, center-based AI image analysis platform

Pre-learning system configuration and work flow chart (vehicle information recognition part)



Suwon City Abnormal Behavior CCTV

Success Stories & Use Cases
Smart City

- Improved urban security and crime detection rate through the Abnormal Behavior CCTV system
- Overcoming the limitations of existing detection systems

Suwon City Behavior CCTV

Improved urban security and criminal arrest rate through CCTV system

Suwon City is introducing MINDsLab's Abnormal Behavior CCTV system to improve city security and crime arrest rate. This means that it is based on the heterogeneous CCTV image data set which is jointly developed by the Korea Information Society Agency. The artificial intelligence technology automatically detects and analyzes human movement, and human interaction in CCTV video in real time by sensing system.

Overcoming the limitations of the existing detection system

The original CCTV integrated control room consists of 9,423 cameras in 3,141 locations operated by Suwon City monitored by 49 control personnel working in 4 groups of 2 shifts; 780 cameras were monitored by each agent. In order to solve these limitations of direct control system, the following accomplishments have been achieved through the integration of the Abnormal Behavior CCTV. First, the smart control operated the control system efficiently and therefore raised the crime arrest rate. Second, the smart city detects abnormal situations such as robbery and harassment in roads and alleys. Finally, the Smart Factory detects abnormal situations in the factory such as employees fainting and falling off the ladder.

Development of intelligent CCTV through abnormal behavior image data

MINDsLab's abnormal behavior video data is used as learning data for the future development of intelligent CCTV. Currently, intelligent CCTV is an AI technology which is actively applied in various fields such as smart control, smart

city, and smart factory. MINDsLab will develop a more complete intelligent CCTV using the ideal behavioral image data in the future.



Objective of constructing abnormal behavior CCTV video data



Development of Intelligent CCTV

Smart City



Smart Control



Smart Factory



Daegu City Ddubot: AI Civil Affairs Consultation Chatbot

Success Stories & Use Cases
Smart City

- "Ddubot," Daegu City's Intelligent Civil Advisory Consultation Chatbot Successfully Opened
- Daegu City's " Ddubot", Selected as the best smart city project in the Asia-Pacific area.
- "Ddubot" upgrading project, selected as the final project by Ministry of Public Administration.

Smart City Successfully Opened "Ddubot" Consultation Chatbot for Intelligent Civil Service in Daegu City

Daegu City successfully opened “Ddubot” consultation chatbot

Daegu City's artificial intelligence counsellor "Ddubot", developed by MINDsLab, completed its stabilization and pilot opening period and showed its first appearance on June 1, 2018. Ddubot is an artificial intelligence platform-based civil consulting service that MINDsLab is initiating with Daegu City. Ddubot is Korea's first intelligent civil service consulting service based on an AI platform that can make civil consultation through a chatbot system. It was officially opened in June after its test period for citizens and can be used in KakaoTalk in addition to web pages.

In order to improve Ddubot's response accuracy, MINDsLab focused on precise language processing and natural conversation. In particular, it introduced the most complex technology in the natural language processing area, the latest QA technology, Machine Reading Comprehension (MRC) to improve the response accuracy. MRC is an AI technology that can read complex and long passages accurately and quickly, and Ddubot can find the correct answer in narrative materials such as various administrative guidelines and laws. In addition, it analyzes the cumulatively 400,000 calls in the 120-month-old call center for one year and identifies the most frequent dialog scenarios so that conversations can be implemented naturally.

The consultation service area of Ddubot also expanded from passports to automobile registration, municipal government and local festivals. Ddubot has expanded the consultation service area by identifying 120 areas that are most frequently dealt with in the call center. It improved the performance level of counseling service especially in Daegu City 's civil service systems, such as Dudeuriso and Dalgubeol Call Center, and Daegu - related system as well as the Ministry of Foreign Affairs passport website.

MINDsLab and Daegu City will discuss and standardize intelligent civil affairs counseling services of central government departments and other local governments based on the consultation with the Ministry of Public Administration and Security and the Korea Information Society Agency. When a standard service model is developed, automatic consultation service can be established on a consistent basis in any organization, and a knowledge base can be used in common, thereby reducing the cost due to system redundancy development.

The automatic inquiry and response service in the form of a chatbot like Ddubot allows simple and efficient civil affairs consultation services and is a cornerstone for intelligent e-government systems across all administrative fields. Daegu AI Counselor, which is based on MINDsLab's superior artificial intelligence technology, is making efforts to reduce social costs and improve service satisfaction of the people.

Daegu City "Ddubot," selected as the best smart city project in Asia-Pacific

'Intelligent Consulting System Ddubot' was selected as the best Smart City project by the 'Smart City Asia Pacific Awards 2018', the international evaluation of Smart City for the selection of the best Smart City projects in the Asia-Pacific region, hosted by the IDC (Global Market Analyst).

The 'Smart City Asia Pacific Awards' (SCAPA) selected the final 19 Smart City projects among the 148 Best Smart City candidates in the Asia-Pacific region. The only intelligent consulting system in Korea, Daegu City's 'Intelligent Consulting System Ddubot' was selected as the best smart city project in the citizen participation field.

The intelligent counseling system is a chatbot service that automatically provides various pieces of information that relate to the city such as passport, car registration, and general festival information through questioning and answering using AI technology. SCAPA uses IDC's Smart City Development Index framework each year to select government and public institutes and private companies that are considered to outperform 12 Smart City functional

service areas.

“Ddubot” upgrading project, selected as the final project by the Ministry of Public Administration

Meanwhile, Daegu City Intelligence Consultation System 'Ddubot' upgrading project was selected as the final project promoted for the 'Promotion of Public Services Utilizing Advanced Information Technology in 2019'. The Ministry of Public Administration and Security has selected three tasks to be pursued under the theme of 'Promotion of Public Service Utilizing Advanced Information Technology in 2019' utilizing core technologies of the fourth industrial revolution, such as blockchain and artificial intelligence.

As a result of the competition of the central ministries, the only project of Daegu city, 'Ddubot', was selected as the final project funded by the national budget.

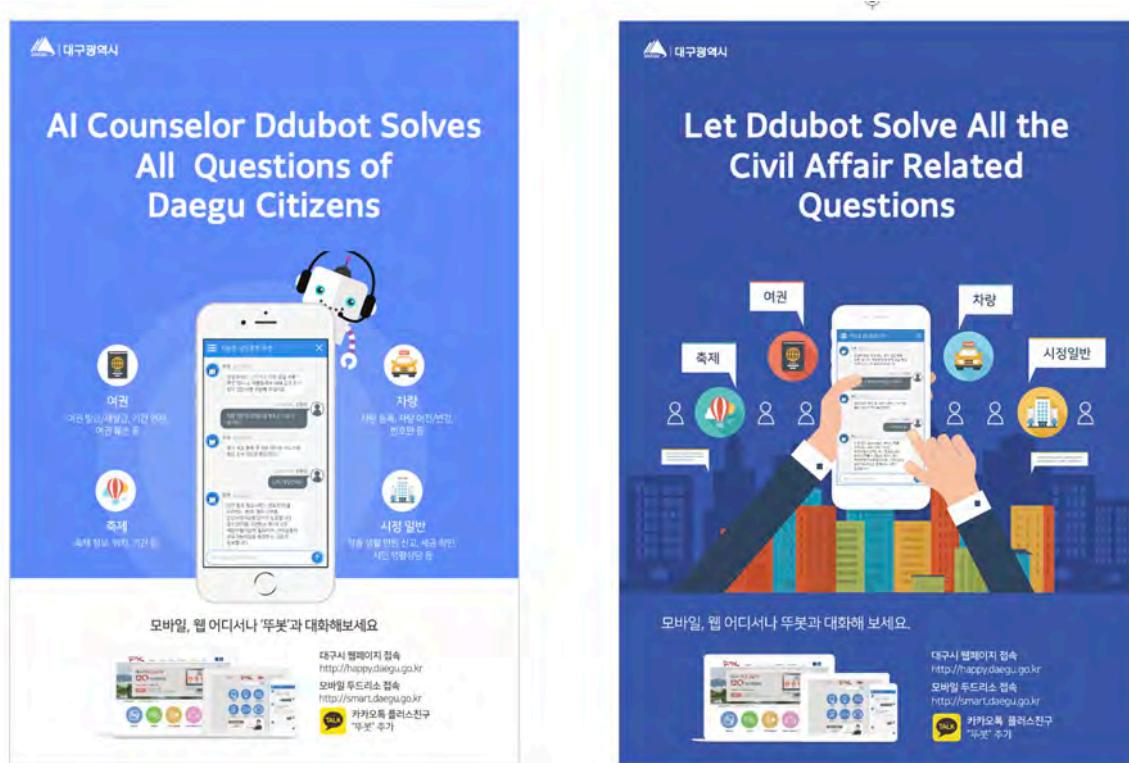
Daegu City plans to introduce civil intelligence and big data technology to its intelligent civil service consulting service, which has been operated since last year, and to implement a system that can provide consulting 24 hours a day, 365 days a year.

The existing text-based chatbot service has limitations in providing basic citizen service because it is limited to four categories of services. It also caused inconvenience to information-vulnerable classes who are not familiar with using chatting system.

In particular, Daegu City plans to make 'Ddubot' a national standard model for intelligent civil affairs counseling system by providing nationwide shared services so that other agencies can freely utilize the intelligent civil affairs counseling system built by Daegu City. Kwon Young-jin, the mayor of Daegu, said, "The selection of the 'Ddubott' upgrade project has been recognized by the government once again for the utility and expansion potential of the intelligent civil service counseling system project that Daegu City has pursued for the convenience of citizens. We expect that citizens will be able to receive 24-hour service regardless of time."

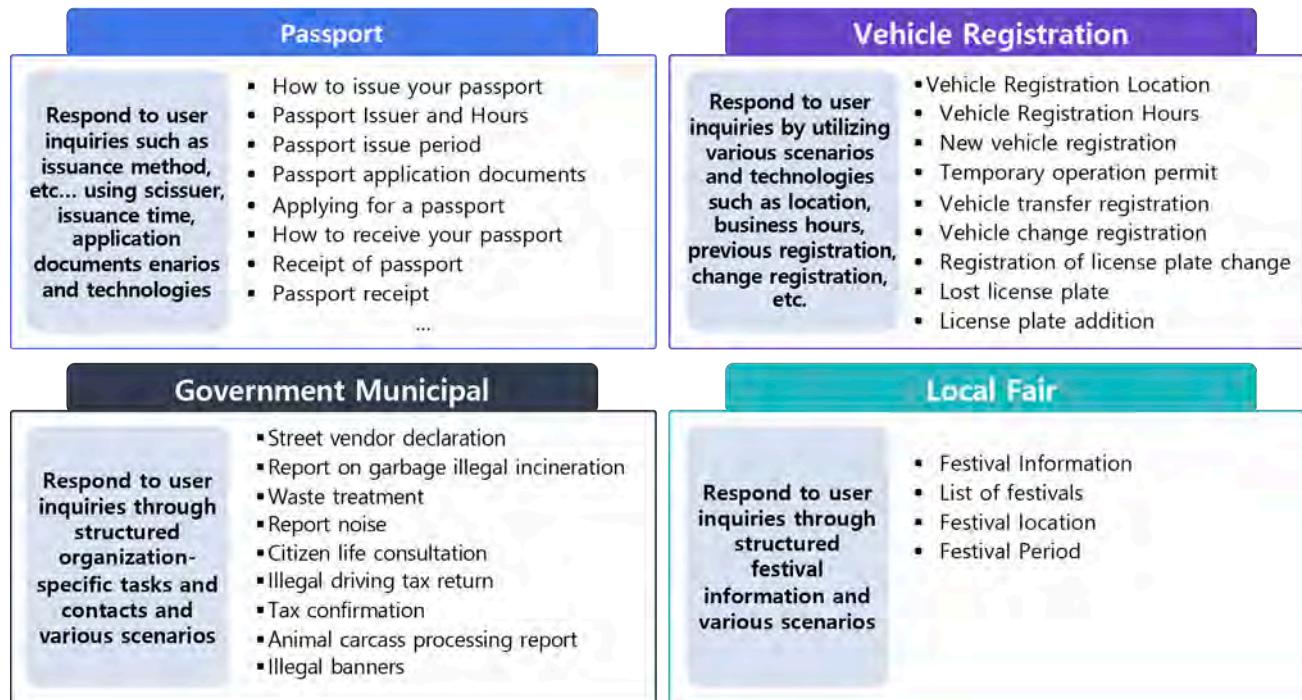
The first AI Civil Affair Consultation Chatbot in Korea, 'Ddubot'

Daegu City's 'Ddubot', made with MINDsLab's AI chatbot technology, automatically handles questions from various fields of civil petitioners. Compared to previous times, civil petitions processing time decreased by more than 91%. Together with Ddubot, Daegu is now the fastest-growing city among the nationwide municipalities.



The First AI Civil Affair Consultation Chatbot in Korea, 'Ddubot'- Consultable area

The consultation area was extended to the most frequent inquiry areas to 120 Dalgubal Call Center, including the registration of cars, existing passports, municipal administration general and local festivals.



 Success Stories & Use Cases

2.3 Video Search & Analysis

Korea Copyright Protection Agency

- Identification of illegally distributed video works by the Korean Copyright Protection Agency
- AI deep learning based illegal image identification, searchable technology
- 100% performance on illegal video pattern detection, even with 10 seconds of video playback, illegal video objects can be detected
- MINDsLab's in-house development of deep-learning video understanding framework, ViSUAL utilization

Korea Copyright Protection Agency

Identification of illegally distributed video works by the Korean Copyright Protection Agency

"In the era of YouTube, finding illegally distributed video works with AI"-Deep learning based video identification technology. While the harm due to illegal video reproductions is steadily increasing, methods to avoid existing illegal video filtering techniques have become widespread. Under the influence of YouTube and web hardware, video distribution is incomparably higher than the past, and it is very difficult to detect illegal video by the conventional method. AI video identification technology can be used to overcome the limitations of existing methods for detecting illegal videos, and the technology also shows high performance and detection speed in various fields in terms of comparing and identifying videos.

AI deep learning based illegal video identification and searchable technology

MINDsLab has developed a technology to find video works illegally circulated by artificial intelligence. The video recognition technology based on Deep Learning AI that MINDsLab has researched and developed can be used to respond quickly to the trend that emerged as a social issue due to the fact that video distribution and consumption became active through YouTube. Through Deep Learning, finding illegally distributed videos and suspicious images became quicker. It is a system that can identify distorted images that were difficult to identify by conventional methods.

100% performance on illegal video pattern detection, even with 10 seconds of video playback, illegal video objects can be detected

This AI video identification technology has good performance and enough speed to be commercialized. First, it showed 100% accuracy in the detection of 10 different types of images distorted in various forms. In particular, it is possible to search or classify a video object in a time as fast as it can be assessed even if only 10 seconds of the video are seen without viewing the whole video. This is fast enough to be applied to real video streaming sites.

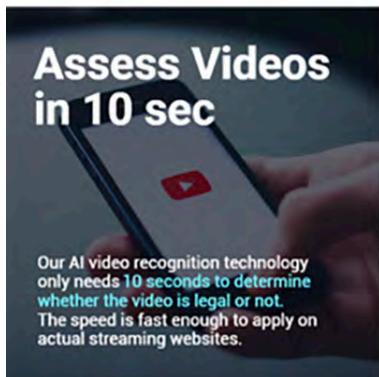
MINDsLab's Visual Intelligence Deep-Learning Video Understanding Framework ViSUAL

By applying the deep learning video understanding framework ViSUAL (Video Search, Understanding, Analytics and Learning) developed by MINDsLab's Visual Intelligence Lab in a recent research and development process, video analytics performance was improved. Through the ViSUAL, the computer detects and recognizes the features of the image, such as dialogue between characters in the image, texts and screen marks on specific objects, and trademarks, signboards, and subtitles at specific locations. Then it can understand the timeline based on the features as a characteristic of the video.

Meanwhile, MINDsLab is conducting various projects in visual intelligence research and development based on the deep learning algorithm. Document Image Analytics, Research, and Learning (DIARL), a document detection and recognition framework developed by MINDsLab's Visual Intelligence Lab, was applied to KEB Hana Bank's 'AI Banking Secretary' service 'HAI Banking' and was successfully commercialized. MINDsLab is concentrating on various research and development projects that understand images, thereby further enhancing its ability to commercialize visual intelligence. In the future, AI video identification technology will be able to be commercialized in various fields to compare and identify videos.

How did image recognition find out illegally distribution videos?

Video Search & Analysis card news



Understanding Video maum VISUAL

This example shows how a video copyright protection system was developed using AI of Korea Copyright Protection Agency (2018). Videos can be analyzed in real-time on streaming sites such as YouTube by applying artificial intelligence.

- ✓ Based on Deep Learning
- ✓ Speech to Text
- ✓ Optical Character Recognition
- ✓ Face Recognition
- ✓ Object Recognition



인공지능 기반 불법영상을 탐지
분석 결과 결과

탐지 된 영상을: 미운우리네(94회)

Deep Learning Voice Recognition

번호	제작
1	미운우리네(MBC)
2	미운우리네(MBC)
3	미운우리네(MBC)

物体 탐지 결과

자막/언어/로그인 결과

Face Recognition

Object Recognition (logo, caption, etc.)

Deep Learning Voice Recognition

번호	제작
1	미운우리네(MBC)
2	미운우리네(MBC)

번호	제작
1	미운우리네(MBC)
2	미운우리네(MBC)

 Success Stories & Use Cases

2.4 Smart Office

Public sector recording system
Major company in-house chatbot system

Public sector recording system

Success Stories & Use Cases

Smart Office

- Data acquisition of recording material through real-time STT system
- Create a better working environment through a recording system

Public sector recording system

Data conversion of meeting materials through real-time STT system

During the main conference proceedings of public organizations, the voice data input by the microphone is transferred to the voice recognition server and converted to characters in real time. Using this system, the characters that are converted in real-time can be edited on the PC by whoever is writing the meeting log. The result of the character conversion is stored in the DB along with the recording file, so that it can be easily utilized in the meeting log search, listening, and editing tasks in the future.

In the past, when there was no recording system, the results were summarized only for the main issues (only 10% of the whole conference) during the meeting due to the time and effort involved that is required, and the summaries took several days to distribute and confirm.

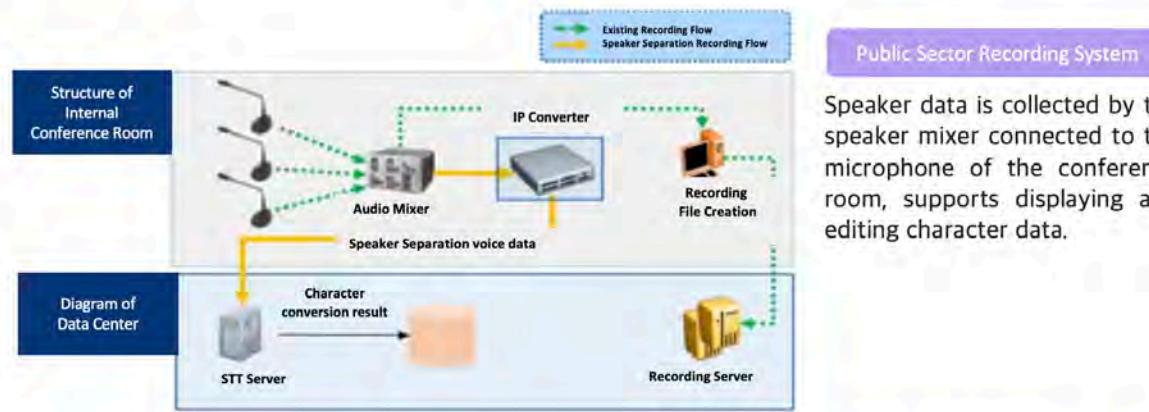
Also, it costs a lot of money to store vast amount of recorded files (over 1,000 hours a day), but it was difficult to search in the files for keywords or apply them for work.

Cost savings of KRW 2 billion KRW through recording system

We introduced a recording system based on a deep learning speech to text recognition. We constructed an average of 1,000 hours of learning data per day. Our goal was to improve recognition rates and improve efficiency of human labor. In order to speed up the process we displayed the word unit instead of the entire sentence and added a few functions to facilitate the creation of learning data.

By utilizing real-time / batch character conversion data, it is possible to concentrate on existing tasks by making it easy to support document creation work and to confirm the recorded contents.

Utilizing existing conference room recording infrastructure, the STT (voice recognition) server of data center provides character conversion results as real-time streaming service and saves big data by storing it in DB. This resulted in cost savings of about 2 billion KRW, considering the cost of writing all of the meeting logs.



- Real-time text editing screen
Edit real-time character data
Selected speaker's voice is auto-recorded.
Changing the speaker (using the numeric keys on the keyboard)
Copying and pasting characters (chapters)
- Save edited document
Saved edited character document shorthand (HWP)



Smart Office

Major company in-house chatbot system

- Introduced artificial intelligence interactive chatbot to utilize the '10 million pieces of in-house information' in business.
- Expected to improve operational efficiency and spread creative thinking through interactive Chatbot
- Continuously innovates the office environment by spreading a horizontal communication culture with interactive Chatbot

Major company in-house chatbot system

Introduced artificial intelligence interactive chatbot to utilize '10 million in-house information business

Large company A has introduced an AI chatbot that can talk in everyday language and uses it for business. An Interactive chatbot is a system that provides customized answers by analyzing user's intention based on deep learning based natural language processing ability and reasoning ability. Employees can chat with the interactive chatbot like a messenger and get the information they want.

Interactive chatbot makes it easy to search in-house for intellectual property

With interactive chatbots, you can easily search about 10 million intellectual assets in your company, use them for your work, and access more information about other departments.

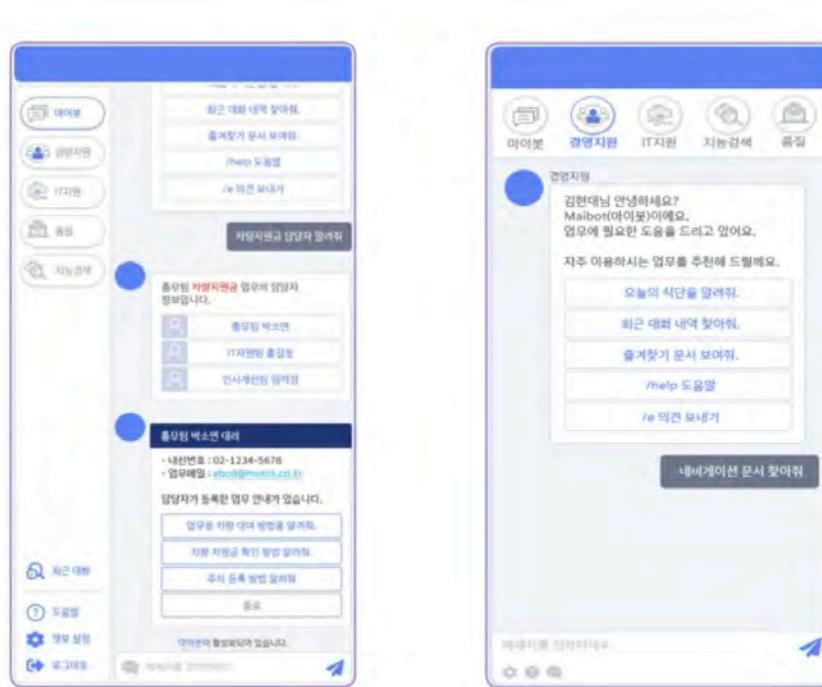
In the past, there was a limit to how much of other departments' information you could access because each department managed its own documents.

This was an inefficient aspect which wasted the time of related personnel responding to simple repetitive inquiries.

Continuously innovate office environment by spreading horizontal communication culture with interactive chatbot

Interactive Chatbot use is not just for business convenience, but for company members to transparently share information and spread horizontal communication culture. It is meant to spread and can dramatically change the way you work through continuous innovation in your office environment. The core technology of interactive Chatbot is implemented by Company A using Deep Learning Open Source, which provides continuous performance improvement without additional cost investment. It was designed to provide increasingly accurate answers as usage experience accumulates. This will be a great help to improve work efficiency and to spread creative thinking in the technology development process.

Large company in-house chatbot





Success Stories & Use Cases

2.5 Edu Tech AI

LG U +: English Speech Teaching Content for AI speakers

Samsung English: Miss Selena

Deep Study

EasyTalk: English for Phone Calls

mAI English: My First AI Buddy for English

LG U +: English Speech Teaching Content for AI speakers

Success Stories & Use Cases
Edu Tech AI

- Launched U + My home AI “YBM English Speaking”, which was jointly developed with LG U +
- Compares user's speaking accuracy with native speakers
- Applied MINDsLab's AI based English education solution “Minds English” for customizing AI speakers
- High-recognition rate features optimized for the service applying the target customer's actual voice data based on adaptive learning method

LG U +: English Speech Teaching Content for AI speakers

Experience AI English learning technology with LG U Plus' 'YBM English speaking'

Launched with LG U+ 'U+ My home AI' 'YBM English Speaking'

An English-speaking learning service with AI speakers is prepared and serviced by Mindslab and LG U+. This English Speaking service for AI speakers is equipped with an artificial intelligence English speech teaching engine that is customized to AI speakers.

Conversation with a native teacher through AI speakers

The YBM English Speaking service developed by LG U+ is a service for children aged 7-10 years to communicate with U+ AI speakers and learn about 300 English sentences included in the elementary school curriculum with native speakers and AI teachers.

Compare user's spoken English with native speakers by applying MINDsLab's 'MINDsEnglish'

This service was developed based on MINDs English, an AI English learning solution. Based on AI technologies such as speech recognition and SDS (Spoken Dialogue System) dialog processing, MINDs English is a solution that helps users to continuously learn by providing feedback to users who have heard and understood the user's speech. We developed an English speaking learning engine for AI speakers installed in MINDs English so that users can experience the service smoothly and get precise feedback with an AI speaker alone.

Target audience's real speech based adaptive learning method applied, high recognition rate for service

The English Speaking Learning Engine for AI Speaker improves the completeness of the individual technology applied to the service through the adaptive learning method so that it can judge the accuracy and fluency of speech at the same time. Adaptive learning is a learning method based on actual speech data of a target group of the English Speaking service. It is characterized by showing a high recognition rate for children's immature English pronunciation even in a noisy environment. Users can also be provided with precise feedback on grammatical accuracy.

The purpose of the AI based education service is to provide high quality educational contents by minimizing the cost burden at the same time and without restriction of time and space. YBM English speaking service with LG U+, which enables user learning, proved the possibility.

In the future, the service will improve, and the technology that can be commercialized in various fields such as English speech teaching engine for AI speakers has been created.

AI is the essence of Edutech

How do education companies implement AI into their business?



LG U+ 'YBM English Speaking'

It is equipped with an AI speaker-based English education service using MINDsLab's AI English education service. Users can learn more than 300 English sentences. It became killer content in the world of AI speakers.

Samsung English: Miss Selena

- MINDsLab launched “Miss Selena, AI-based English language learning program, with Samsung Publishing Co.Ltd.,
- AI technology such as voice recognition and text analysis enables learners to customize their own AI English teaching services
- Provides objective assessment of English expressions, English conversation skills, pronunciation etc with various conversation scenarios

Samsung English: Miss Selena

From pronunciation assessment to conversation practice ... 1: 1 customized AI native English education service

MINDsLab launched 'Miss Selena', AI-based English language learning program, with Samsung Publishing Co.Ltd.,

AI native English teacher Selena, developed with Samsung publishing company (representative Kim Jin-yong), was launched. Samsung English is an English language specialized franchise operated by Samsung Publishing Company and currently operates more than 1,300 franchise stores. Miss Selena, after the demonstration class, was fully introduced to participating academies all over the country. MINDsLab's MINDs English technologies is adopted in Miss Selena.

Speech Recognition (STT) • AI Technology such as text analysis, to help Individualized Repetitive Learning through AI English Education Service

Miss Selena, a native AI English teacher, uses AI technology, such as speech recognition and text analysis. This is a program that allows you to learn and check your individual learning status. Selena helps with conversation practice and pronunciation evaluation.

The learner can perform a 1: 1 customized activity, such as repeating learning materials for 7 minutes every day and supplementary learning for deficient areas.

Provides objective evaluation scores for English expressions, English conversation skills, pronunciation, etc.

... Scenarios suitable for various conversation situations are also available

'Miss Selena' evaluates English pronunciation and English speaking ability as well as the pronunciation accuracy of the learners. In the case of the pronunciation evaluation, the learner's voice is recognized as text and compared with the correct text. Then, the learner's voice is compared with the native English speaker's sound source.

MINDsLab co-developed 'Miss Selena' with Samsung Publishing Co., Ltd. and advanced the program.

Miss Selena is equipped with a STT engine, which is specially designed for Korean pronunciation and utterance, so that elementary school students, as well as adults who are immature in English, can accurately recognize English pronunciation and compare with native speakers. In addition, the program was designed to allow students to read and interact with conversation scenarios on a wide range of environments.

With its one-year launch, MINDs English has become an innovative educational AI application that allows customized learning for learners who have had difficulties with the existing education industry due to time and cost issues.

Beginning with 'Miss Selena', an AI native language teacher who was prepared with Samsung Publishing Company, MINDsLab is focusing more on technological development to improve individual performance and user satisfaction such as voice recognition and evaluation.

Innovative AI application that enables customized learning



Samgsung English 'Miss Selena'
Through 'Miss Selena', AI evaluates student's speaking accuracy and practices daily conversation. Samsung English will gradually introduce Miss Selena to increase customer satisfaction and to increase the efficiency of teachers' work.

삼성영어가 강해졌습니다!

이제 선생님과 한 번, 셀레나 선생님과 또 한 번 수업을 합니다.
AI 원어민 셀레나 선생님과 매일매일 브리토깅으로
매달 최소 140분 이상의 원어민 1:1 수업 효과를 납니다.



- Native Speaker
- Speak in English
- 7 Min Every Day
- 1:1 Teaching

- AI tutor allows teachers to focus on managing their students
- AI tutor that enhances the effectiveness of self-directed learning
- Interest-based learning, responsive learning implementation

Deep Study

AI tutor reduces the administrative burden of visiting and the teacher can concentrate on emotional management.

The AI tutor replaces some of the tasks that the existing visiting teacher was managing. It reduces the burden of teachers and helps to focus on caring for students and their parents because AI tutors can perform learning confirmation and review activities instead.

AI tutor, enhances the effectiveness of self-directed learning

Where self-directed learning is carried out with books, textbooks, and diaries, the AI tutor helps learners to use the textbook more effectively. The AI tutor performs activities such as reading the book, post-reading activities, and questions and answers, so that learners can teach themselves and monitor what they are doing.

Interest-based learning, reactive learning implementation

Build an interesting and interactive learning model in an environment where learners are studying alone.

Using various chatbot features such as WikiBot, weather bots, etc., students can ask a question and get an answer right away. This not only means the ability to acquire simple information, but it also entails realizing reactive learning by questioning and answering an AI tutor. Furthermore, learners won't lose interest in studying.



AI application for education program, Deep Study

MINDsLab's customized B2B solution that combines AI technology with existing English education programs



Target **Educational project for home study**

After reading the book, student can conduct post-learning activities with the help of AI teachers

Reducing administrative burden

From simple query responses to learning functions, AI can replace tasks that need to be remotely or managed in person.

Introducing AI tutor to class

Multilingual dictionary using chatbot, mind map drawing, intensive focus game, and reading together to enrich the lesson.

Increase efficiency

The introduction of AI Tutors increases the number of students that each teacher could handle. This can increase the efficiency and satisfaction of parents and students.

Easy Talk: Telephone English that you can See

- Launched Easy Talk 'Telephone English', a customizable AI phone service for learning English
 - Combine mAIEnglish to study conversational English on the phone
 - Visually check 'Telephone English' contents through voice recognition
- Advance AI technology for English education through Easy Talk 'Telephone English' that overcomes limitations of existing telephone English

Easy Talk: Telephone English that you can See

Launched 'Easy Talk' telephone English service, a customizable AI telephone English service

MINDsLab has launched 'Easy Talk Telephone English', an AI-based personalized telephone English service, with its English education subsidiary MINDsEdu. Easy Talk's Telephone English is an AI based technology that adds AI speech recognition technology and 'mAIEnglish' learning services. For the first time in education industry, it enables AI-based classroom review and personalized speech learning on mobile devices.

Combined mAIEnglish for daily conversation - The contents of lessons over call are visually shown by texts

The learner will review the actual conversation content transferred to text through the speech recognition technology immediately after the telephone English class with the native speaker, with the feedback of his/her incorrect expression. Based on this, learners will follow the main expressions according to the topic recommended by AI. Students will be evaluated for speaking, intensive review of vulnerable areas, and conversation exercises on related topics with the AI.

Advancement of AI technology for English education through Easy Talk Telephone English that overcomes limitations of existing telephone English education

The existing telephone English had few ways of reviewing and it was difficult to practice speaking. It provides personalized services to overcome limitations of existing telephone English learning and to provide practical assistance in improving conversational skills. Since MINDsLab released MINDsEnglish in 2017 as a corporate AI-based English education solution, it is improving. Based on this, it is also accelerating into overseas markets such as Japan, China and Southeast Asia.

Telephone English brand Easy Talk

By combining MINDsLab's AI speech recognition technology with existing telephone English, the company launched the industry's first 'Telephone English that You Can See' and earned 97% of consumer satisfaction rate and ranked No.1 in the English industry.

EasyTalk: Telephone English that you can see

By adding speech recognition, the AI English education service allows students to visually check conversation between AI teachers and themselves and helps them to focus on reviewing weak parts in studying.



Writing & Speaking Practice

Sentence 7-1

설 연휴 어떻게 보내셨나요?

입력하세요 Check

음성인식기는 크롬브라우저에서 작동합니다. (IOS 사파리) 링크복사

STT Review Practice

no nothing special probably you have any special day
me yeah well
yeah because
you're wrong yeah because and fifty cents yes you usually celebrate the
클릭시 해당 대화내용부터 듣기 가능

Find Next Prev

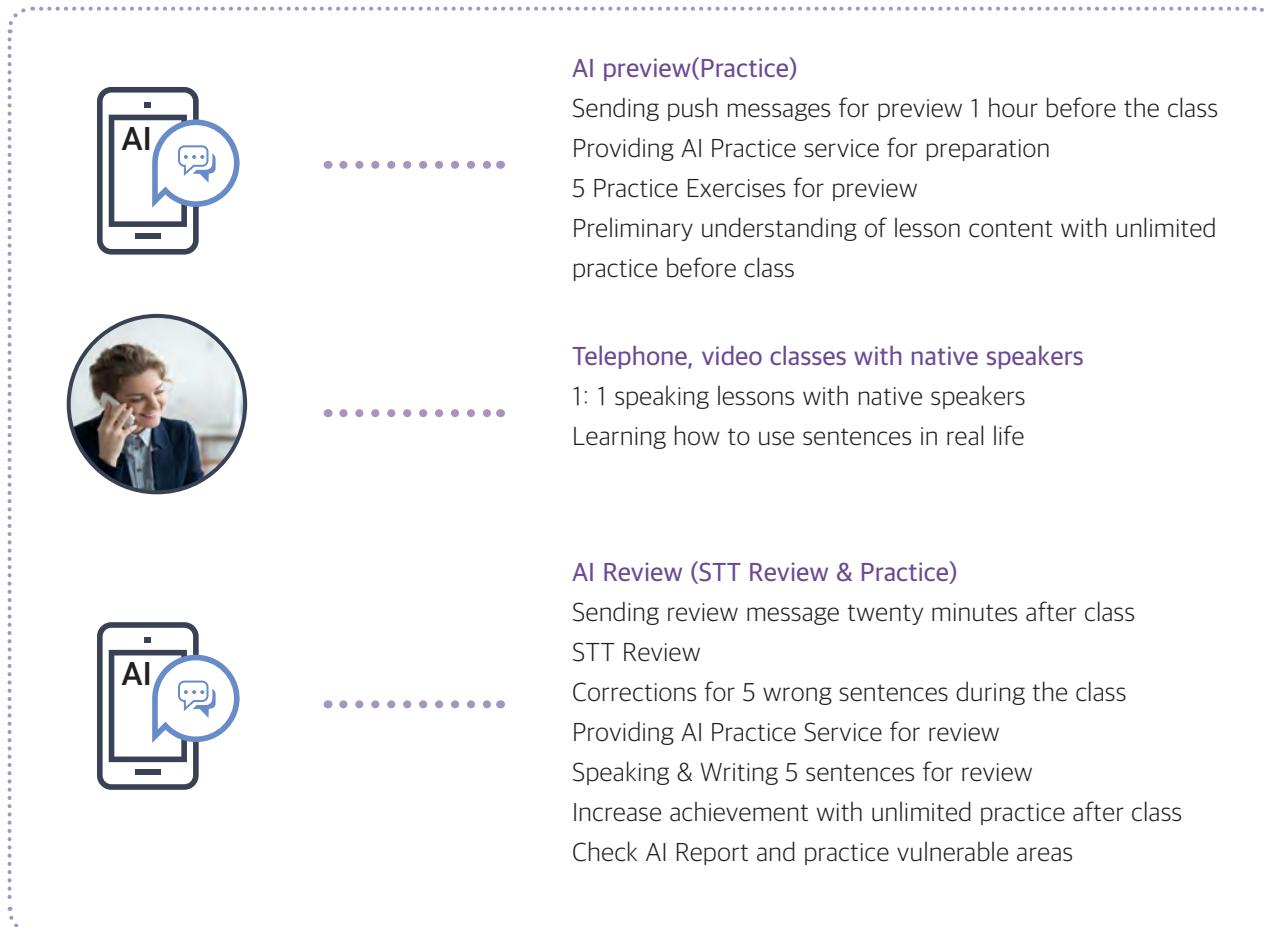
Correction Comment Topic

- I forgot everything around me.
- I like those kinds t.v. programs.
- We can cheat on our viewers.
- They try to cheat on viewers.
- They always emphasize how good they are.

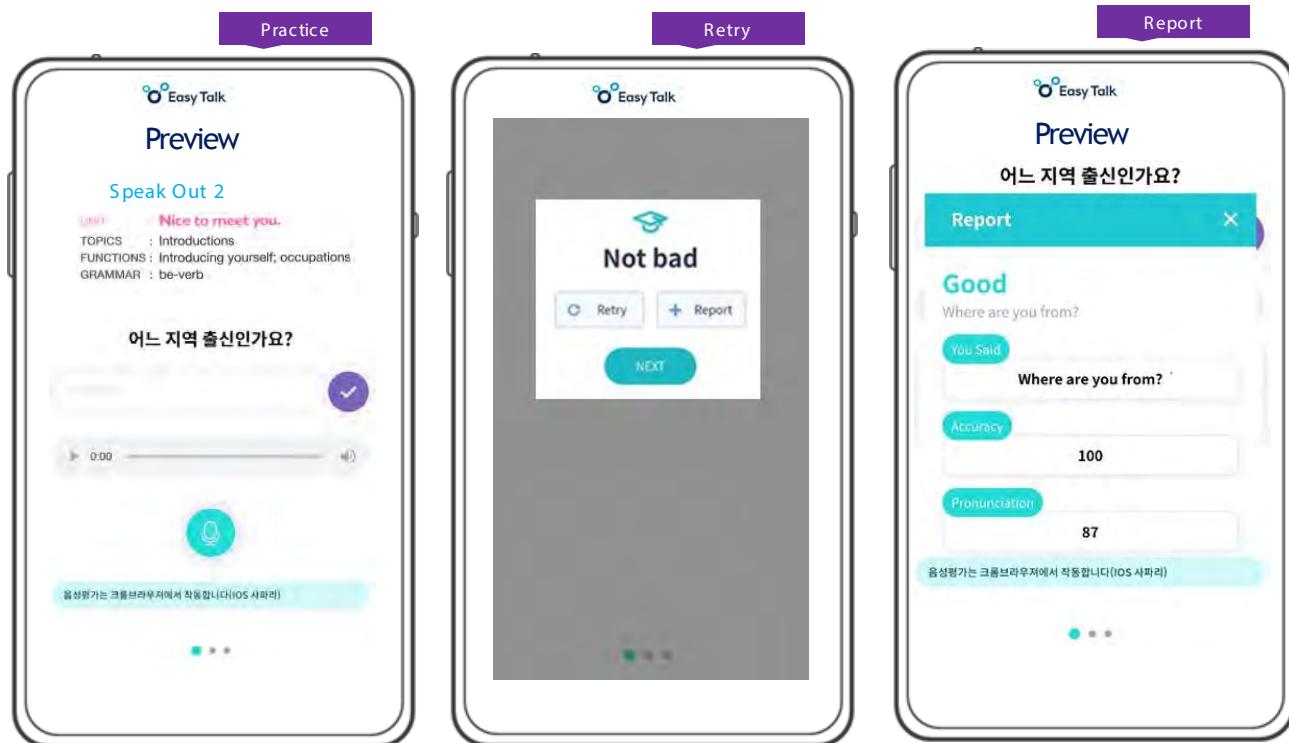
STT Review Practice

Easy Talk, Video English Preparation, Review Flow

Maximize learning achievement with a previewing class with AI and a reviewing class with STT(Speech to Text) and AI practice.



Preview the class with Easytalk Practice



- Practice English speaking with speech recognition and pronunciation evaluation technology anytime and anywhere
- Compare accuracy, fluency, and pronunciation to a native speaker
- Your own AI study guide with personalized feedback and management
- Resolving the anxiety of speaking in front of foreigners that most Korean English learners deal with

mAI English

Practice English speaking with speech recognition and pronunciation evaluation technology anytime and anywhere

The problem of learning English in Korea is the lack of opportunities to speak in English. To overcome these limitations, English pronunciation training app that has pronunciation evaluation and speech recognition features to provide appropriate feedback through pronunciation assessment techniques. Learners can listen to sentences or view their English speaking in text for more accurate self-diagnosis.

Evaluate Accuracy, Fluency, Pronunciation Compared to Native Speakers

mAIEnglish provides feedback by comparing and evaluating learners' English speaking with that of native speakers in terms of accuracy, fluency, and pronunciation. AI technology has been able to replace speech feedback that previously could only be provided by a native speaker. Therefore, it is possible to obtain the effect of learning English together with a native speaker, but without the constraints of cost, time, and place..

Your own AI study guide with personalized feedback and management

One of the major educational aspects of AI technology is that individualized learning is possible. mAIEnglish analyzes individual speaking and feedback data and graphs the progress and speech improvement. Students can learn their strengths and weaknesses through the guide, so that it can be applied to future adaptive learning.

Resolving the anxiety of speaking in front of foreigners that most Korean English learners deal with

Most Koreans have been studying English for more than 10 years but are still anxious to speak in front of foreigners. This common difficulty faced by Korean English learners can be solved with AI. Learners can overcome the English phobia that they feel in front of foreigners by talking to the AI character, mAI. Depending on various situations and responses, learners can speak English with mAI who helps students gain confidence to speak in a real-life situation.

My English AI Partner, mAI English

Allows you to practice until YOU think it is enough, about the topics YOU want, at YOUR convenient time

The diagram illustrates the benefits of My English AI Partner compared to traditional education institutions. It features a central figure of a person walking, with two thought bubbles on either side. The top thought bubble contains the text: "Practice without limitation on time or places!". The bottom thought bubble contains the text: "Lots of education institutions available but not suitable enough". A dotted line connects the central figure to a callout box on the right.

Practice without limitation on time or places!

I want to stop studying English with TOEFL/TOEIC materials. I want to learn **practical English** that I can use in daily life.

I want to study English **anytime, anywhere** I want.

Lots of education institutions available but not suitable enough

A need of interactive contents

Even with the emergence of diverse video platform, still, lecture-based contents are major in the market.

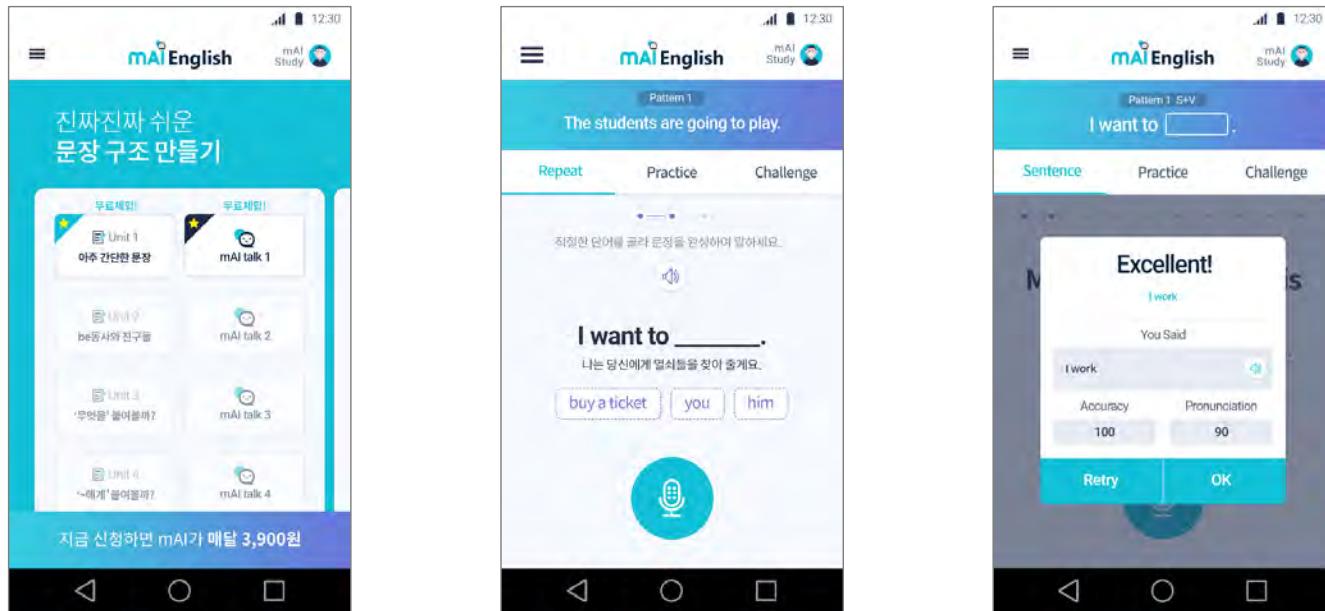
A need of having the platform for practice

There is no place for the learners to practice English until they feel confident.

My(Mai) AI English Partner
allows you to practice until YOU think it is enough, about ANY topics, at your CONVENIENT time

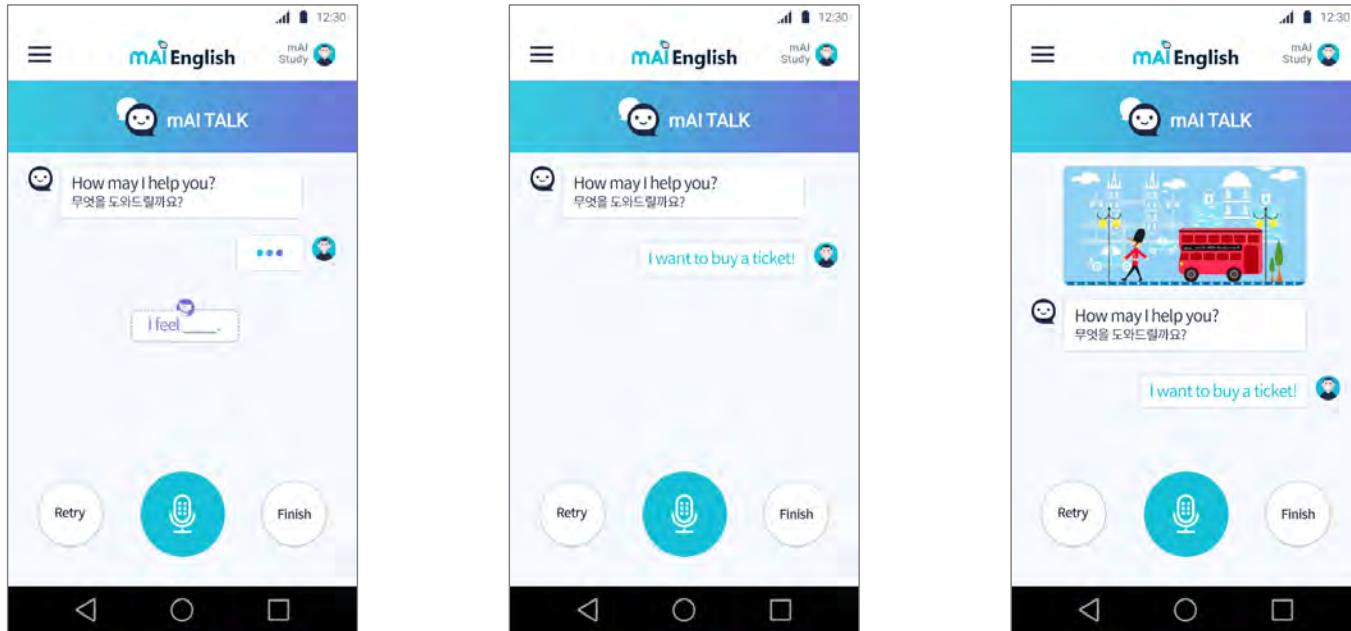
Speak Along - Accuracy of pronunciation, utterance, and fluency at once

mAI English can evaluate the learner's speaking of English sentences using AI and compare how close the pronunciation and intonation are to native speakers.



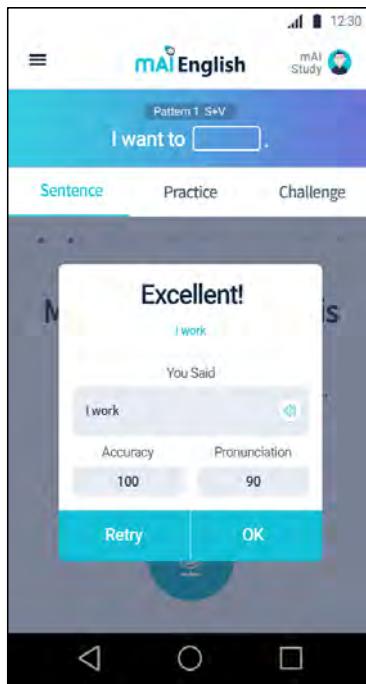
Conversation - Conversation training in various situations with AI

mAI English provides a variety of English conversation situations such as travel, shopping, and meetings, and conducts conversation training with AI using voice or text.



Evaluate Speaking Accuracy - Presenting evaluation through comparison with native speakers

mAI English evaluates the accuracy of pronunciation in sentences so students can see the improvement made from their studying.



 Success Stories & Use Cases

2.6 FinTech AI

KEB HANA BANK HAI Banking

- The latest AI banking system: processing bill transfers to payment through a simple statement
- Accurately understand customer intentions with the latest deep-learning based three-part neural network engine
- 'HAI Lens,' visual intelligence framework, supports the recognition of various images such as money, bills, etc., as well as automatic payments.

KEB HANA BANK HAI Banking Automatic bill recognition, currency recognition, chatbot

From overseas remittance to utilities payment ... Provides another level of AI banking experience.

MINDsLab, completed KEB Hana Bank 'HAI Banking' "Language & Visual Intelligence, Completely New AI Banking Technology"

MINDsLab built KEB Hana Bank 'HAI banking'. The new AI technology expands the interface and enhances the service quality. The second project of HAI-banking is to make it possible to communicate with the 3D AI financial agent. The AI Banking system has been completed successfully. MINDsLab has expanded the customer interface and enhanced the quality of service by integrating the latest AI technologies in the field of language and visual intelligence.

KEB Hana Bank and the second HAI-banking project will enable customers to interact with a 3D AI financial agent in voice and text. MINDsLab introduced new AI technology related to conversation processing. In addition, the 'HAI Lens' function incorporating the visual intelligence framework enables foreign currency recognition and automatic bill payment, thereby extending the AI banking service interface to the visual area.

Precisely grasp the customers' intentions through three artificial neural network structure dialogue engines based on the latest deep-learning algorithm

The project with KEB Hana Bank integrates various AI engines of MINDsLab's AI platform maum.ai based on the latest deep-learning algorithm. This expanded the awareness channel of AI to text, voice, and visuals and raised the

understanding level of conversation to create the best AI agent service of its kind. Notably, by making M2U platform function as a deep-learning conversation engine with an artificial neural network structure, AI financial agent can grasp customers' intention faster and respond more precisely. M2U (Maum to You) is a platform that enables interactive interfaces using AI's cognitive and reasoning intelligence, and is one of the core technologies that lead to dialog-oriented AI-based services.

Supports the recognition of various images such as money, bills, etc., as well as automatic payments through 'HAI Lens,' visual intelligence framework

The visual intelligence framework was actively utilized. By introducing the visual intelligence framework maum DIARL (Document Image Analytics, Recognition and Learning) into HAI-banking, it showed HAI Lens's function that recognizes various forms of images such as money, bill and automates simple transactions. If you take a picture of foreign currency bills, you can check which countries the bills are used in and the current exchange rate. In addition, it is possible to automatically pay bills such as the electricity bill and water bill using HAI Lens. As maum DIARL has been successfully commercialized through HAI-Lens, it is expected that the framework will change the perception of the existing OCR-based document recognition market by taking advantage of the structure recognition function that recognizes and processes various tables.

By expanding KEB Hana Bank's AI service range and raising its technology level, MINDsLab's latest deep-learning AI engine and platform technology had been confirmed in its superiority. KEB Hana Bank's HAI-Banking service will continue to provide technical support so that it can be reborn as an AI service that is loved by customers. At the same time, it will fuse with IoT and robot technology so that the AI technology of MINDsLab can be utilized in various fields such as CS and education and focuses on platform and engine performance enhancements.

KEB Hana Bank HAI Banking

FinTech AI card news

MINDs Lab **maum.ai**

HOW DID KOREA'S TOP BANK BECOME A LEADER IN AI BANKING?

Automatic Bill Payment Service

Hana Bank applied MINDsLab's image recognition technology to its online banking app to automate all bill payments (electricity, water, and tax) by capturing a photo of bills. This service shows 100% accuracy rate for image detection.

Foreign Money Recognition Technology

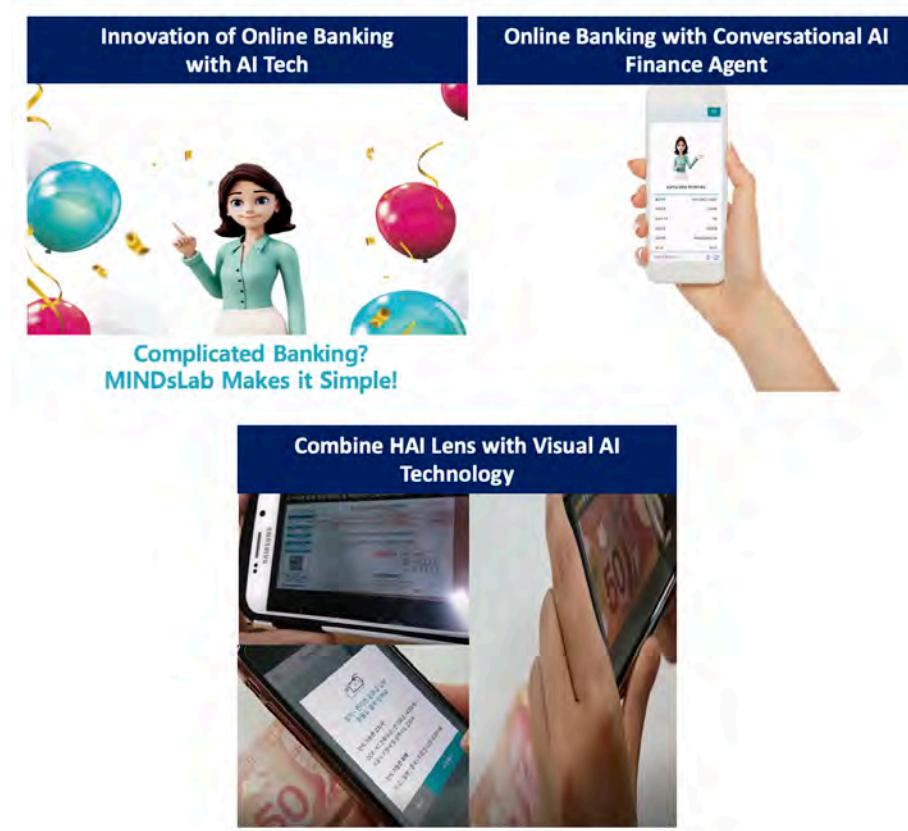
Hana Bank provides image recognition service that distinguishes types of foreign money and unit. When customer takes a photo of bill they will instantly receive information about issuing country, monetary unit, and exchange rate.

AI Finance Chatbot

MINDsLab's technologies including image recognition and automatic bill payment service are linked to AI Finance Chatbot.

Successfully commercialized AI Banking system for the first time as a commercial bank

Korean commercial bank customers are no longer looking for offline banking services to obtain financial services. If you have a banking service that integrates MINDsLab AI technology, you can handle all your banking services through non-facing channels like smartphones



 Success Stories & Use Cases

2.7 InsurTech AI

Hyundai Marine & Fire Insurance company, AI Voice Bot
Fire Insurance Company B AQC
Life Insurance Company C AQC
Fire Insurance Company D, Automatic Call Classification

- Significant increase in efficiency of consulting work through AI voice bots that sound like real agents
- Reduced insurance screening time and improved service quality by automating AI Voice bots
- Appointed as a Banking Service Agent by the Financial Services Commission

Hyundai Marine & Fire Insurance company, AI Voice Bot

Boosting efficiency of consulting work through AI voice bots that emulate actual agents

Hyundai Marine & Fire Insurance Co., Ltd. was selected as a designated agent for the insurance contract lending financial service entrustment process selected by the Financial Services Commission through MINDsLab's AI voice bots. MINDsLab's AI voice bots, which are provided to Hyundai M & F, combine real-time STT technology and chatbot technology to provide the closest consultation service to actual agents. Hyundai M & F expects to improve the service efficiency and the work efficiency of agents by processing outbound calls repeatedly through AI voice bots.

Automated service of AI voice bots dramatically reduces insurance screening time and improves service quality

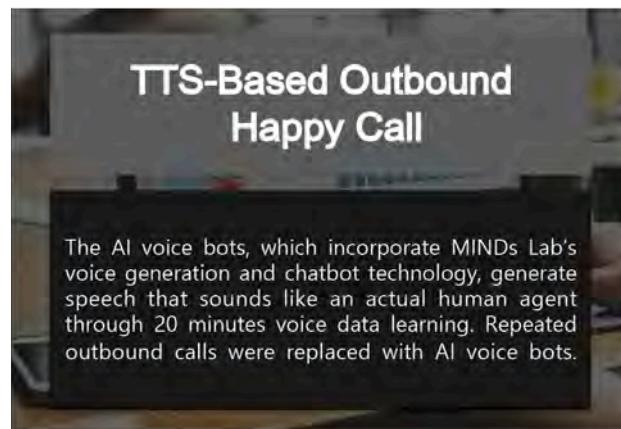
The natural voices of AI voice bots, which replicate up to 20 minutes of voice learning even to individual accents and dialects, provide a higher level of satisfaction for customers who are reluctant to communicate with mechanical voices. Hyundai M & F placed AI voice bots to handle repetitive calls and reduced the screening time to less than 10 minutes while processing applications from receipt to review of insurance contract loans in one step.

Appointed as designated agent selected by the Financial Services Commission

The designated agent is a system in which FinTech company entrusts core financial services that have been granted only to financial companies. After MINDsLab was selected as a designated agent by the Financial Services Commission, it plans to provide a one-stop service for inspecting and executing insurance contract loans through AI voice bots and a full sale monitoring service for insurance contracts. Through automation of full-sale monitoring, the efficiency of work is expected to increase dramatically.

Hyundai Insurance Company AI Voice Bot

InsurTech AI Card News

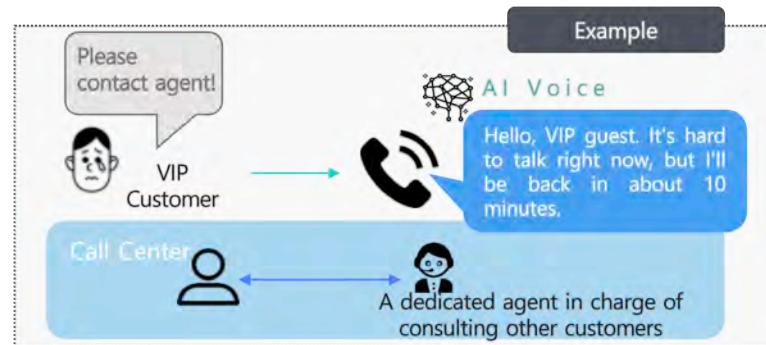


What changes did MINDsLab's AI Voice Bots Bring to the Insurance Industry?

Case 1. VIP 1:1 consultation service quality improvement

When we receive VIP customer's consultation call, it may be difficult to respond immediately if the agenting is handling other calls.

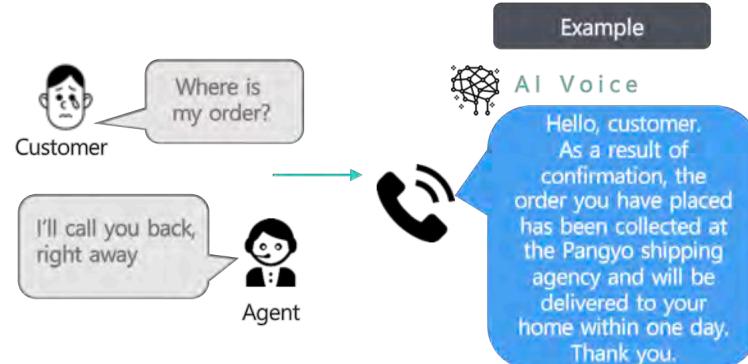
Human agent's AI Voice can tell the customer about the situation and make the outbound call so the customer can continue the consultation. It can increase customer service loyalty and quality of service at the same time.



Case 2. Automate outbound responses to individual inquiries

If an inbound call consultation has a customer's inquiry that is difficult to resolve right away, the agent typically takes the outbound call directly after the call.

Customers can feel that they are being cared by delivering contents with AI Voice, and it can also reduce agent's workload.



- 43% improvement in counseling efficiency by automating examination through AI voice-bot service
- Increased work efficiency, consultation quality, and reduced incomplete sales

Fire insurance company B AQC Automatic Quality Control

Automatic insurance inspections improved 43% of work efficiency

Fire insurance company B made a phone call to customers before signing the contract to confirm customer information and purchase agreement. The average time required per call was around 60 minutes, and the final screening time required for quick check-up was 40 minutes per customer.

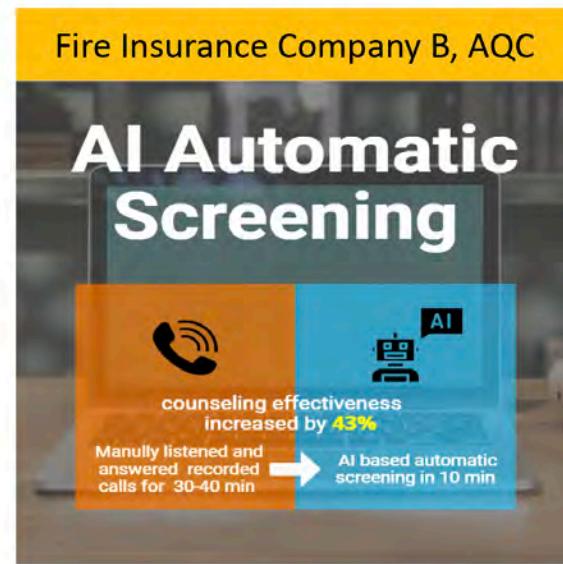
With the introduction of STT and TA, it classifies the 60 minute-long calls and displays them on the monitor so the agent can listen to just the part that they need. As a result, the examination time for each customer has been reduced to 10 to 15 minutes, the accuracy of the examination has increased, and the complaints caused by incomplete sales have decreased. It could also expand the TM business without further staffing.

Increase work efficiency, consultation quality, and reduce incomplete sales

MINDsLab's maum AQC is a solution that visualizes and automates the work of the consulting center and can reduce labor and improve consulting quality. Company B increased the efficiency of existing QC work by more than 40% through AQC, shortened QC time per contract to 15 minutes on average, and decreased incomplete sales.

How Did Insurance Industry Implemented AI?

InsurTech Card News



QA work efficiency increased by 43% with AI insurance automatic review
30 ~ 40 minutes audition for call recording >> AI-based automatic audit within 10 minutes

Visualization of agent quality control system and automation solutions, maum AQC's innovative way of quality control

Standardization
Increase existing business efficiency

40%
work efficiency increased by more than 40%

15min
Reduced average QC time per contract by 15 minutes

Incomplete Sales
Decrease incomplete sales

1 Contact Information

계약자 성명	홍길동	주민번호	750228-1*****
가계약 / 충전번호	00000-0000-000	취급부	대***
청약일자	2017-00-00	대리점명	기****
월보령	34,560원	안기(점자)	2082-00-00

2 Standard Script List

- Customer response
- Listening to Recording Interval
- Category Detection

3 Recorded Files Player

4 Standard Script Section Details

5 STT Detected Sentences

[A]Agent [C] Customer [00120] Undetected

The screenshot shows a software interface for managing contact information and standard scripts. It includes a table for contact details and a list of standard scripts with their detection status (e.g., detected, undetected). The bottom right corner displays a legend for Agent (A), Customer (C), and Undetected (00120).

- Incomplete sales monitoring with one-stop service
- Improve work efficiency and monitoring capacity, and standardize work

Life insurance company C AQC

Incomplete sales monitoring through one-stop service

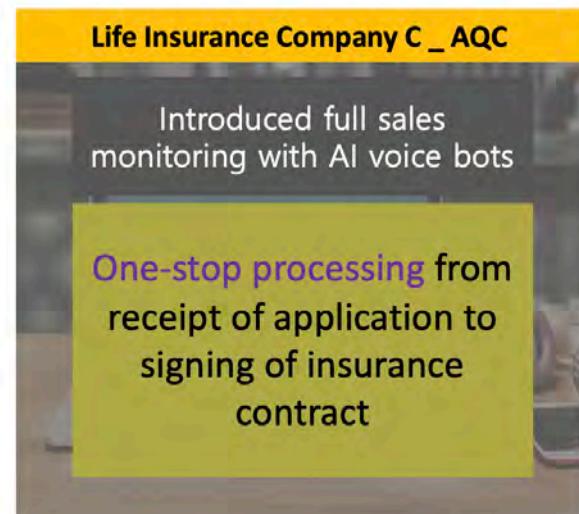
Life insurance company C introduced STT / TA for efficiency of QA work and improved work efficiency by 30%. It is 2 ~ 3 times more efficient to check text converted contents than directly listening to the call. Through this, the efficiency of the QA work increased and the quality management basis of the CS counselor became possible.

Quality improvement through standardization of QA business to prevent incomplete sales / complaints

Since the system makes the first judgment on the system requirements such as judging the standard script item, the deviation of the work by each agent was reduced and the QA agent was only able to check items with a high degree of difficulty such as customer consent and banned words. This has allowed the expansion of the scope of audits and improved the capacity to monitor incomplete sales.

How Did Insurance Industry Implemented AI?

InsurTech Card News



Introduced incomplete sales monitoring AI voice bots

>> One-stop processing from receipt of application to signing of insurance contract

Fire insurance company D, automatic call classification

- Systematic customer support process through accurate counseling call classification
 - Counseling to provide higher customer satisfaction with fewer agents

Fire insurance company D, automatic call classification

Systematic customer support process through accurate counseling call classification

Fire insurance company D uses MINDLab's AI service for automatic call classification. There is a need to accurately classify about 60,000 counseling calls per day coming through the service center. With this technology, company D's 60,000 consultation calls are automatically classified into 13 categories with an accuracy of 97.2%.

Conduct consultation that provides higher customer satisfaction with fewer agents

Company D performed a systematic process of responding to customer complaints by classifying types of customer complaints and causes of complaints. MINDsLab's STT / TA technology provides a series of processes to understand customer complaints, identify the types of complaints through text analysis, define the intensity of complaints, and establish measures to respond to customer complaints. This enabled company D to conduct consultations that provided higher customer satisfaction rate with fewer agents.

How Did Insurance Industry Implemented AI?

InsurTech Card News



Classification Accuracy 97%

>> Average of 60,000 counseling calls per day needed analysis / classification accuracy 97.2%, automatic classification into 13 categories

Insurance company S, TA

For the entire consultation call, classification is conducted to evaluate the customer's degree of satisfaction and the cause of a customer's complaint to establish a systematic response process to customer complaints.

 Success Stories & Use Cases

2.8 Service Robot

ASCAR
Pororot
Reception Bot

Service Robot

- The world's first portable AI speaker manufactured by MINDsLab technology, ASCAR
- AI assistant with various functions and services
- Information retrieval service while driving
- My own AI assistant

ASCAR On-demand AI speaker

The world's first portable AI speaker manufactured by MINDsLab technology, ASCAR

ASCAR is the world's first portable AI speaker built by MINDsLab. It provides many functions and services in cooperation with various bots. With built-in battery and excellent portability, ASCAR is made of metal and Italian leather and has a luxurious appearance. It is equipped with a built-in vehicle that allows you to talk and answer questions while driving.

My AI assistant who provides various functions and services

ASCAR has various functions including speech recognition and voice control to provide various services through it. As an AI assistant, it answers questions about alarm settings, schedule information, date and time confirmation, and weather information. It also provides translation and interpretation services for immediate translation and finds information on dictionaries and Wikipedia. In addition, various cloud-based AI services can be applied.

Information retrieval service while driving

Whatever you ask while driving, ASCAR answers without pause. It suggests nearest gas stations, hospitals, and restaurants.

My own AI assistant

When you ask for alarm setting, date or time check, and weather information, ASCAR will respond quickly. Enter the schedule for a specific date and ask for your schedule, you will get the answer immediately.

Smart Speaker ASCAR

ASCAR, an AI speaker built with MINDsLab's in-house technology, can interact with various bots.

인공지능 음성인식 스피커

차량 경찰 가능한 휴대용 인공지능 음성인식 스피커
ASCAR는 대화형 인공지능 서비스를 제공합니다.
운전석에 ASCAR에게 말을 걸어보세요.

MINDs Lab.
ASCAR

나만의 인공지능 비서

알람 설정, 요일/시간 확인, 날씨/기상정보 확인 등
궁금한것이 생기면 바로 물어보세요.
ASCAR가 신속하고 시원하게 답변해 드립니다.

오케이 마인즈, 아침 6시에 깨워줘

오전 6시에 알람을 설정했습니다.

오케이 마인즈, 오늘 서울 날씨는 어때?

현재 서울 날씨는 영상 4도로 포근한 날씨입니다.

오케이 마인즈, 오늘 일정 알려줘

오늘 오후 2시에 판교 마인즈랩에서 회의가 있습니다.

Smart Speaker ASCAR



- Pororot, who listens, talks and reads books
- Pororot, who repeats after parents
- Designed to be the first AI robot in a child's life
- "We hope that Pororot can be a best buddy to pediatric patients who are hospitalized for a long time..."

Pororot

AI Robot Pororot: AI friend of children

Robots who listen, talk and read books - Pororot

AI robots are now in the shape of cartoon characters. The voice of Pororot, a character familiar to children, answers children's questions and continues the conversation. If you install a simple application, you will hear the voice of Pororot saying, "Hi, good to see you. Let's play." If children say "I'm bored. Please read the book." then Pororot answers with "What type of book do you want me to read?" and starts reading a book for children.

Pororot repeats after what parents say

Waking up children and put them into sleep is the most basic thing that parents do everyday. Pororot, who is connected to a mobile phone, can communicate the words of parents to children with the voice of Pororot. If you enter the words "Be a good child and go to bed early" on the registered cell phone, it will be heard in Pororot's voice. In addition to that, just enter sentences based on different situations and it will be delivered to the child in Pororot's voice.

The first AI robot in a child's life

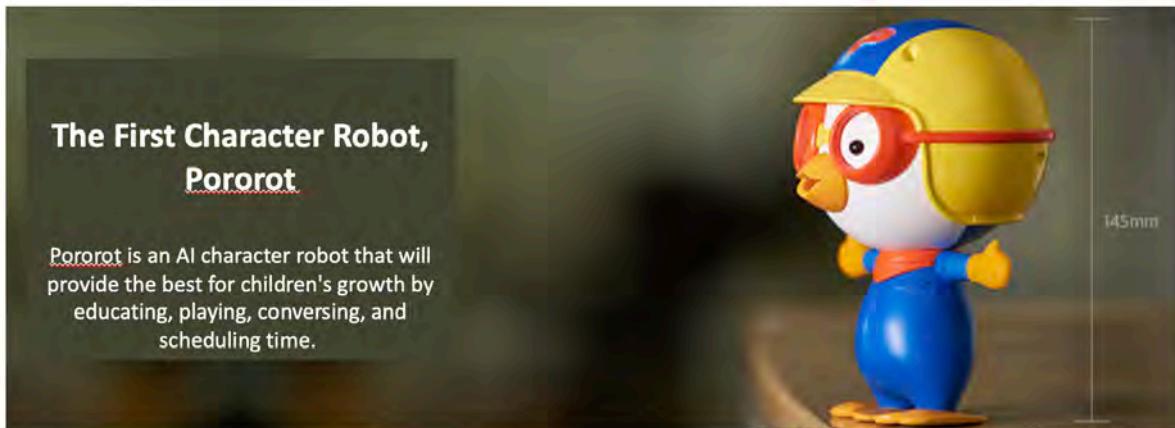
Pororot was designed to be the first AI robot in a child's life by Jininsa Company, targeting children before and after kindergarten. Speech to Text, Text to Speech, and chatbot should be linked to enable simple and trivial conversation. When the child speaks, it hears and quickly deliver in text, and the chatbot responds accordingly.

A TTS engine based on deep learning speech synthesis, which can make the most natural voices, delivers sentences written by parents to children in Pororot's voice. All of these procedures are being serviced through the maum.ai, AI service platform. In the AI platform maum.ai, it is very easy to expand the scope of the service based on needs. For example, if you want to create an encyclopedia robot with a wide range of knowledge, you can link the corresponding question answering engine.

"We hope that Pororot can be a best buddy to pediatric patients who are hospitalized for a long time..."

Pororot was showcased on a large-scale at the "Pororot Happiness Sharing Project" at the end of the year in 2018. This project was carried out with an event to donate a large number of Pororot units as well as instruct people on how to use them. The Pororots were donated to the children's ward of Seoul National University Bundang Hospital and to the Seongnam City Children's Group Home (small-scale cohabitation home), which cares for marginalized children in Seongnam City. We hope that Pororot will continue to support children who are in the process of getting injections or who are undergoing surgery, and those who are in need.

My child's first AI character robot, Pororot



The First Character Robot, Pororot

Pororot is an AI character robot that will provide the best for children's growth by educating, playing, conversing, and scheduling time.



Read Story Books

When children talk about the book they want, Pororot reads books for them.



"Play the song"
"I want to listen to 3 bears"
"Read a book"



Speak with Pororot

"Pororot tells you what your family wants to say instead."



"Let's go play together."
"I don't want to eat"
"I don't like going to bed"



A Vast Knowledge Base

"Pororot is a walking encyclopedia that conveys all the knowledge of the world."



"What is the tallest mountain on Earth?"
"Who created Hangeul?"
"Where is the capital of China?"

AI Robot Service

Artificial intelligence-based smart toys listen and understand what children are saying and respond immediately. This ‘intriguing toy’ is attracting attention in the toy market.

Simple conversations and games

"What did you have for lunch today?" Pororot can understand what children are saying and continue fun activities such as simple conversation and word games.

English speaking content for children

Pororot provides educational content such as speaking simple English sentences and singing in English so that children can enjoy English conversation.

Schedule and Timeline

You can start a conversation according to the schedule you set, and the conversation and activities that your child has shared with Pororot are automatically recorded and displayed on the timeline.



110

Screenshot of Pororot app



Pororot, installed in the pediatric facility

Service Robot

Reception Bot

- AI-based Service Reception Bot applicable to various contexts
 - Golf Club reception bots
- Increased customer satisfaction rate and reduced labor costs through reception bots

Reception Bot

AI-based Service Reception Bot applicable to various contexts

MINDsLab's reception bots are based on MINDsLab's AI engines, providing services in conjunction with the customer's system.

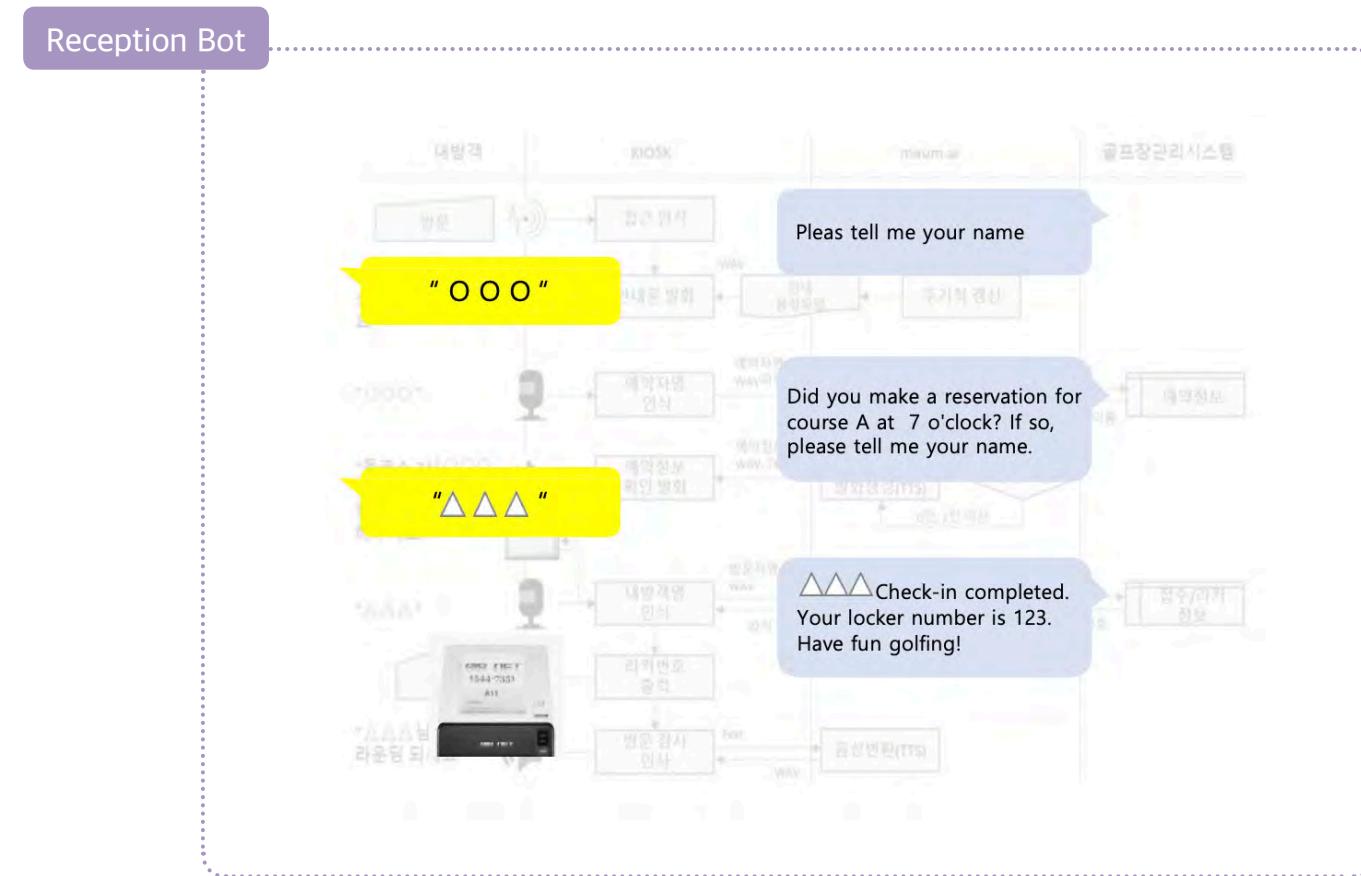
Golf Club reception bots

When customers who made reservations over the Internet visit a golf club at a busy time of the day, they had to wait for a long time and were unhappy with the situation. In addition, there were difficulties in recruiting and maintaining employees due to the long distance between the golf course and the city, as well as due to working hours.

Increased customer satisfaction rate and reduced labor costs through reception bots

The AI Reception Bot provides an automatic check-in service by recognizing a customer's voice, enabling entry through the unmanned kiosk without going through the desk. With the introduction of reception bots, customers didn't have to wait for a long time to check in, and the golf club operator reduced labor costs by using AI reception bots.

Example of Reception Bot Dialogue



 Success Stories & Use Cases

2.9 Defense Industry

Characterization of Communication Data
Air Traffic Control Center Text System

Characterization of Communication Data

Success Stories & Use Cases
Defense Industry

- Characterization of communication data using voice recognition
- Increased work efficiency and simplified administrative system by converting communication data into text

Characterization of Communication data

Characterization of communication data using voice recognition

MINDsLab's communication data characterization system converts communication data into text using voice recognition technology, stores it in DB, and searches. It provides optimal solutions with proven cutting-edge technology and products. Increasing the available information by expanding operations makes it possible to prepare for various situations and ensures sufficient performance, scalability, and interoperability. Furthermore, performance optimization and system conversion improve trust level and maintainability.

Establishment of simplified administrative system and increasing work efficiency by applying communication data characterization system

In the past, the contents transmitted and received by the communicator were manually recorded in a journal, and the voice was stored as a data file through digital recording. These voice data files do not have a search function, and it takes a long time to find necessary information. The introduction of the communication data characterization system increases the work efficiency and can provide a search and inquiry service of communication data when necessary. In addition, reliability and maintainability of communication data are improved, and simplification of administrative system can be expected.

- Air traffic control center text system using voice recognition technology
- Difficult to obtain ideal time due to trouble getting voice and location information from radio disturbance zone
- Increase operability by visualizing real-time aviation communication data

Air Traffic Control Center Text System

Air traffic control center text system using voice recognition technology

MINDsLab develops and provides the air traffic control center text system. The control center characterization system converts the communication between controller and pilot in real time into text and displays it on the air traffic monitoring screen. It also analyzes the radio interference zone and displays it on the screen. In addition, the communication data between the controller and the pilot are converted into big data. The analyzed data and statistics are linked to the newly constructed dashboard screen.

Difficult to obtain ideal time due to trouble getting voice and location information from radio disturbance area

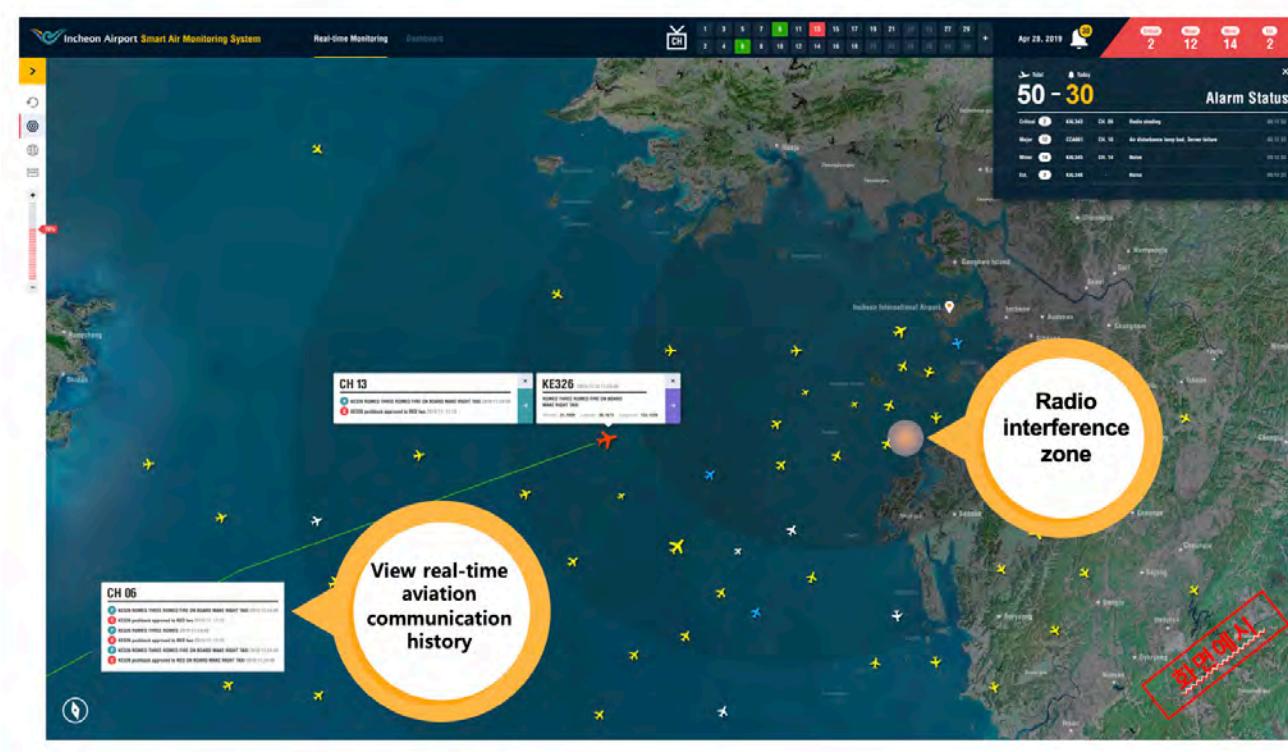
In the existing process for filtering radio disturbances, it is difficult to identify the cause of the disturbance, and in addition it takes time to check the voice / location information of the radio disturbance zone. Since there is no real-time aviation communication audio history, there is no text, and there is no real-time aviation communication audio and aircraft location information. It is difficult for the controller to take time to identify and correct the problem depending on the data received.

Increase operability by visualizing real-time aviation communication data

The air traffic control center text system simplifies the process of filtering real-time radio interference by analyzing AI text and noise figures. It also provides a real-time monitoring environment based on data such as aircraft name, location, time of occurrence, and communication details. It is possible to visualize the real-time aviation communication data after collecting the aviation communication audio information and the aviation position radar information, thereby increasing the ability of the user to operate.

Air Traffic Control Center Text System

Visualization of real-time aviation communication data using smart control system to increase the ability of the user to operate.



The contents of communication between the controller and the pilot are displayed in real time text on the air communication monitoring screen and the radio interference zone is also displayed



Success Stories & Use Cases

2.10 BIO AI

Immune cell therapy

Immune cell therapy

- GNS BIO Started development of AI-based brain tumor treatment medication in cooperation with MINDsLab
- The database of RNA data is made through AI and analysis of individual nucleotide sequences is used in the development of new drugs
- Bio Healthcare is a field where there is a lot of room for AI application to expand.

Immune cell therapy

GNS BIO Started development of AI-based brain tumor treatment medication in cooperation with and MINDsLab

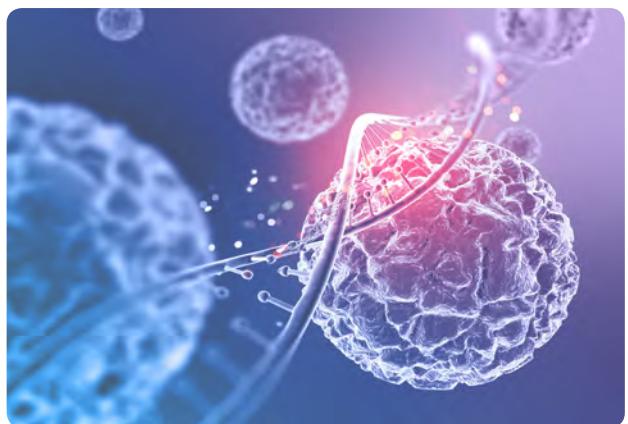
Bio-venture company GNS BIO cooperates with MINDsLab to research and develop brain tumor treatment drugs using AI. It is used to analyze genomic big data information extracted from brain tumor tissues using AI and to compile the results into a database to develop new drugs based on immune cell therapy.

The database of RNA data is made through AI and analysis of individual nucleotide sequences to be used in the development of new drugs

The two companies plan to compile the RNA data into a database extracted from brain tumor tissue cells through AI and analyze the nucleotide sequence of each tumor that shows different characteristics to use in the development of new drugs. Until now, it has been difficult to predict the sequence combination, which can be an important blueprint for the development of new drugs. There were limits to the ability to collectively analyze a large amount of individual tumor data, but it has been overcome by AI. The development of new high-performance ScFv antibody sequences based on AI-based oncogene sequences is also one of the main research projects.

Bio Healthcare is a field where there is a lot of room for AI application to expand.

BioHealthCare is a field where AI must be applied in new ways.



Because it can fundamentally affect human life, the business agreement with GNS BIO has more value than just a simple MOU.

MINDsLab will be able to expand its areas of AI research and application so that AI algorithms can play a substantial role in discovering as of yet unknown treatments for brain tumors.

 Success Stories & Use Cases

2.11 Customer Service

Global Manufacturing Company 'E' • Domestic Fire Insurance Company 'F'

Korean Telecommunication Company 'G' KB Establishment • Korean Property Insurance Company 'H'

Korean Bank 'I' • Korean Card Company 'J', TM-QA Automation

Short-Term Collection STT Development For Korean Credit Card Company • Korean Telecommunication Company 'L'

Semi-Real-Time STT / TA System

Korean Online Store 'M'

- Development of VOC analysis system using real-time voice recognition and text analysis technology
- Provision of a higher level of customer service through AI technology and a strong customer service system
- Consultation quality control through visible VOC management and provision of optimal counseling to customers

Global Manufacturing Company 'E'

Development of VOC analysis system using real-time voice recognition and text analysis technology

Global manufacturer 'E' uses MINDsLab's real-time voice recognition technology and text analysis(STT/TA) to capitalize on 30,000-40,000 daily customer VOC which are transmitted through call center, chat, and e-mails. Company 'E' also uses the VOC to handle real-time customer complaints and improve customer service. The contents of calls are textualized with a voice recognition technology that was improved to 90% accuracy through customized learning, analyzed according to business classification, and used to improve customer satisfaction.

Provision of higher level of customer service through AI technology and a strong customer service system

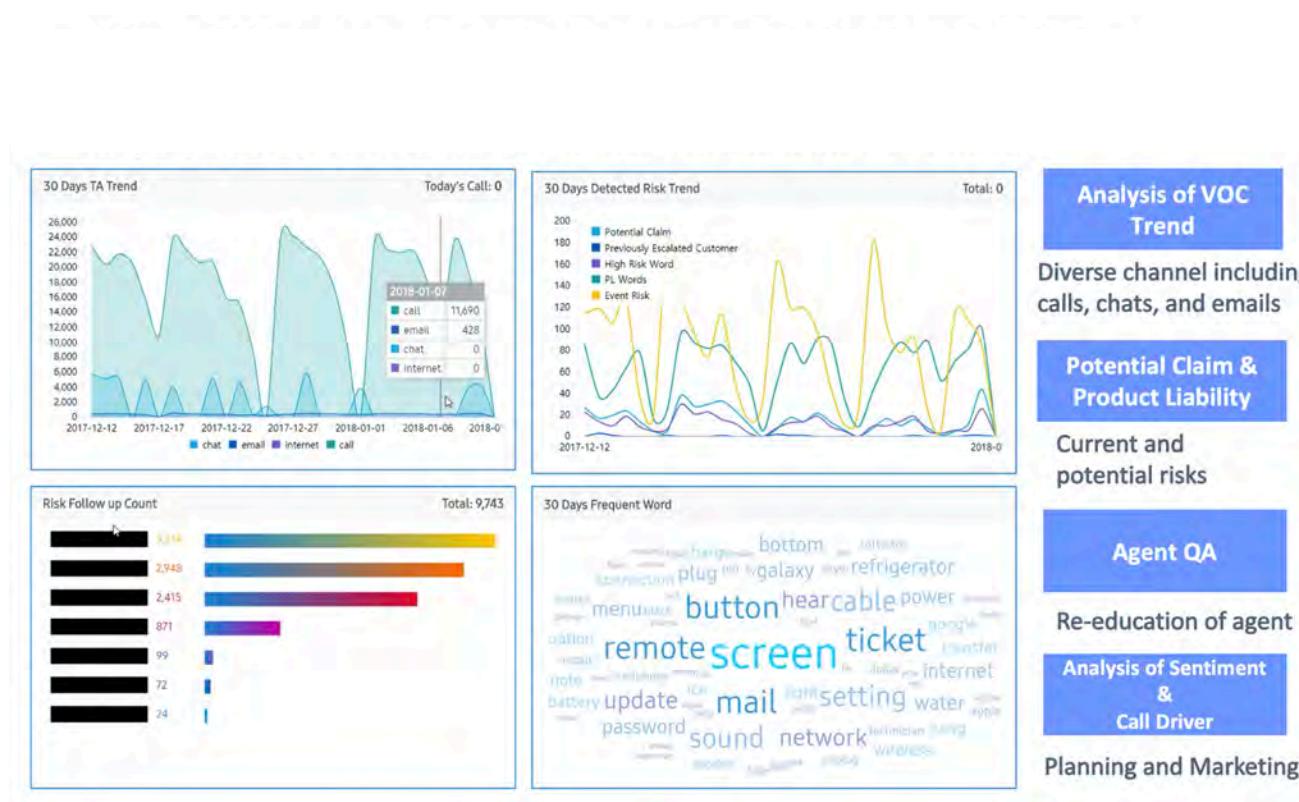
The VOC management system constructed by company 'E' is not limited to simply identifying customer issues, but issued VOCs are selected and assigned to the person in charge so that the assigned person can finish the F/U until the end of the conversation. The system is implemented as a closed loop that inputs the execution results to improve customer satisfaction. In addition, it has been designed to continuously improve the performance of AI.

Consultation quality control through visible VOC management and provision of optimal counseling to customers

The existing consultation quality assurance system is limited to only a few calls due to the limit of human employees' work efficiency. By using MINDsLab's voice recognition technology, it is possible to visualize the entirety of the conversation contents. A system was established to observe and verify whether the agents were following the rules for handling a conversation with a customer.

maum VOC, Offers a dashboard view of conversation between agents and customers.

Offers a dashboard view of conversation between agents and customers. All the conversation is transcribed and stored. The data becomes the Company's asset, and it is available to search anytime the client want.



- Systematic response to customer complaints
- Identify the cause of complaints and the degree of dissatisfaction through the processing of 60,000 daily calls and VOC analysis
- Increase work capacity by classifying complaints 2.4 times more accurately and quickly than human agents

Domestic Fire Insurance Company ‘F’

Systematic response process to customer complaints

Fire insurance company F has organized a systematic response process for customer complaints through MINDsLab's Maum VOC. In the past, there was no fundamental analysis of the causes of customers' dissatisfaction. It was necessary to analyze the cause of customers' dissatisfaction on the entire customer support call. Due to lack of a systematic analysis and response process, there was a need to develop one.

Identify the cause of complaints and the degree of dissatisfaction through the processing of 60,000 daily calls and VOC analysis

MINDsLab provided integrated VOC after Daily Batch processing and VOC analysis of 60,000 daily calls through maum VOC and loaded STT / TA processing results on the big data platform. VOC categorized the complaint calls based on questions asked by customers, so the system could answer with the correct information using the saved data.

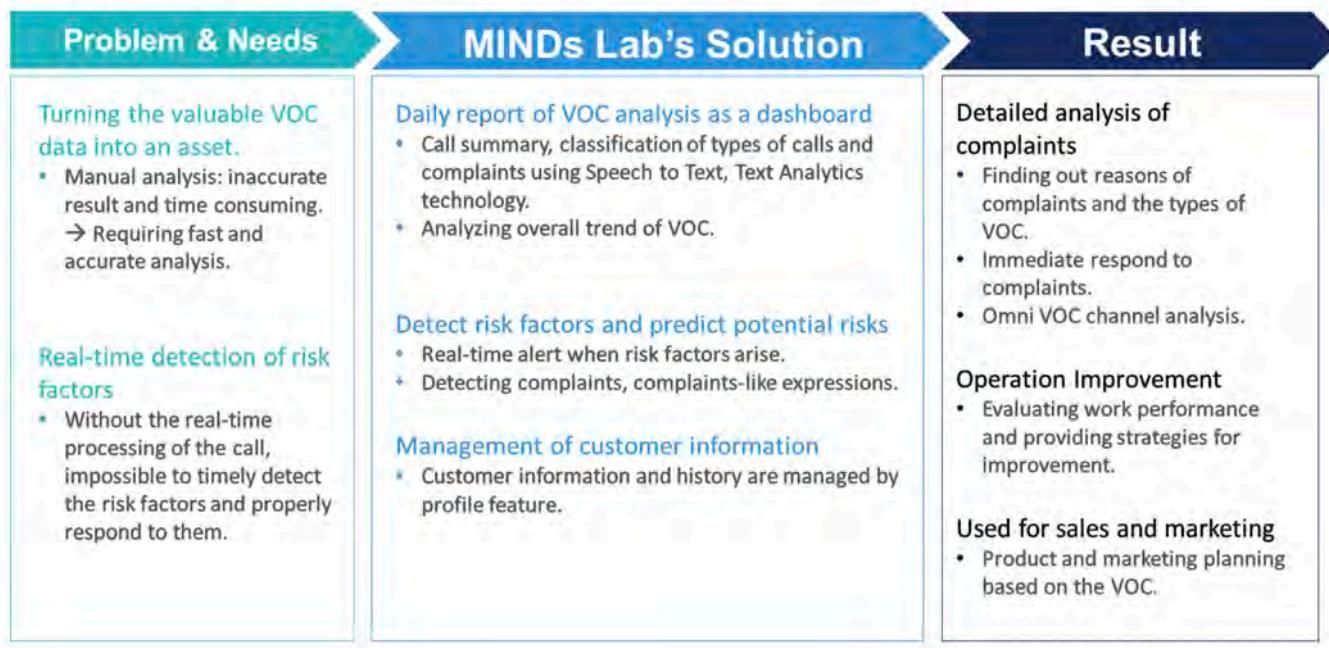
Increase work capacity through classifying complaints 2.4 times more accurately and quickly than human agents

With the systematic response processor through Maum VOC, it became possible to analyze the type of complaint quickly and accurately. The causes of complaint were automatically classified into 13 categories with an accuracy of 97.2%, which was 2.4 times higher than the agent-based classification.

In addition, with the introduction of Maum VOC, the handling capacity of the call center department has been increased. VOC results helped companies obtain customer information for marketing and sales. Through this, it was possible to provide insight on improvement of business activities.

maum VOC, systematic response process for customer complaints

"For the last 3 years, we have received reports on VOC analysis. We were able to expand the analysis to product planning, marketing and agent training."



- Convention with a Korean Telecommunication Company on Assembling STT/TA
 - Obtaining expanded knowledge data through a flexible KB database

Korea Telecommunication Company's KB Establishment

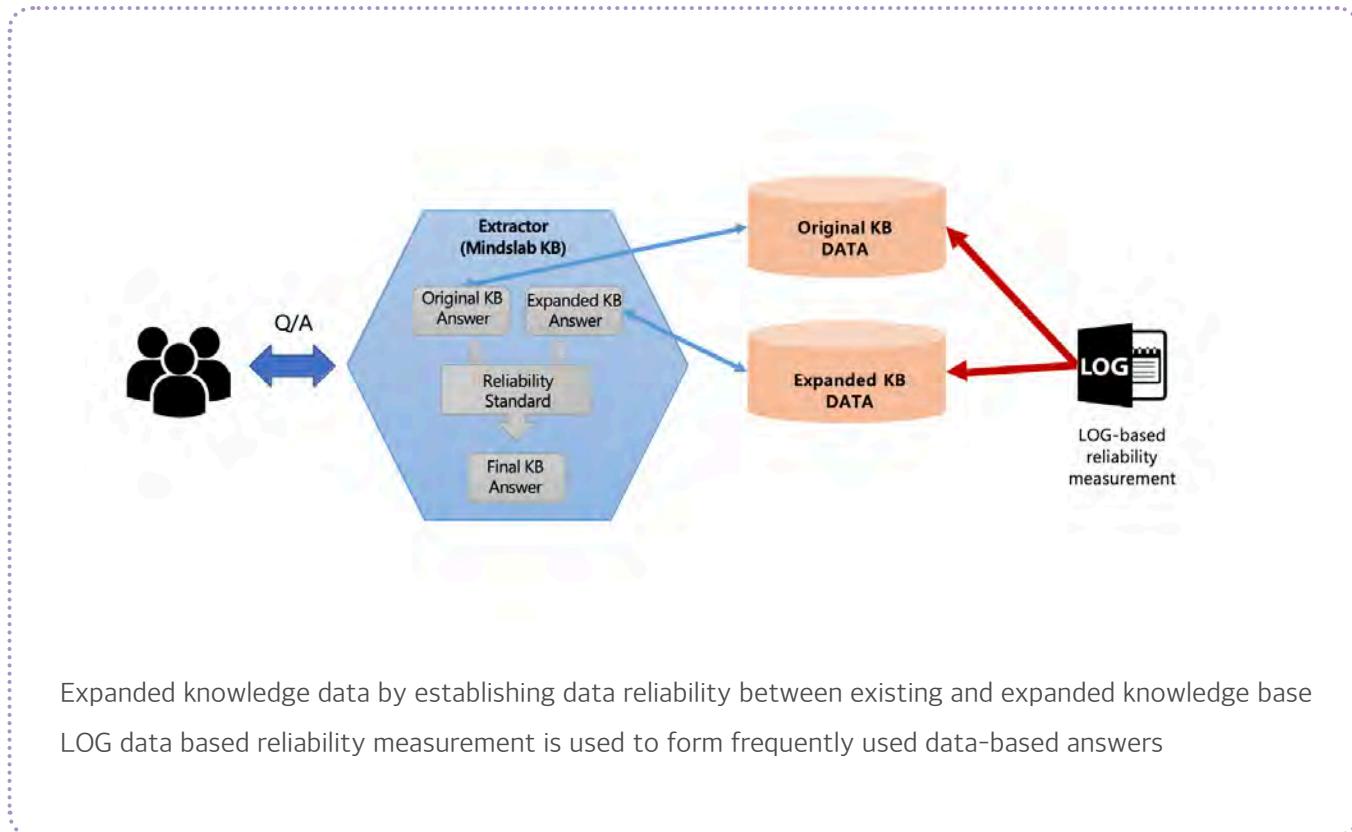
Convention with a Korean Telecommunication Company on Assembling STT/TA

The domestic telecom company 'G' felt the need to build a vast knowledge base to automate the response system in order to answer various queries of customers in the smart speaker environment. Major areas of implementation of knowledge base construction include expanded WiKi area, high coverage, addition and modification of the knowledge base, various domain data, vocabulary expansion and accuracy. The existing system was limited in its ability to obtain a large amount of knowledge. Despite the ability to reuse the knowledge base in various ways, it has not been properly managed and has been produced by using more resources than necessary.

Obtaining expanded knowledge data through flexible database

Expanded knowledge data was constructed through the establishment of the reliability of the data in the existing KB and expansion of the knowledge base. By building a flexible knowledge database, a large amount of knowledge and data can be secured. In addition, it was possible to obtain practical knowledge by reusing and reproducing databases in various fields.

Expansion of KB and establishment of knowledge base using information extraction technology



- Work Efficiency in Customer Support Team
- Helping in New Channel Sales Division
- Complaints management in Consumer Protection Team

Domestic Property Insurance Company 'H'

Domestic Property Insurance Company H has made work efficiency in QA and CS business.

Customer support team

The CS team automated some of the QA standard script compliance and streamlined some of the long-term inspection on Quality Assurance tasks.

This work resulted in a 20% saving of manpower operations and reduced incomplete sales. This team is planning to raise the long-term QA target which is currently at around 60%.

The system provides an easy-to-understand display screen about high frequency and keyword analysis, re-incoming and transferring call analysis. This screen also shows silence sections in recording call and required sentence for the CS task. This improved the efficiency of handling incoming calls, the one-stop processing rate, and the quality of customer support.

New channel sales division

In the recording listening tasks, automobile external recording marketing agreement and a part of the monitoring was automated. By doing this, it helped to streamline the manpower operation and enabled 15 employees to operate 20 existing QA teams. For the CS service, the company has added the function of the detection of and response to complaining customers and detection of abnormal silences. This allows pre-emptive responses to complaints and management of the call time for abnormally silent calls.

Consumer Protection Team

Complaints management service team analyzed the data of customers who expressed dissatisfaction and linked them with VOC. This has helped to strengthen the system of complaint prevention.

- Bank 'I' improved work efficiency through MRC technology, a reading comprehension technology for long passages by MINDsLab
- Increased demand for consultation via chatting system / ensured high position in competition through quick implementation
 - 24/7 real-time customer support and latency reduction, securing outbound marketing opportunities for call agents, gaining a competitive edge for future online channels

Domestic Commercial Bank

Bank 'I' improved work efficiency through MRC technology, a reading comprehension technology for long passages by MINDsLab

A Korean domestic bank, Bank 'I', has signed a business agreement with MINDsLab to implement MRC technology. MRC technology, which is a reading comprehension technology of MINDsLab Chatbot for long passages, provides employees with the optimal answers for customers. It extracts AI-based QA system knowledge by collecting previous data such as product terms, business regulations, and finance related laws to enable more knowledge to be delivered for the answer.

Increased demand for consultation via chatting system / ensured high position in competition through quick implementation

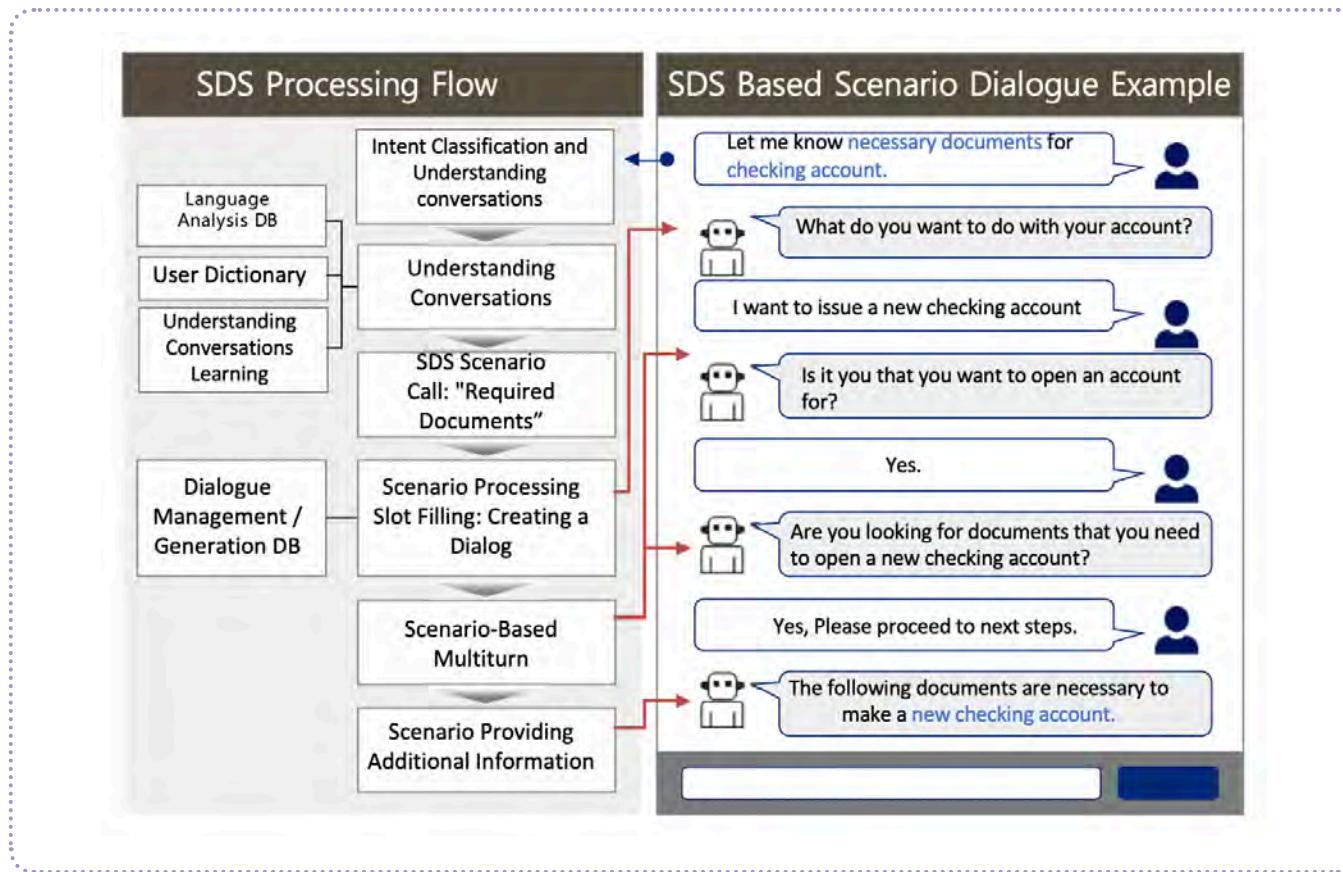
Bank 'I' had to shorten customers' waiting time with increased demand for chatting consultation. In addition, it was necessary to acquire high quality data and improve the quality of learning services for rapid market entry and to secure data and a learning period. As the implementation of AI chatbot into the financial sector is getting into its full swing, it was necessary to secure a competitive advantage.

24/7 real-time customer support and latency reduction, securing outbound marketing opportunities for call agents, gaining a competitive edge for future online channels

Chatbot provides a lively dialogue as it handles a conversation on a scenario basis. Then, based on various features, it identifies the intention of the customer then provides answers. Bank 'I' has enabled its chatbot to provide real-

time customer service 24 hours a day, 365 days a year. In addition, outbound marketing opportunities for agents were secured along with the effect of replacing chat consultants. It also became possible to gain a competitive edge for the future for online channels.

Effect of SDS Spoken Dialogue System



Domestic Card company J, TM-QA Automation

Success Stories & Use Cases
Customer Service

- Automation of QA tasks through MINDsLab's TM-QA automation solution
- Expecting to prevent incomplete sales and civil complaints through the improvement of consulting quality by using standard scripts, QA standardization, and efficient QA tasks

Korean Card company J, TM-QA Automation

Automation of QA tasks through MINDsLab's TM-QA automation solution

Company 'J' signed a business agreement with MINDsLab to provide TM-QA automation solutions. Through the introduction of the TM-QA solution, 'J' could manage standard information such as audit items and standard scripts as well as QA tasks such as evaluation, evaluation results, performance evaluation, review, statistics, and system integration.

Expecting to prevent incomplete sales and civil complaints through the improvement of consulting quality by using standard scripts, QA standardization, and efficient QA tasks

In the past, it was difficult to cope with future incomplete sales because there was no manpower to verify product notices according to TM, and each insurer was dependent on its own QA. In addition, call monitoring was limited to call quality according to only some CS elements. Through this project, MINDsLab improved the efficiency of representative consulting services of call centers, automated TM channel QA tasks, linked homepage / mobile chatbot. Some of the effects of the project are having a quantitative effect by improving the QA task efficiency, standardization of QA tasks, improvement of consulting quality through enhancement of standard script, and prevention of civil complaints.

Korean Credit Card Company 'K', Developed Short-Term Collection STT

Success Stories & Use Cases
Customer Service

- Company 'K' developed short-term collection STT with MINDsLab
- Necessity of solutions for building short-term collection and real-time monitoring
- Increased efficiency of counseling tasks by adopting short-term collection STT

Korean Credit Card Company 'K', Developed Short-Term Collection STT

Company K developed short-term collection STT with MINDsLab

'K' has developed a short-term collection STT with MINDsLab. Through this, 'K' achieved the realization of a dashboard optimized for real-time services, implementation of user-oriented and statistical data interface and agent quality management. This has achieved a recognition rate of 85% through real-time STT after it learned a 150-hour recording file.

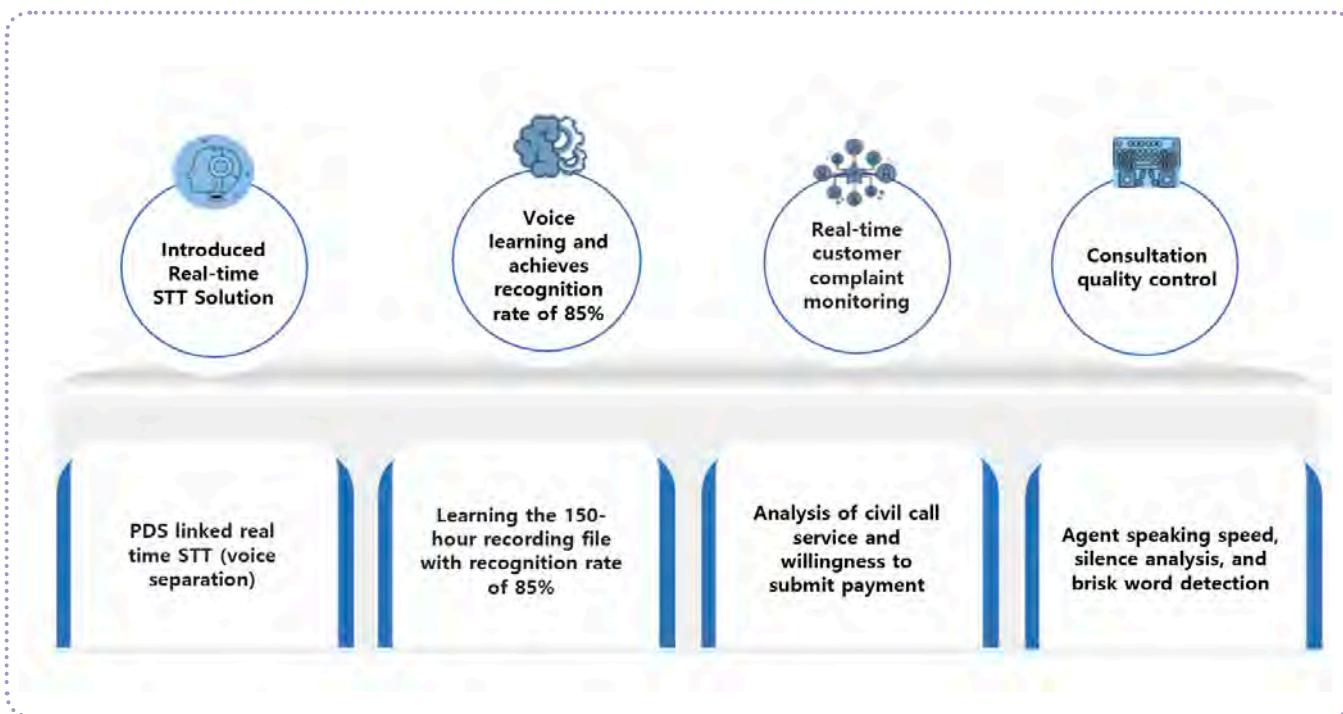
Necessity of solutions for building short-term collection and real-time monitoring

In the past, there was no solution for short-term collections. In addition, it was difficult to detect and respond to customers in real time, and there was an inefficient aspect to listen to each consultation call in order to generate statistical data of the consultation calls. It was necessary to establish an analysis system to utilize in the debt collection business.

Increased efficiency of counseling tasks by adopting short-term collection STT

Since company 'K' implemented MINDsLab's short-term collection STT, only about 6,000 effective counseling calls among the total of 25,000 daily counseling calls have been culled to increase the efficiency of counseling tasks. In addition, a variety of detailed statistical data can be generated from the feedback and it can be utilized as the data on the bond collection. Real-time customer response was strengthened through detection of customer monitoring in real-time civil affairs. The counseling quality control method was improved through counseling speed enhancement, silence detection, and brisk word detection.

Strengthen Consultation Call Monitoring Through Introduction of Voice Recognition System / Applied to Debt Collection Business



Domestic Telecommunication Company 'L', Real-Time STT / TA System

- Company 'L' built real-time STT / TA system with MINDsLab
- Ensured infrastructure for establishing day-to-day guidance for customer response through semi-real-time STT / TA system

Domestic Telecommunication Company ‘L’, Real-Time STT / TA System

Company ‘L’ built real-time STT / TA system with MINDsLab

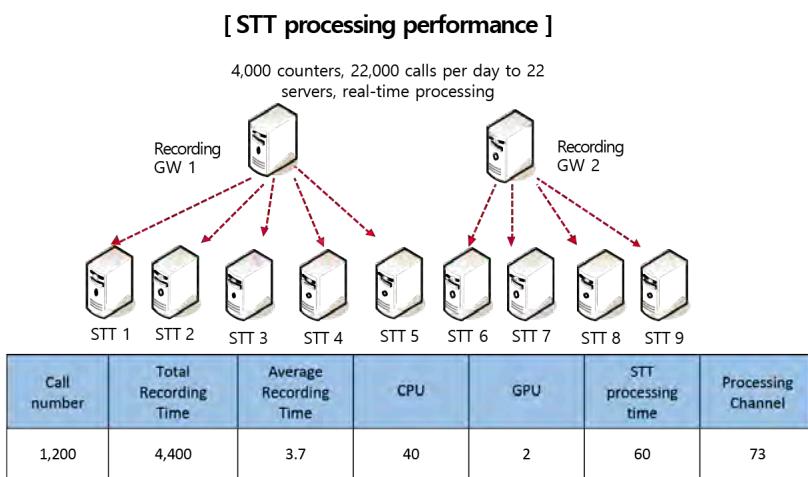
Domestic telecommunication company ‘L’ has built a real-time STT / TA system with MINDsLab. The real-time STT / TA system is a system that translates the audio of the call center consultation tasks into text in real time (within 30 minutes after the call) and analyzes keywords that are mentioned frequently. In order to improve the recognition rate of character conversion required for an effective construction of the system, it learned 2,000 hours of recorded files and fulfilled 90% of inbound counseling calls.

Ensured infrastructure for establishing day-to-day guidance for customer response through semi-real-time STT / TA system

It was difficult to analyze the contents with the existing system of company ‘L’ in real time. As a result, it has been pointed out that there is a limit in establishing counseling guidelines and establishing uniform guidelines for emerging issues. By constructing a real-time STT / TA system, ‘L’ is handling 200,000 calls a day in 4-minute sessions in a semi-real-time system(within 30 minutes). This allowed ‘L’ to secure an infrastructure to establish customer response guidelines within the same day.

Domestic Telecommunication Company 'L', Real-Time STT / TA System

It can obtain recognition rate of 89% or more through 2,000 hours of acoustic learning, and can stably operate STT (character conversion) processing for 200,000 calls a day with a semi real-time system (within 30 minutes).



[STT Recognition Rate]

Counseling Task	Recognition Rate
General	87.9 %
Termination Counseling	89.4 %
Online Shop	90.2 %
Call Quality	87.5 %
Roaming Service	89.6 %
New Subscription	91.5 %
Customer Support	88.0 %
Other	90.7 %
All	89.5 %

- Increased efficiency of business through implementation of address input automation system
- Reduced 50% of the address input-related agent tasks by increasing the real-time recognition of the shipping address to a rate of 50%.

Shopping mall ‘M’ in Korea

Increased efficiency of business through implementation of address input automation system

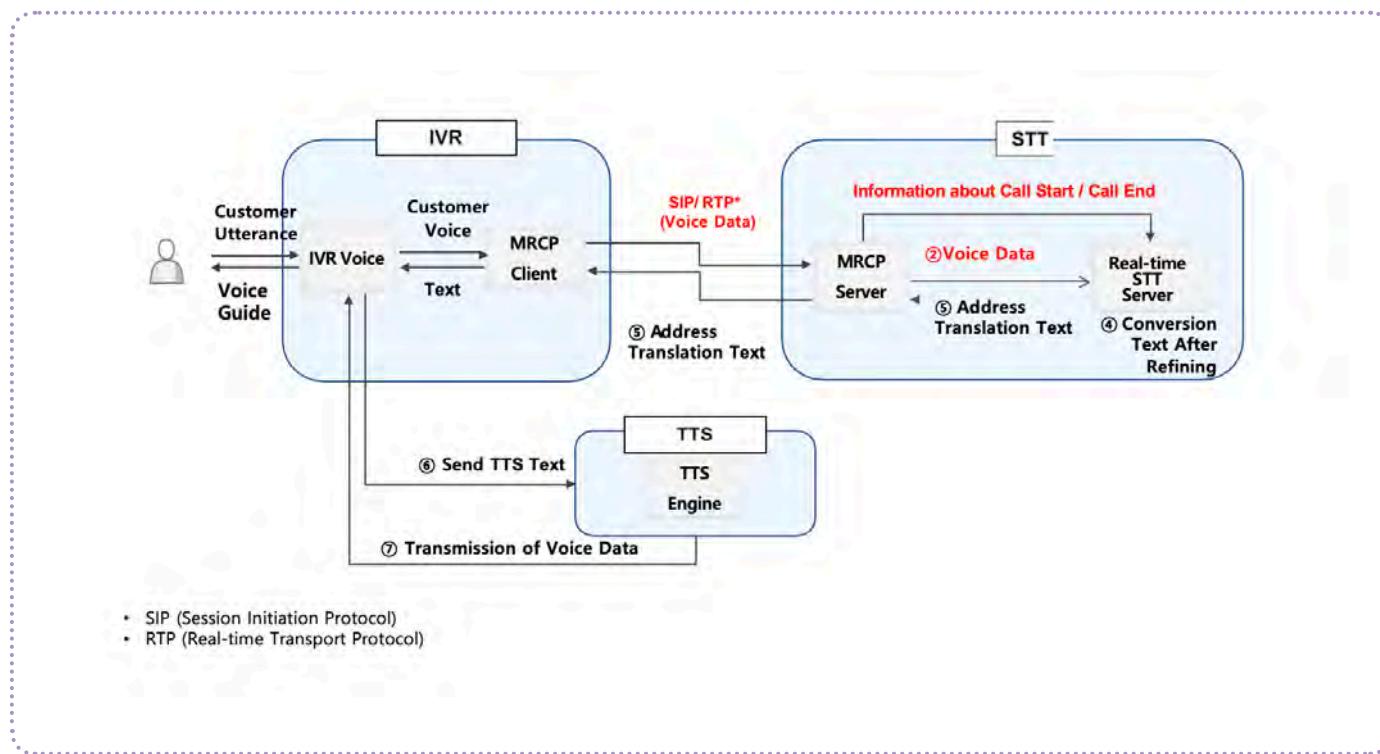
Company ‘M’, a Korean shopping mall, introduced MINDsLab’s address input automation system. The system automates the process of accepting a shipping address from new e-commerce subscribers or new customers. In addition, through IVT and real-time voice recognition, the customer’s speech is converted into the address in real time and the conversion result is verified by the customer through voice generation.

Reduced 50% of the address input-related agent tasks by increasing the real-time recognition of the shipping address to a rate of 50%.

In the existing system, the customer recorded the contents of the address, then an agent listened to the recording and entered the address into the DataBase. After implementing the address input automation system, company ‘M’ converted the conversation captured by IVR into text, confirmed the converted text with the customer through voice generation and stored it in the database. As a result, the ratio of the customer self-confirming the address to has been increased to 50%, which allowed the workload of the agent to reduced by 50%.

Address input automation processing

Converted the conversation captured by IVR into text and confirmed the converted text with the customer through voice generation and stored it in the database.



 Success Stories & Use Cases

2.12 Big Data Analysis

Public Institutions Agency ‘N’ Surveys the Public Opinion
Korean Securities Company ‘O’
Public Institute ‘P’

Public Survey

Success Stories & Use Cases Big Data Analysis

- Civil policy created by the big data analysis of public opinion on large-scale accidents
- Data analysis on 254,203 Korean twitter postings, 69 News Media and 4 types of blogs.
- Via big data analysis, collects the public opinion faster and at lower cost

Public Survey

Supporting national policy-oriented activities through analysis on large-scale accident

With MindsLab, agency ‘N’ has conducted data analysis of public opinions on large-scale accidents. This has been driven by the need for the public to recognize their needs to take action in preventing crisis because social and economic damage has increased as a result of large-scale accidents. The purpose of this analysis is to raise the public awareness of large-scale accidents by analyzing big data and applying that to the process of making an actual policy.

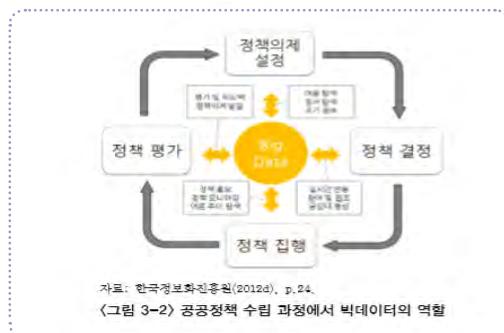
Analyze 254,203 Korean twitter postings, 69 News Media and 4 types of blogs

MindsLab analyzed the frequency, emotion, relevant words, and original texts of 69 news media, 4 major blogs, and Korean twitter for data analysis. We analyzed a total of 254,203 pieces of data (about 24% as news articles, 36% as blogs and 40% as Twitter posts) and analyzed the public opinion on major accidents by analyzing texts containing any of 18 keywords from 3 different perspectives. Based on the analytical viewpoint, we performed analysis using both BigKinds Pro and Minds Insight complementarity.

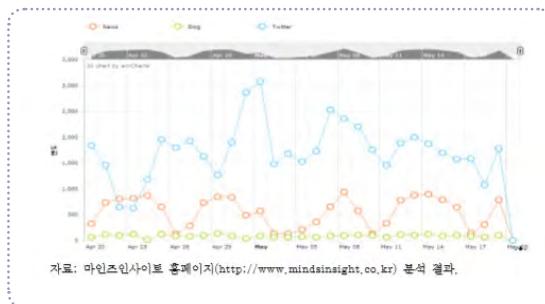
Via big data analysis, collect the public opinion faster and at lower cost

Previously, in order to collect public opinion on government policies and activities, a survey was conducted using traditional methods such as questionnaires and ARS. These traditional methods require a lot of time and money to collect data. However, big data analysis allows the examination to be finished in a smaller amount of time. Through the analysis of the frequency, we derived the keyword, “environment,” and we were able to confirm how the public’s interest and attitudes have changed. Depending on the social big data analysis engine, frequency and types of attitudes can be subdivided, and the analysis of trends over a period of time can be used to analyze changes in particular issues.

Demand of Policies for the Utilization of Big Data in the Environment Sector KEI

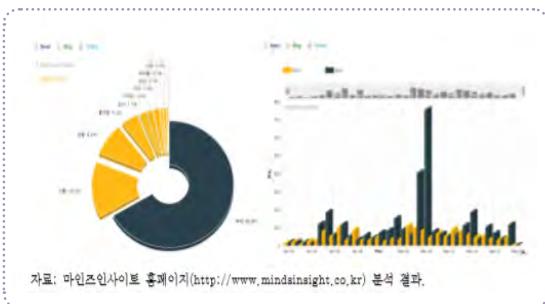


When we look at the process of making public policies, we can better understand the purpose of utilizing social big data on public areas. Although traditional approaches have gathered public opinion on government policies or activities, these methods consumed too much time and money in collecting data.



Analyze the frequency of environmental keywords

Through frequency analysis, we know the frequency of the word, "environment" appearing on Twitter, news, and blog. Through this analysis, we can know how the public's interest in the environment changed on a daily basis during a specified period.



Analyze the attitude toward environmental keywords

The results of the analysis on the attitude toward the keyword, 'environment' are shown. It shows how the public's daily attitudes have changed. According to the social big data analysis engine, the type of attitude can be classified, and it is possible to analyze the pattern of the change in attitude on a specific issue through a trend analysis for a certain period of time.

Success Stories & Use Cases

Big Data Analysis

Securities company in Korea

- Optimized IT system for big data based customer management
- Big data-based analysis ensures that explanatory power of the hypothesis is secured, executive power is improved, and the deviation between predicted value and performance value is prevented
- Optimized IT system according to the implications of the global advanced analysis system

Securities company in Korea

Optimized IT system for big data based customer management

Domestic brokerage firm O has built a Big Data based customer management IT system with Minds Lab. The stock market itself has been shrinking due to uncertainties in the financial market and competition for low-priced commissions. As a result, the performance of securities firm is deteriorating, and measures are needed to overcome these challenges.

Big data-based analysis ensures that the explanatory power of the hypothesis is secured, execution power is improved, and the deviation between the predicted value and the performance value is prevented

Recently, several domestic and foreign financial companies have begun paying attention to utilizing STT and text-based unstructured data. However, there are differences in the collection hypothesis for each subject under consideration, such as the cause of departure according to the customer, and the target variables for obtaining unstructured data are different. The voice recognition based on Big data and the analysis of the voice-recognized text can secure the explanatory power of each hypothesis, enhance the execution power, and prevent the deviation between the future predicted value and performance value.

Optimized IT system according to implications of global advanced analysis system

Global Advance Corporation's analysis promotion method is centered on Use Case (use scenario). It implements model verification through on-site execution according to the linkage of analysis and execution and has implications in emphasizing model governance. Therefore, the roadmap was derived based on the use case, the project execution stage through the pre-construction pilot was included in the project, and the validation process was designed to check the update period, the person in charge and the decision maker for each model. Based on this background, we have defined the verification and analysis model and the application process of the underlying technology and constructed the optimized IT system.

- Expansion of efficient computer screening through big data analysis
- Customer Center has difficulty in monitoring and responding to issues in real time and needs improvement
- Increased consultation efficiency by more than 80% and customer satisfaction by 50% by establishing a new examination system

Public institution P

Expansion of efficient computer screening through big data analysis

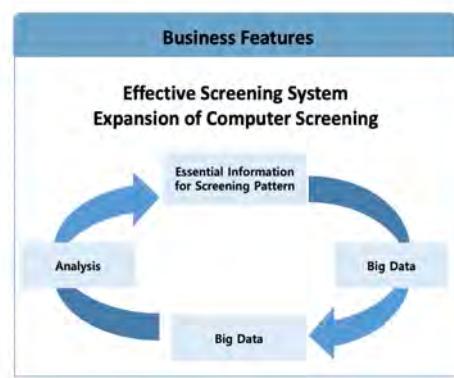
Public agency 'P' conducted a project to run the knowledge base examination system as a text analysis system with MINDsLab. Accordingly, various large-capacity data were analyzed and patterns were discovered to establish a system for linking the examination system to real-time data.

Customer Center has difficulty in monitoring and responding to issues in real time and it needs improvement

In the agency P's existing audit system, it was difficult to monitor and respond to issues in real time at customer centers and the efficiency was extremely low. In order to succeed with the new analysis system, it is necessary to have a system and solution suitable for the big data analysis, the real-time processing, and the understanding of the audit industry's main goal in its policies. It is necessary to have experience in projects involving similar business, as well as expertise in each field.

Increased consultation efficiency by more than 80% and customer satisfaction by 50% by establishing a new examination system

The institution 'P' has built a system with the highest capability through the sustainable knowledge-based customized screening system and the user-oriented optimized service platform. Using this system, 'P' focused on enterprise-wide capabilities to accomplish the zero-defect business. As a result of these efforts and the establishment of a new screening system, customer centers' real-time monitoring became possible and real-time responses to issues became possible. In addition, counseling efficiency increased by over 80% and customer satisfaction increased by 50%.



 Success Stories & Use Cases

2.13 Customized TTS

YouTube Creators / Lecturers / Video Game Companies

YouTube Creators / Lecturer / Video Game Companies

Success Stories & Use Cases
Customized TTS

- Natural and human-like AI voice that is difficult to distinguish from the actual speaker
- Examples of various uses of AI Voices - YouTube Creators / Lecturers / Video Game Companies

Customized TTS

Create a natural and human-like AI voice that is difficult to distinguish from the actual speaker within one hour

MINDsLab provides a customized TTS that can implement individual voices with AI. A minimum of 20 minutes to an hour of recording can be done and then the deep-learning processing will produce an AI voice that speaks in a personal voice whenever you want, no matter what the text is. Also MINDsLab's technology for removing background noise is also capable of producing clear voices, even for files recorded in a poor condition or audio files of the voice of people in history. MINDsLab's AI Voice features a natural, smooth voice that is indistinguishable from the actual speaker.

Examples of various uses of AI Voices

YouTube Creators

YouTube creator C runs a YouTube channel and uploads videos of himself reading books for his subscribers. It took too much time for him to record a video each time since he would have to read the whole book. However, after C used MINDsLab's AI voice, which is similar to C's actual voice, it saved more than 50% of the time it originally took for him to produce his content. The use of these AI Voices is rapidly spreading among Korean YouTube creators.

Lecturers

Professor J took a long time to record his lessons every time for lectures. However, as a result of MINDsLab's TTS, J started to create lecture content by using an AI voice similar to J's own voice. This not only reduced work time by

more than 50%, but also allowed J to offer lecture content to students online.

Video Game Companies

Global video game company B has moved away from the previous method where voice actors have recorded their lines one by one. It was costly to record every time new content came out. The introduction of MINDsLab's AI Voice, which expresses 6 kinds of emotions, reduced the production cost of video game characters by more than 80%.

Our AI TTS Technology

Regardless of topics and voice of the speakers
maum.ai makes AI Voice sounds like a real
human-being.



Regardless of
age & gender



With minimum of
20 mins of voice
recording file



AI Voice can be
made even
with the low
quality of recorded
files

AI Voice (AI TTS) for every business

Apply it everywhere

MINDsLab offers customized TTS that can produce an individual's voice with AI.

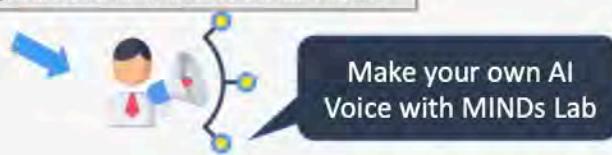
After recording 20 minutes of your voice and going through deep-learning processing, you will have your own AI voice that you can hear whenever, wherever you want.

* TTS(Text-to-Speech): Technology to transfer text to speech

Example of AI Voice (TTS)

Enter the sentence you want to listen with AI Voice

Make your own AI Voice with MINDs Lab



A natural voice that sounds like a real human being

MINDsLab's AI Voice is so natural and smooth that it is hard to distinguish it from actual speakers.

Click on the icon for the sample voice to hear the various AI voices created by MINDsLab's customized TTS technology.

Example of AI Voice (TTS)

Agent



Celebrity



Boy



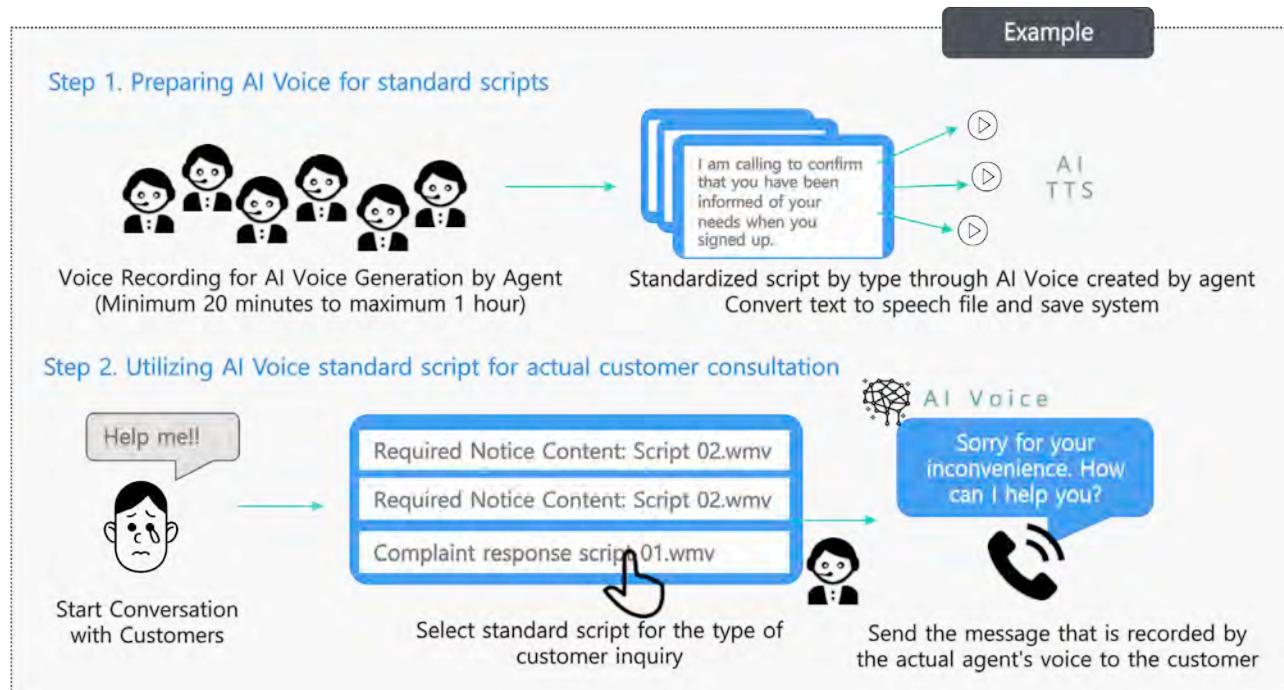
Girl



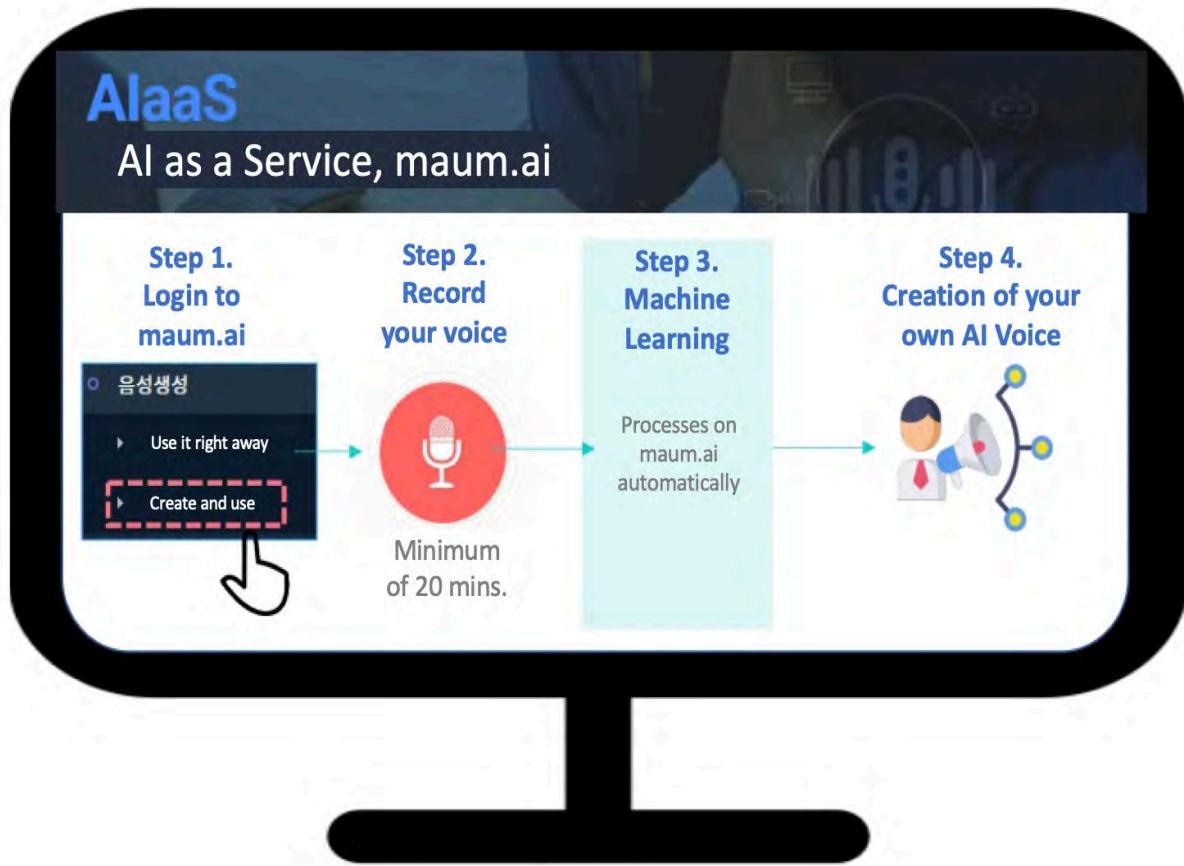
How to succeed with maum.ai

Automation of Agents' Standard Script

Instead of having to talk directly to the repetitive comments that are frequently used, such as standard scripts, the agent automates this by having the AI agent speak. Because it is reproduced from the voice of the actual agent, natural customer consultation can be achieved. The agent's work efficiency will also be greatly improved.



Make your own AI Voice at maum.ai



 Success Stories & Use Cases

2.14 OCR-Based Business Automation

Credit card company ‘M’, OCR-based business automation

OCR-Based Business Automation

Success Stories & Use Cases

OCR-Based Business Automation

- Credit card company ‘M’ introduced MINDsLab’s OCR-based business automation system to improve work efficiency
- Automatic verification of card registration agreement and recognition of various types of objects with 100% accuracy

OCR Optical Character Recognition based M-Card consent recognition system

Credit card company 'M' introduced MINDsLab's OCR-based business automation system to improve work efficiency

In order to improve work efficiency, M-Card introduced MINDsLab's OCR-based business automation system. It applied to the post-preprint agreement and the card sign-up agreement field. After issuing the card, it took a long time for the company to consult because of the redundant confirmation tasks, such as checking 8 pages of consent forms as well as making sure the handwritten signature is placed in the correct position.

Automatic verification of card registration agreement and recognition of various types of objects with 100% accuracy

M-Card introduced MINDsLab's DIARL engine to check customers' consent forms. MINDsLab's DIARL engine automatically identifies and accepts customers' card sign-up agreements using the automatic image recognition system in documents, and recognizes various types of objects such as signature boxes and checkboxes in sign-up agreements with 100% accuracy. M-Card's work efficiency has been improved by 60% after adopting MINDsLab's OCR-based preprocessing system and automating verification of the card registration agreement.

M Card

OCR-based business automation analysis

The image displays three cards from MINDs Lab and maum.ai, all related to automating card sign-up agreements:

- Top Card:** **MINDs Lab** and **maum.ai**.
Title: Automating Card Sign-up Agreements by Computer Vision
Text: Work Efficiency 60%↑
Image: A hand holding a card with a signature.
- Bottom Left Card:** **MINDs Lab** and **maum.ai**.
Icon: Two people at a desk.
Text: **Card Company** manually checked 8 pages of consent paper to make sure whether checkboxes are marked and signed.
Text: How Did The Task Get Automated?
Image: A person working at a desk with papers.
- Bottom Middle Card:** **MINDs Lab** and **maum.ai**.
Text: Reduced Labor Costs & Increased Work Efficiency
Text: MINDsLab's image recognition system automatically recognizes and confirms card sign-up agreements.
Text: Work efficiency has been increased up to 60%.
Image: An office environment with multiple desks and computers.
- Bottom Right Card:** **MINDs Lab** and **maum.ai**.
Text: Automatic Identification for Card Sign-up Agreement
Text: Card Company S introduced MINDsLab's DIARL engine to check customer's consent form.
Text: AI recognizes signatures, checkboxes, and other types of objects with 100% accuracy.
Image: A close-up of a document with a purple overlay.

Products and Services

3

3.1 Services

3.2 Applications

3.3 Platform

3.4 Engines

3.5 Data

3.6 Algorithms

 Success Stories & Use Cases

3.1 Services

Consulting
maum.ai Cloud Service
Easy Talk English
mAI English
Hybrid AI Contact Center
Cloud based Chatbot Builder
Reception Robot

MINDs & Company leverages the algorithms, engines, and platforms that MINDsLab implements to provide enterprise intelligence analytics solutions.

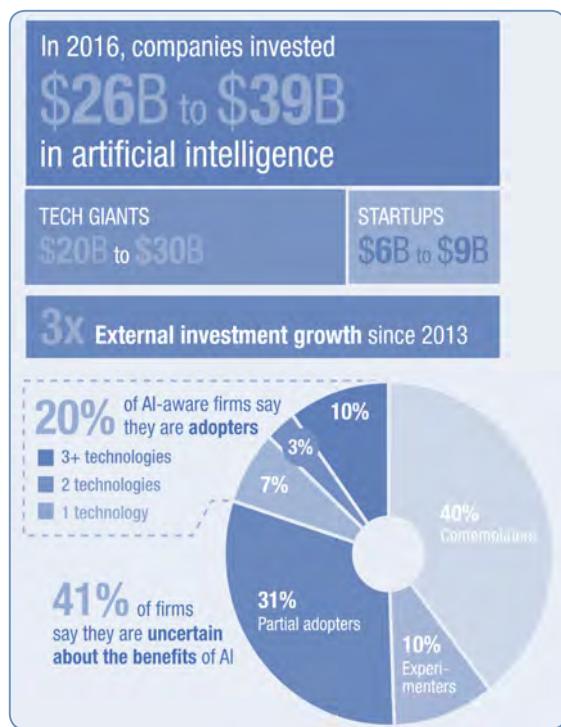
The future of the data analysis industry using AI is bright, but the market is formed centering on business needs.

In order to overcome this, it is necessary to go beyond critical mass using platformization and accumulation of professional capacity. MINDs & Company contributes to the development of the AI industry through flexible frameworks and services.

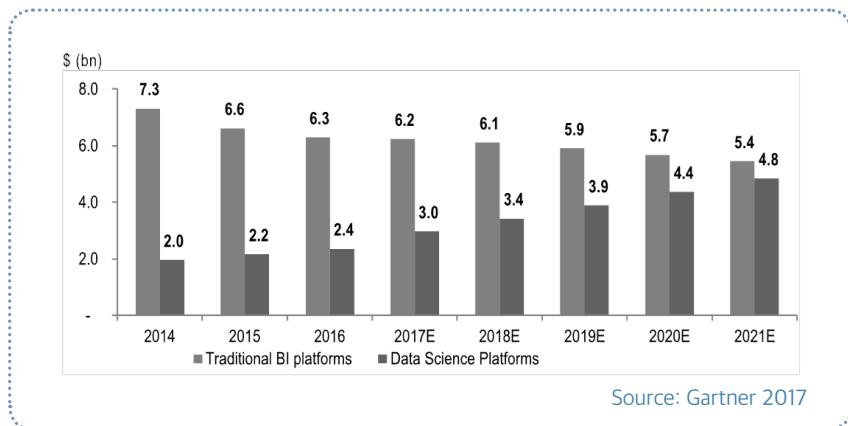


Goal of AI Data Analysis Market

The data analysis industry using AI has a bright future, and MINDs & Company is providing consulting services to this market.



Market size comparison: Traditional BI platforms vs. Data science platforms



Necessity of Building Critical Mass Strategy

The growth of the market size is promising. However, instead of the vendor-driven type technology, the business-oriented technology dominates the market. To overcome the SI industry characteristics, it is necessary to go beyond the critical mass with platform development and accumulation of expert competence.

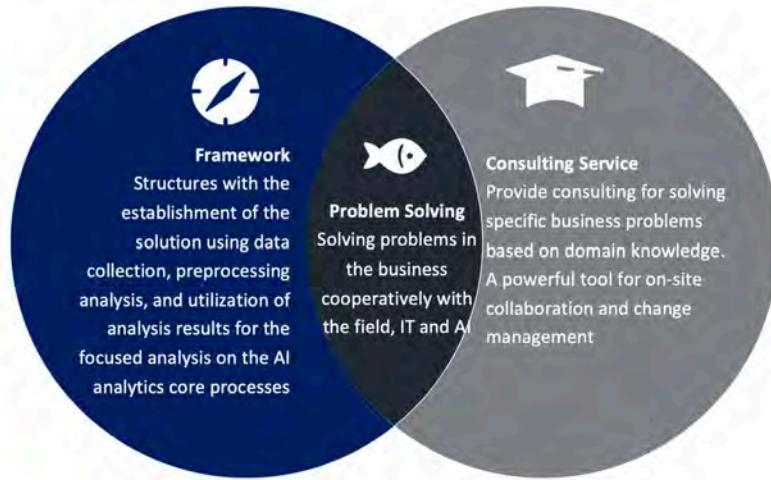


MINDs & Company Framework and Services

MINDs & Company is avoiding the use of over-engineered platforms and addressing specific problems using flexible frameworks and services.

Evolve from a simple framework to a platform by standardizing each industry.

Accumulate expertise in various applications in each industry.



Evolve into industry-specific platform + applications and establish the leading problem solving business.

Products and Services

Services

maum.ai Cloud Service

maum.ai Cloud Service is an AI service platform
for companies and individuals who are looking to use AI technology.

Make your own AI service, maum.ai

The screenshot shows the maum.ai website homepage. At the top, there's a navigation bar with links for AlaaS, Product, Success Stories, Pricing, API Service, Contact Us, and a prominent "Try it for free" button. The main heading "AlaaS" is displayed in large blue letters, followed by the subtext "We provide AI as a service. maum.ai". Below this, there's another "Try it for free" button. The background features a blurred image of a person working at a laptop with a network diagram overlaid. On the left side, under "Experience Voice Synthesis", there are two steps: Step 1 (Select the person or character) showing options for Korean (S. Korean President Moon Jae-in) and English (Homer Simpson), with English selected; and Step 2 (Type in your name & Get Started with the Voice Synthesis) with a text input field and a "Creating Voice" button. On the right side, under "Making My Own AI Voice", there's a subtext "In 30 mins, you can make your own AI voice" next to an illustration of a microphone icon surrounded by sound waves, and a "Get Started" button.

maum.ai website: <https://maum.ai>

AI as a Service (AlaaS) “maum.ai”

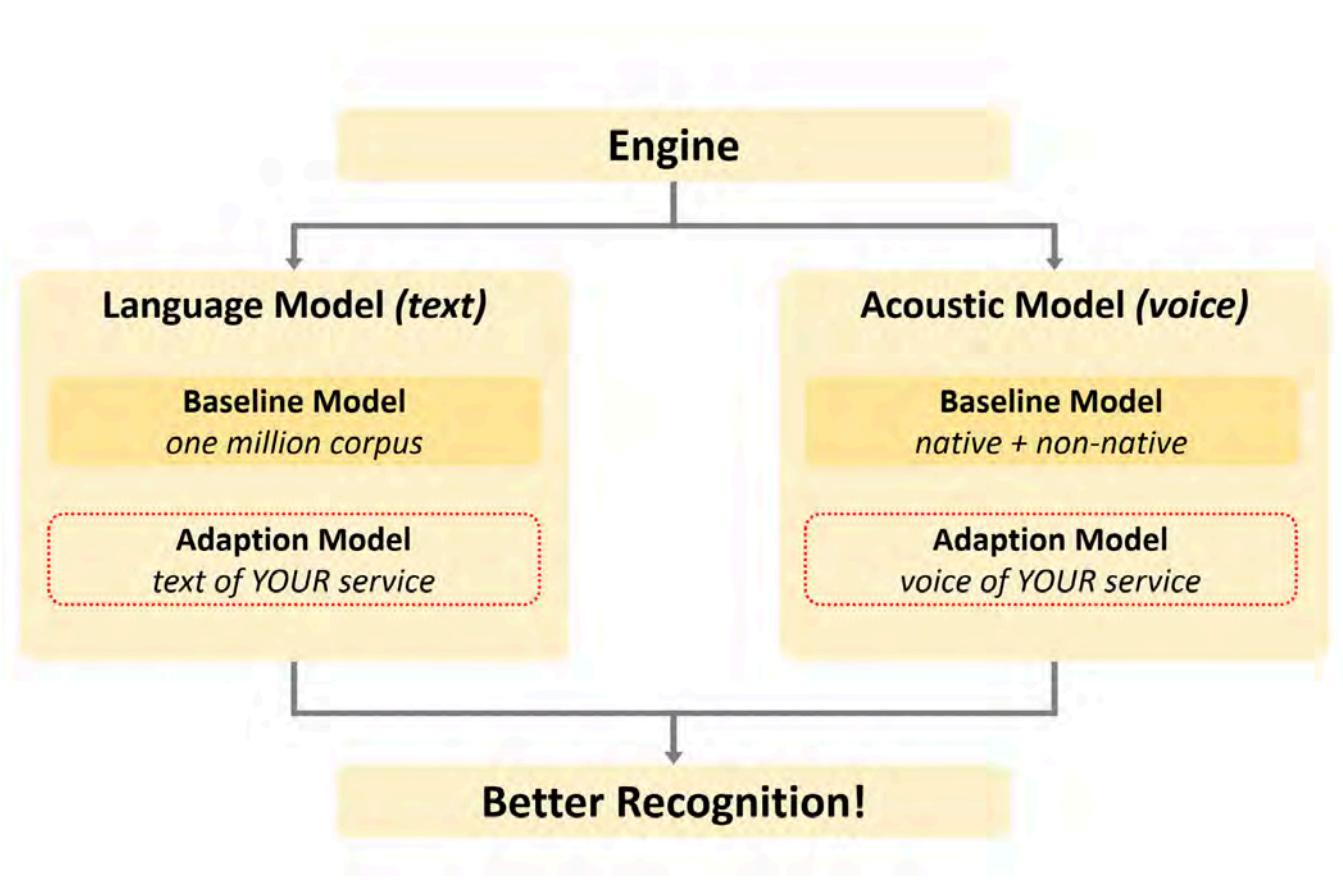


mAI English is an application that enables the user to practice English speaking skills anywhere and at any time through conversations with an AI partner.

The application is on the Google Play Store for ease of use. It has a Speech Recognition (STT) engine specialized in English education, provides voice data, and evaluates the fluency to enable the customer to implement his/her own evaluation system with the desired level. In addition, unlike traditional English lessons, with mAIEnglish, users can learn essential topics and practice as much as they want with AI.

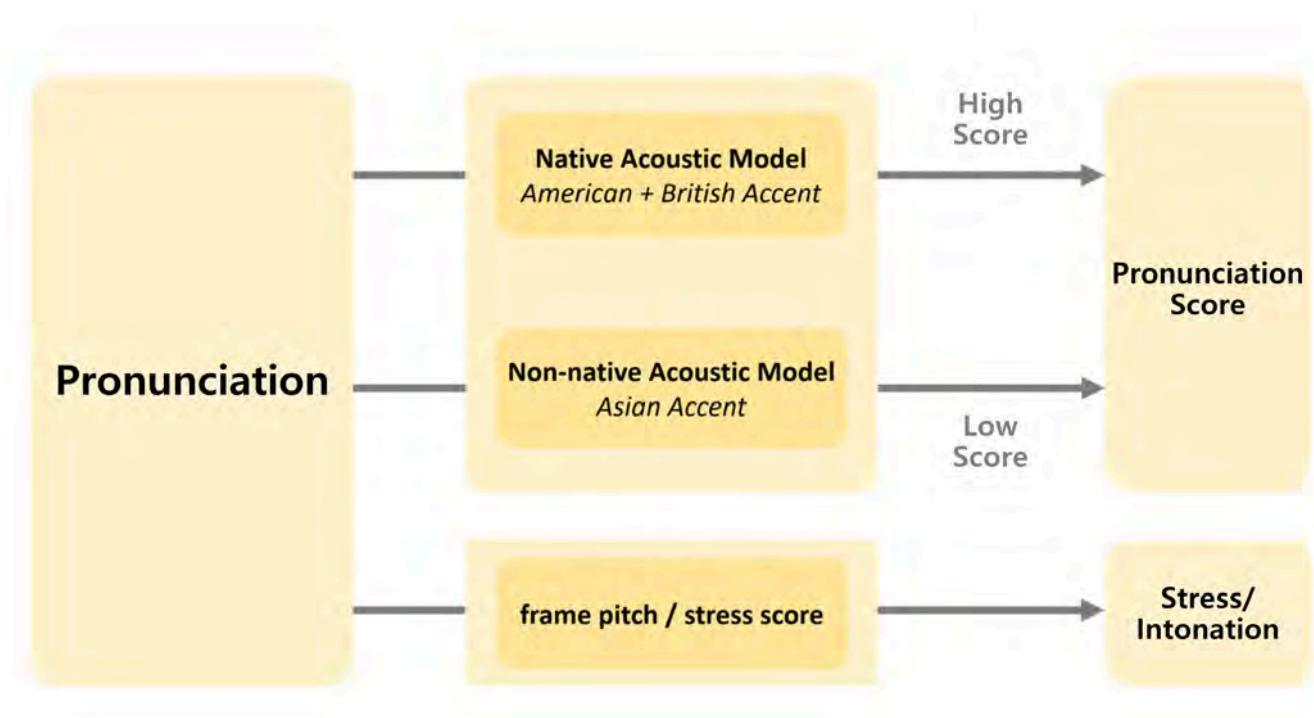
STT Engine Designed for English Education

STT engine includes audio data of English native speakers and non-native speakers(Asian). Non-native audio data even includes voices of Korean children.



Comprehensive Evaluation for Fluency(1)

The engine evaluates speaking fluency by comparing the user's voice to audio data of native and non-native speakers.



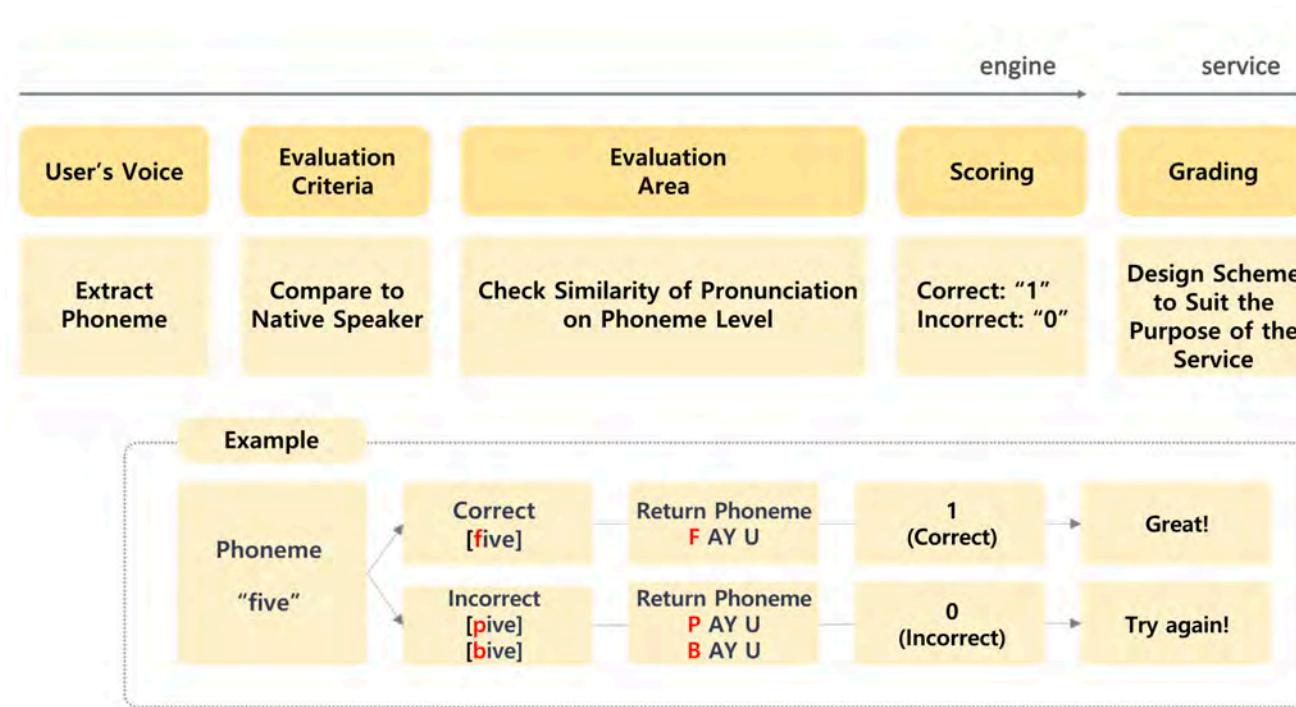
Comprehensive Evaluation for Fluency(2)

By combining scores generated from the evaluation engine, building a grading system becomes possible based on a client's needs.

User's Voice	Evaluation Criteria	Evaluation Areas	Scoring	Grading
Word	Compare to Native Speaker	Check Similarity of Pronunciation on Phoneme Level Holistic: Comprehensive evaluation of 5 areas below 1) Speed: Evaluate speed 2) Rhythm: Evaluate similarity between content words and function words 3) Intonation: Evaluate intonation similarity 4) Segmental: Evaluate similarity on phoneme level 5) Segmental 19: Additional Evaluation	0 ~ 100	mAI English 1. Set scores from 75~100 2. Combine scoring with accuracy Try again (grammar = 0) Not bad (grammar < 75) Good (grammar = 100, and pronunciation < 90) Excellent (grammar = 100, and pronunciation < 95) Perfect (grammar = 100, and pronunciation =< 100)
Phrase & Word	35 Scoring Features ETS(21)+Etri(14)		Scoring on 6 items (Scores from 1~5) * Return value to 7 decimal places	

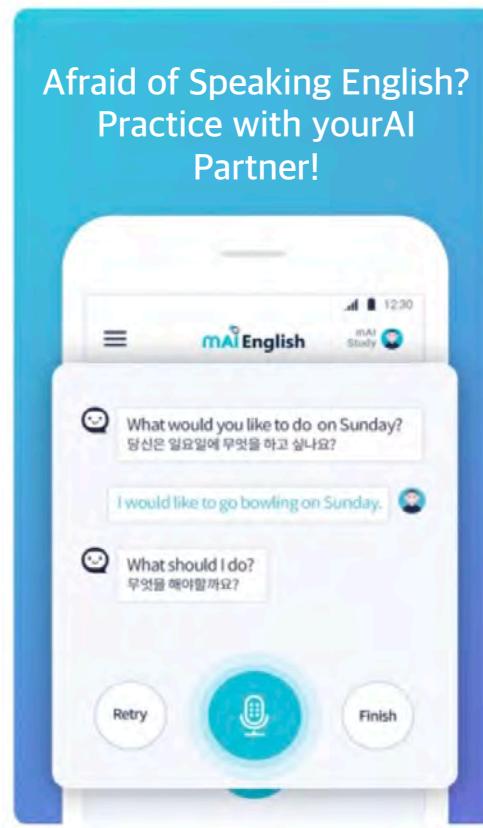
Evaluation for Phoneme

The accuracy of the pronunciation of phonemes in words can be checked and evaluated. It can be used for children who are studying phonics.



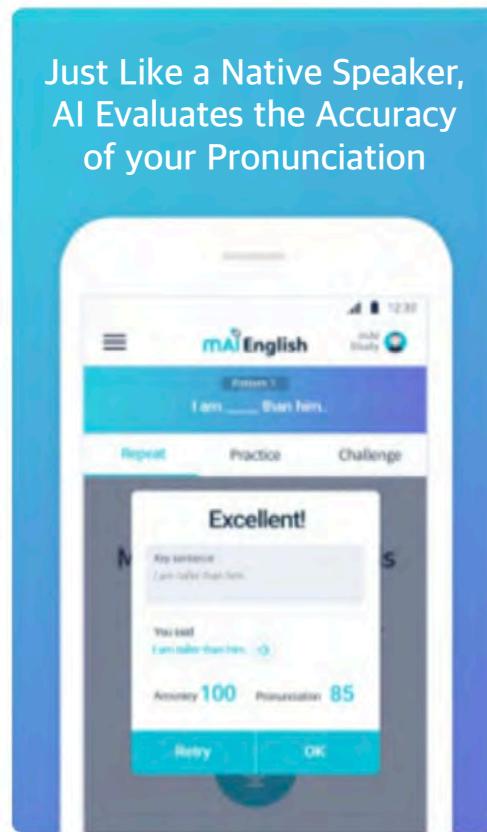
My Own AI English Partner, mAI English

mAI English is ‘My own AI English partner’ that enables users to practice English speaking skills anywhere and at any time. It can help users to improve their speaking level by giving feedback through the checking and evaluation of pronunciation and sentence structure.



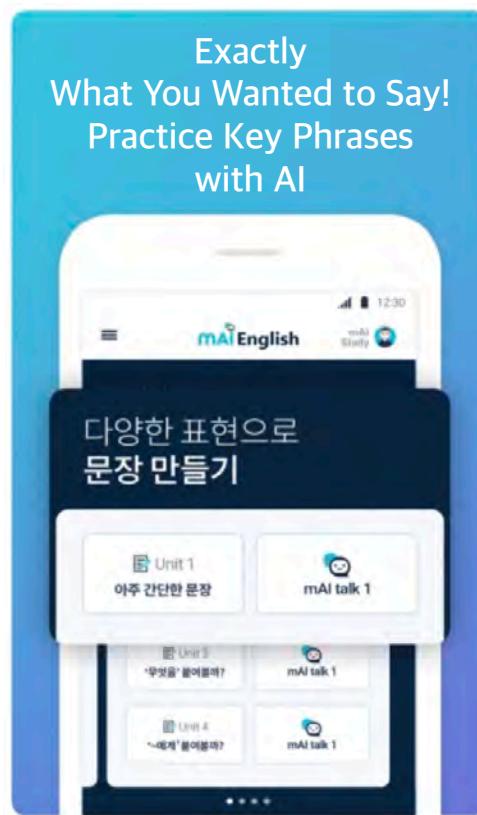
Learning Both Pronunciation and Accuracy of Speech

STT engine applied to mAIEnglish is an STT engine optimized for educational service after adaptive learning. It shows high recognition rate and provides accurate feedback even with the pronunciation of children and Korean adults who are not fluent in English.



Pick your Own Topic to Learn

Unlike traditional English learning, which users lose interest in easily due to the pre-formed curriculum, mAI English allows users to learn essential expressions from the topics that are chosen by users, and helps them practice English as much as they want with an AI partner.



Services

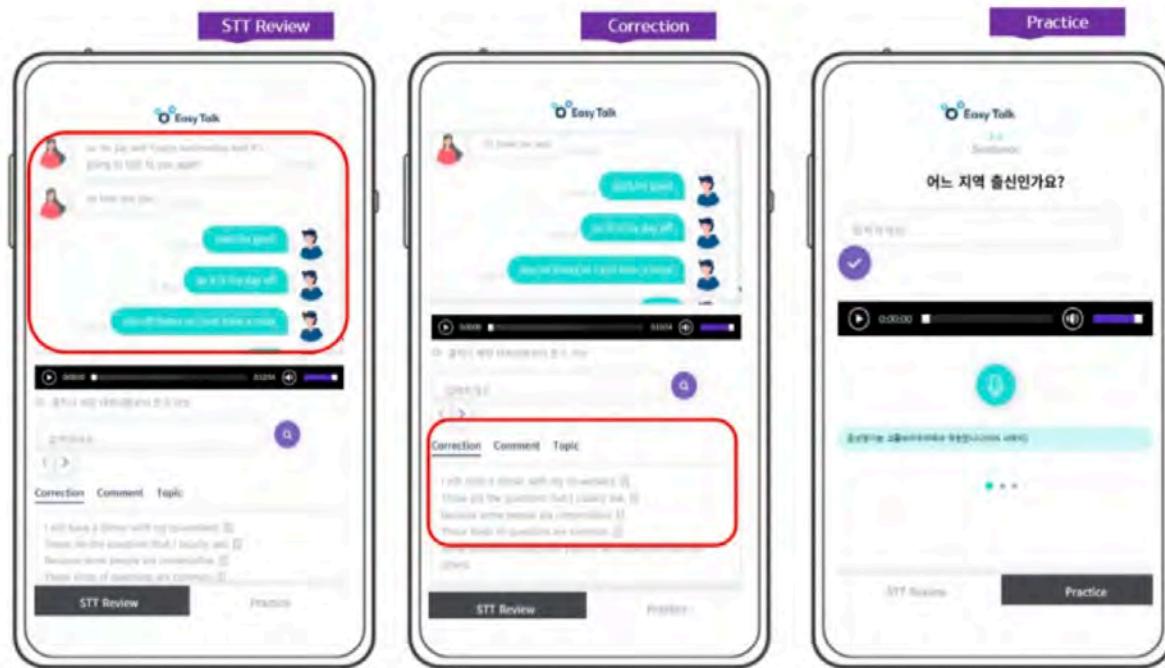
Easy Talk English

Easy Talk English is an AI English education service that integrates AI technology such as voice recognition for phone English learning.

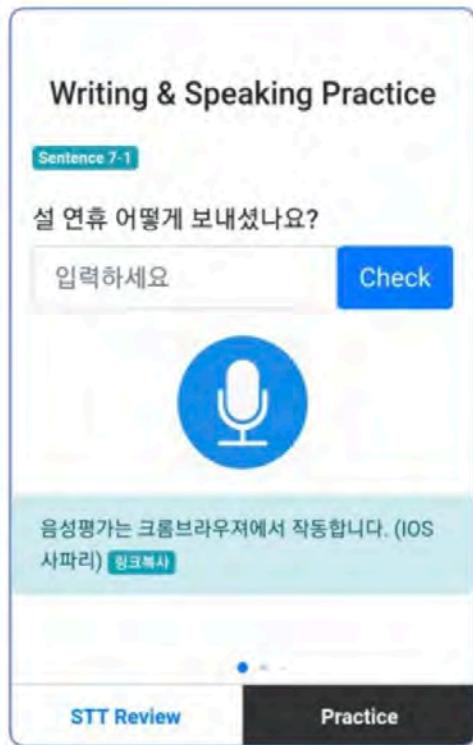
Users can check their conversations with a teacher and receive feedback on weak areas that require more learning.

Through this, users can expect substantial improvement in English speaking skills.

AI Review - STT Reviews & Practice



Easy Talk English, Screenshots of the Learning Pages



Real-time learning screen -
AI speech evaluation



Real-time learning screen -
Speech recognition review

Hybrid AI Contact Center

FAST AI Customer Center is an all-in-one hybrid customer center service that provides chatbots, voice generation TTS-based Happy Call, and automatic recognition of image documents analysis.

By incorporating AI technology into customer consultation, cost/work efficiency and customer care can be achieved easily. It can be expected to increase work efficiency by 5 times as much as before.

Hybrid AI Contact Center

Dramatically increase consulting efficiency through collaborations with AI

ChatBot • AI VoiceBot • Automatic recognition of image documents • Analysis of consultation history combined FAST AI Customer Center Service

FAST AI Customer Center is an all-in-one hybrid customer center service that provides chatbots, voice generation (TTS) -based AI voice bots, and automatic recognition of image documents. The FAST AI Customer Center announced the launch of its service at the Conference on Artificial Intelligence (AI) Next-Generation Contact Center and Construction Strategy at COEX Grand Ballroom in August 2018.

Automation of answering repetitive calls... Agent's real-time support system • Real-time transcription of consultation contents

MINDsLab's FAST AI Customer Center, which is implemented on all channels where phone calls and chats are most active, offers a variety of features to reduce costs and increase operational efficiencies. In the case of telephone counseling, repeated calls such service satisfaction surveys can be handled by an AI voice bot. In addition, the agent's real-time support system that allows the AI to provide the appropriate answer to the agent after listening to the conversation reduces the waiting time of the customer and improves the quality of the consultation. All telephone conversations are instantly converted to text using real-time speech recognition technology.

Chatbot • Human agent intervention… Analyzing consultation history on dashboard and providing easy chatbot operation environment

For chatbot consultation, various functions have been added to enhance the convenience of customers through chatbots. If customers need more detailed consultation than with a chatbot, it can immediately switch the chat consultation to the actual agent.

The dashboard also analyzes the consultation history of the entire consultation channel and provides a user-friendly operation environment to easily improve the quality of counseling services.

Apply the latest AI technologies such as deep-learning voice generation to create natural AI voice with minimum recording time

All technologies of the FAST AI customer center incorporate the latest deep learning based AI technology such as AI voice bot, Happy Call (TTS • Text to Speech). MINDsLab's voice generation technology enables bots to produce a natural voice that sounds like a real agent's voice even with minimum learning time. In addition, it integrates the image recognition engine 'DIARL' (Document Image Analytics, Recognition and Learning), which is a visual intelligence solution for MINDsLab's document and image recognition. Users don't have to enter complex information like a serial number.

Solving problems of operation cost and efficiency… 5 times more efficient with latest AI technology

FAST AI Customer Center is an AI service that is designed to solve problems such as cost reduction/ work efficiency/ collaboration of agents and chatbots. MINDsLab has a variety of references from various call center projects related to customer centers, including customer voice analysis and call quality control automation. The AI Customer Center will provide services that will reduce operating costs and increase consultation quality.

FAST Hybrid AICC

Problems of Existing Customer Centers

"We want to increase productivity and quality at the same time"

Quality: Concurrent demands on improving productivity with high quality.

"The cost of operating the customer center is burdensome."

Budget: Continuous increase in minimum wage. Costly to maintain the department.

"It's too difficult to maintain a stable workforce."

Management: Recruiting manpower - Educating - Entering into workforce - Leaving work (vicious cycle)

"It is difficult to arrange the workforce because the difference in work volume is severe."

Balance: Difficulty to expect work volume depending of the time of the year

"I think customer expectations are getting higher and higher"

Service: High expectations of customer service

"I want to maximize efficiency by applying the latest technology."

High-Tech: Looking forward to combine the latest IT technologies such as AI



F^{inancially} competitive

Five times more efficient in cost



Low Maintenance Fees
Expansion of Coverage

A^{gile}

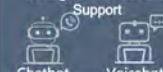
Constant upgrades & Flexible in change



User-oriented AI
Continuously Improving Performance

S^{calable}

Chatbot + Aftersales
Call+Document Recognition+Real-time Support



Hybrid CSR
Hybrid of Chatbot and Agents

T^{riedy}

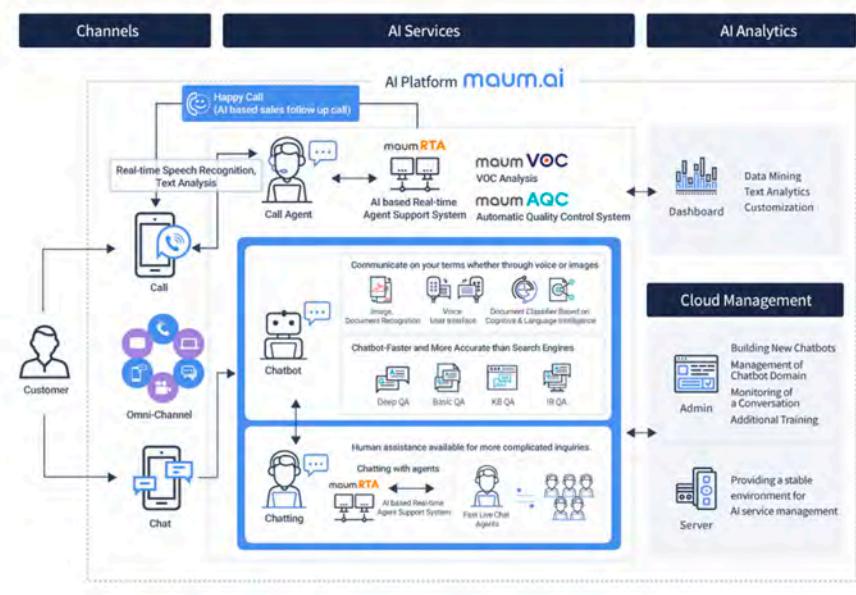
Equipped with cutting-edge AI technologies



Market-leading & Immediately Applicable Technology

Hybrid A.I Contact Center

Overcome the limitations of traditional customer centers and support the use of a 'Hybrid specialist counselor' to answer questions that the AI contact center itself couldn't respond to.



Real-time technology

- **Speech to Text** : Recognize over 95% of customer speech with natural language processing + voice recognition technology.
- **Intelligent Bot(Chat / Voice)** : Intent Finder to identify the intent of the question and provide the best answer for each situation.
- **Text to Speech** : Provides an AI voice as natural as a real person, and was commercialized as the world's best TTS technology for the first time in Korea.

Utility value of H-AICC

The Hybrid AI Contact Center creates utility value to all stakeholders.

Expectations of H-AICC

Concentration of core competencies : Focus on internal management resources by eliminating inefficiency and high-cost factors.

Flexible Scalability : Eliminate human resource shortage due to changes in workload and minimize impacts due to changes in the market environment

Simplifying the Organization : Simplicity • Repetition • Slimming of organization and increasing efficiency

Cost Savings : Excellent productivity compared to existing agents' 1: 1 response (AI Hybrid Consultation: Customer ≈ 1: 5) Lower hiring, training, and personnel management costs for agents

Quality Standardization : Leveling and service quality improvement through the elimination of variance in the response quality of agents due to the different personality and level of proficiency of each agent.

Improving Customer Satisfaction : Improved response rate, 24-hour service available 365 days per year, etc. Customer accessibility, innovative improvement of consultation connection rate, customized service for customer's eye level

Utility value of H-AICC

Counselor perspective : Emotional labor relief due to R&R change

Customer perspective : Increase customer satisfaction by enhancing consultation connection and accessibility such as 24/7 continuous service and personalized services.

Outsourcer's perspective : Improving profitability by streamlining resources (manpower, etc.)

Consignee perspective : dramatically reducing costs compared to existing services without lowering service levels

Application area of H-AICC

Hybrid AI Contact Center can be applied to all business areas



Cloud based Chatbot Builder

maum Chatbot, a chatbot service, consists of company introduction bot 'Sully', HR bot 'Joey', encyclopedia bot 'Noah', and childrens' education bot 'Mini'.

Based on the latest deep-learning technology, chatbot can offer more sophisticated customer consultation. Unlike other chatbots based on rules, advanced maum Chatbots understand the user's intention of asking and provide accurate answers.

Characteristics of maum Chatbot

		
Company introducer Bot Sully	Human Resouce Bot Joey	Kids Educator Bot Mini
General Info Products & Services Pricing Info	Checking Vacation Employee contact info Booking a meeting room Parking Wifi, VPN info	Reading books Sing together Watching video Everyday conversation

Actual screen of maum Chatbot

The screenshot shows a chat interface with a white background. On the left, there's a large, friendly-looking cartoon character of a man with brown hair, wearing a blue suit and orange tie, with a small speech bubble above him. The main text area has a light blue gradient background.

User Message: "Hi there!"

Bot Response: "I'm Sully, your trustworthy AI assistant at your service as you navigate through MINDs Lab's webpage.
If you have any question, please don't hesitate to ask!"

User Message: "Thanks for visiting. I look forward to answering your questions. Let me know!
Here are some examples of what I could answer for you."

Bot Response: (Three buttons for quick responses)

- What is maum.ai?
- How can I get to MINDs Lab?
- Tell me about artificial intelligence!

User Message: "Tell me about artificial intelligence!"

Bot Response: (Text area with a small character icon)

- "What is maum.ai?"
- "How can I get to MINDs Lab?"
- "Tell me about artificial intelligence!"

Thanks for visiting. I look forward to answering your questions. Let me know!

PM 4:36

PM 4:36

Reception Robot

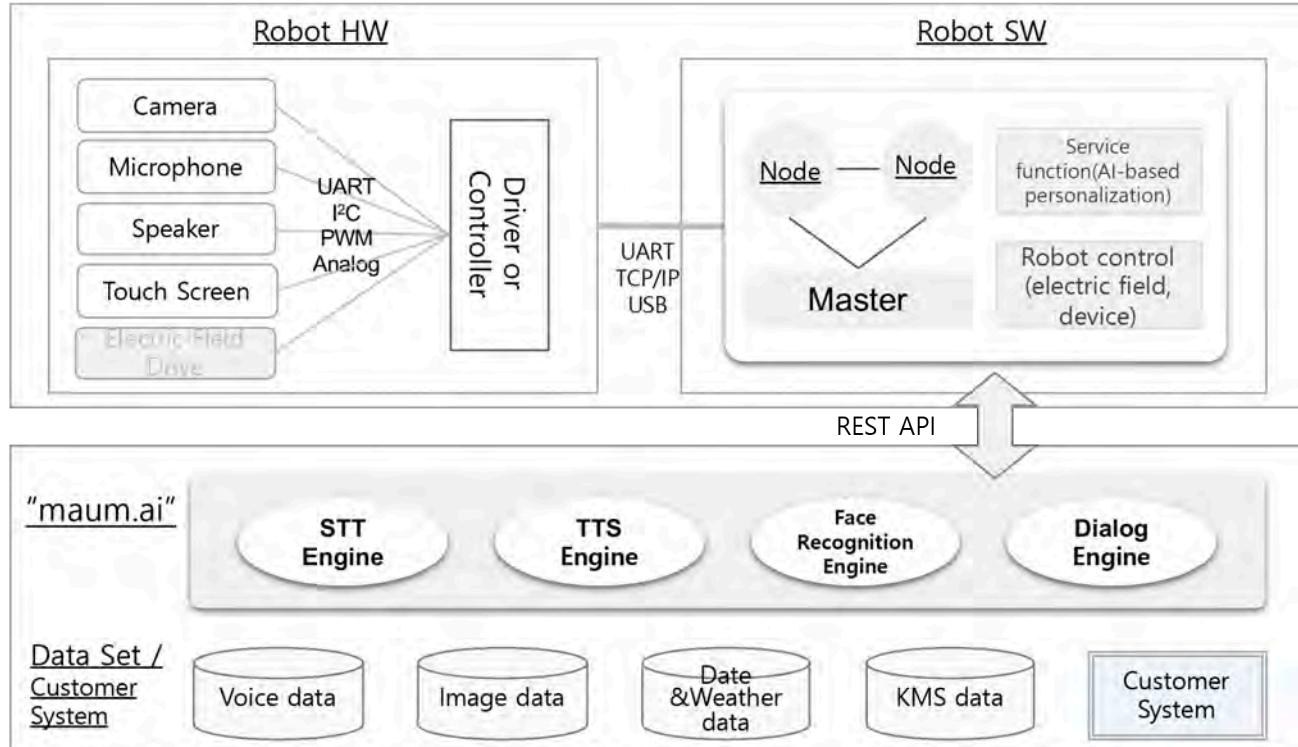
MINDsLab's reception bots are based on its AI engines and provide personalized services in conjunction with the customer's system.

It can be customized based on customer's need and preference.

Reception bot greets people and opens door by recognizing faces. It can be used in a variety of contexts as well as in the general office.

Service Configuration

AI-based reception bots (fixed type, customized type) are provided to customers. Based on MINDsLab's AI engines, it provides personalized service in connection with customer's system



 Success Stories & Use Cases

3.2 Applications

maum MAAL

maum VOC • maum AQC • maum RTA

Intelligent Robot

ChatBot Platform M2U

Hybrid AI Consulting System

AIVR • Voice Bot • SDS • MLT

Cloud based Machine Learning Data Tool

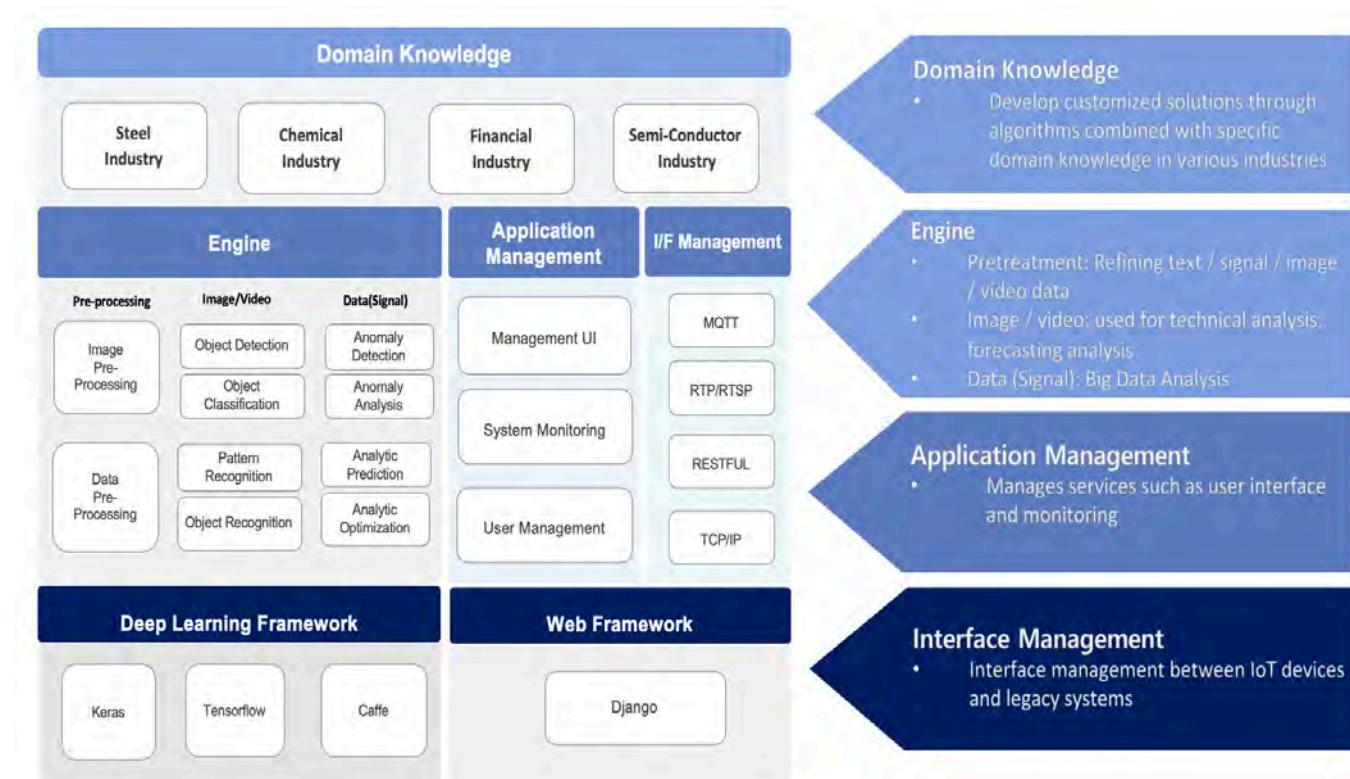
maum MAAL [Manufacturing, Automation, Analytics, and Learning](#) is an AI factory frameworks that can be applied to various processes in the manufacturing process.

Data-based advanced intelligence analysis, automation, and manufacturing processes provide optimized solutions for each production plant.

maum MAAL provides the foundation for an intelligent plant with the best AI solution for performance, cost, safety, and environmental issues in the manufacturing industry.

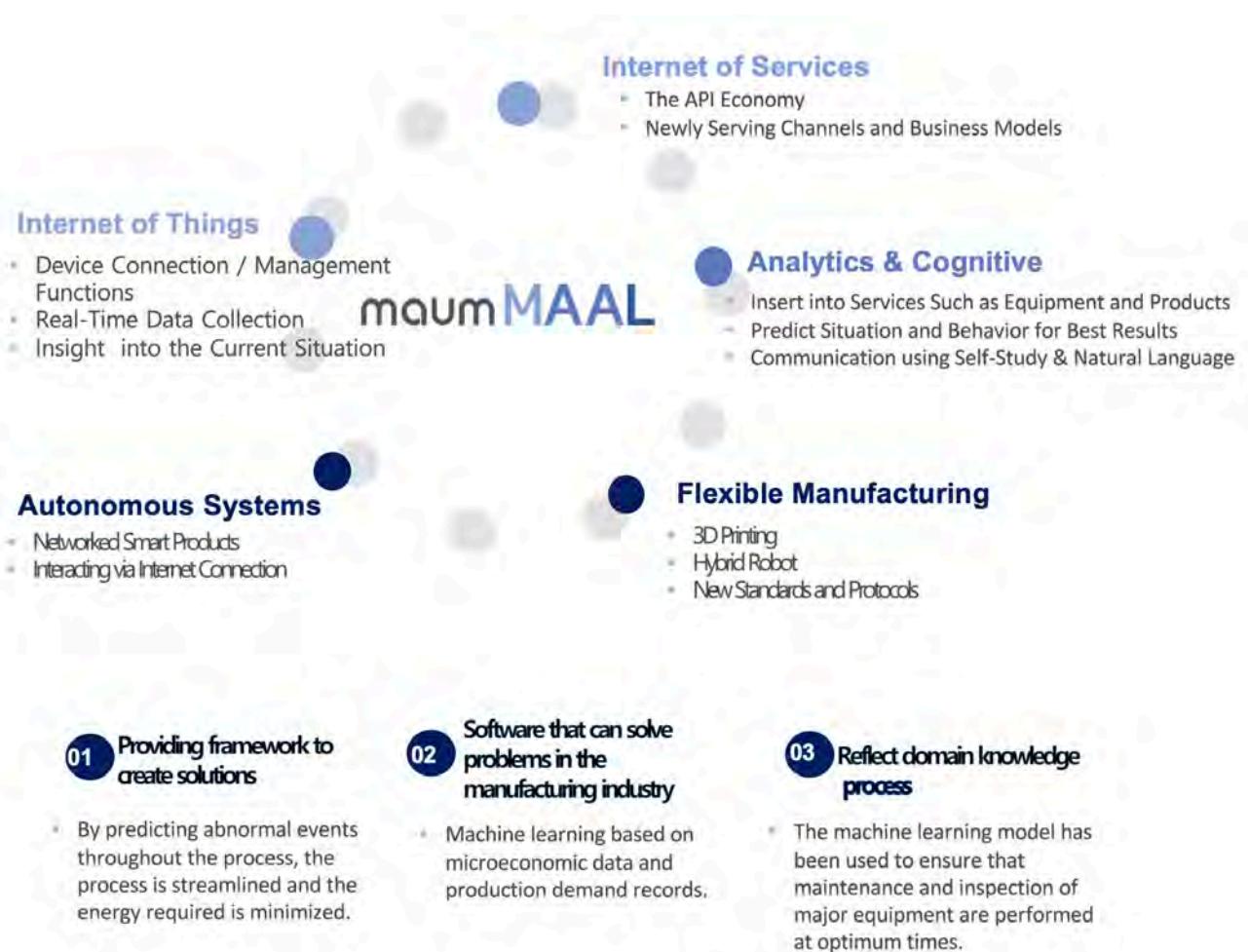
AI Framework For All Manufacturing Processes

maum MAAL is an AI intelligent factory framework that can be used in various manufacturing processes.



Application Area of maum MAAL

maum MAAL (Manufacturing, Automation, Analytics, and Learning) brings innovation to the manufacturing industry with highly intelligent analytics, automation and optimized manufacturing processes based on data.





Intelligent Manufacturing, maum MAAL

maum MAAL provides the best AI solution for all problems in the manufacturing industry such as performance, cost, stability, and environment.

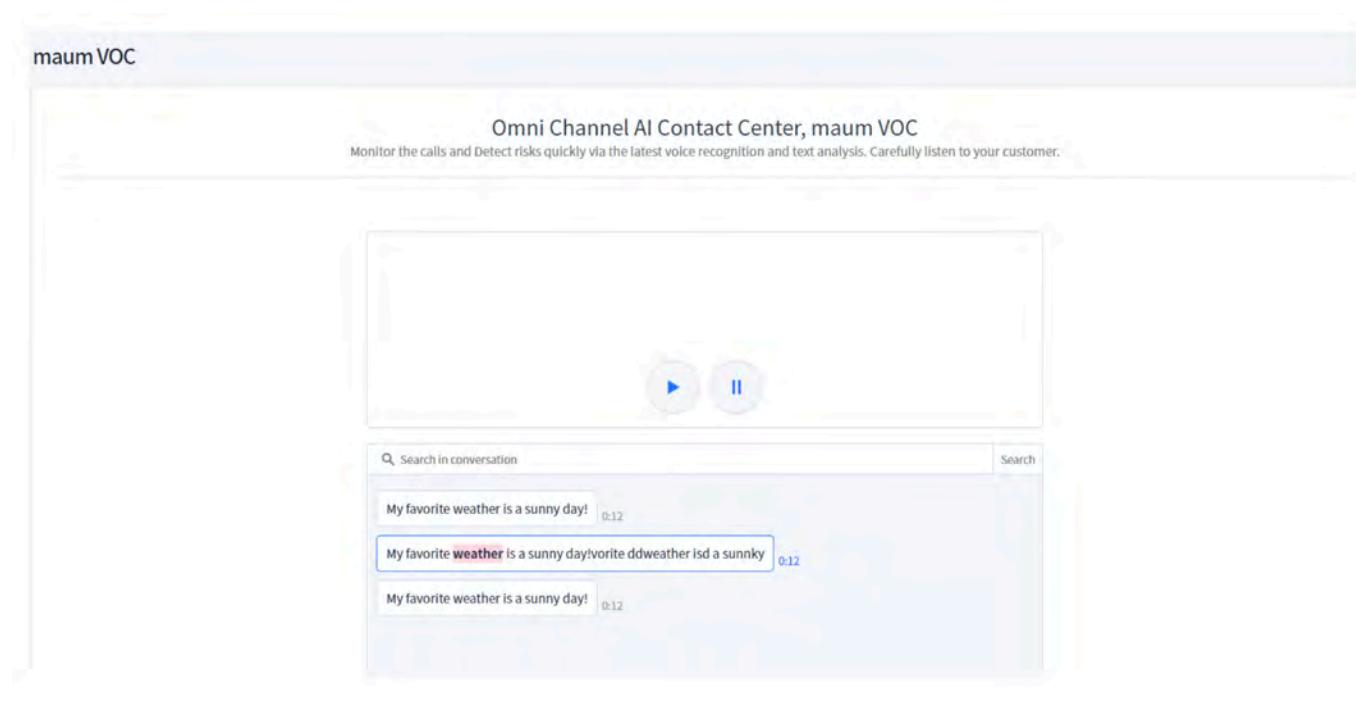
01 Provide a framework for solutions

02 Software that can solve problems in the manufacturing industry

03 Processes based on domain knowledge

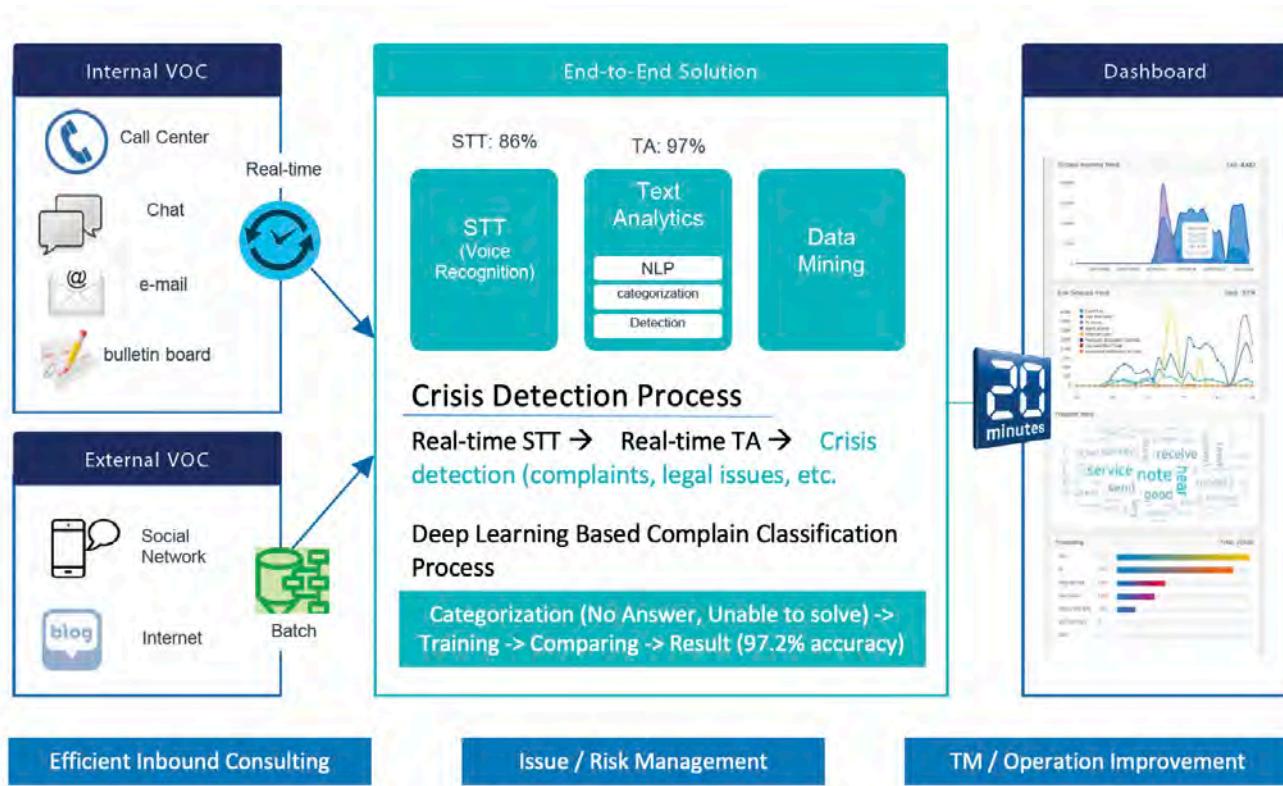
maum VOC(Voice Of Customer) analysis solution, which collects incoming VOCs from various channels such as phone calls, chats, and emails. It analyzes the risk elements in real time and sends them to the relevant departments to enable immediate risk management.

maum VOC: Voice analysis solution



maum VOC: Voice analysis solution

A Voice analysis solution that analyzes the customer's voice and quickly detects risks.



Applications

maum AQC

Agent Quality Control

maum AQC is an AI solution that visualizes and automates the work of the contact center.

Every day, it processes an average of about 200 telemarketing calls on a real-time basis.

It summarizes calls using STT and TA engines. This increases the counseling quality and screening efficiency in quality assurance and also decreases the cost of the contact center.

maum AQC visualizes and automates the work of the contact center.

1

계약자 성명	홍길동			주민번호	750228-1*****
가계약 / 증권번호	00000-0000-000			취급부	대***
청약일자	2017-00-00			대리점명	가****
월보험	34,560원			만기일자	2082-00-00
심사회차	1차	2차	3차	최종	
심사결과	보완	통과		통과	

2

번호	준수	미준수	구간	고객	녹취	구간	답변	청취	답지
				음답	청취	구간			
1	<input checked="" type="radio"/>	<input type="radio"/>	[금칙어]	답변	청취	답지			
2	<input checked="" type="radio"/>	<input type="radio"/>	[제3자동의] 인사말	답변	청취	답지			
3	<input checked="" type="radio"/>	<input type="radio"/>	[제3자동의] 수집동의		청취	답지			
4	<input type="radio"/>	<input checked="" type="radio"/>	[제3자동의] 고유식별	답변	청취	답지			
5	<input type="radio"/>	<input checked="" type="radio"/>	[제3자동의] 본인확인	미답변	청취	답지			
6	<input checked="" type="radio"/>	<input type="radio"/>	[가입설계] 이용동의	답변	답내	미답지			
7	<input checked="" type="radio"/>	<input type="radio"/>	[가입설계] 제공동의		청취	답지			
8	<input checked="" type="radio"/>	<input type="radio"/>	[가입설계] 인출동의	답변	청취	답지			
9	<input checked="" type="radio"/>	<input type="radio"/>	[가입설계] 조회동의	답변	청취	답지			
10	<input checked="" type="radio"/>	<input type="radio"/>	[가입설계]	미답변	청취	답지			

3

출금이체 등의 별도 저장

4

표준 스크립트 구간상세

* 계속보험료와 초기 보험료 납입방법 확인 후 녹취
 * 보험료 자동이체 예금주의 계약자, 피보험자가 아닌 제3자 설정하시는 경우 '제3자 예금주 등의 스크립트'를 별도 진행바랍니다.
 [00112] 계속 보험료는 자동이체로 등록 하겠습니다.
 [00113] 보험료 납입은 예금주 000님 생년월일은 0000년 00월 00일이고 00은행 계좌번호는 ***** *****입니다
 [00114] 보험료 출금에 동의 하십니까?
 [00120] 자동이체 일자는 25일자로 등록하겠습니다
 [00125] 계속 보험료와 동일한 계좌에서 실시간 이체로 일회 보험료 0만 0천 0백 0원 출금에 동의하시습니까?

5

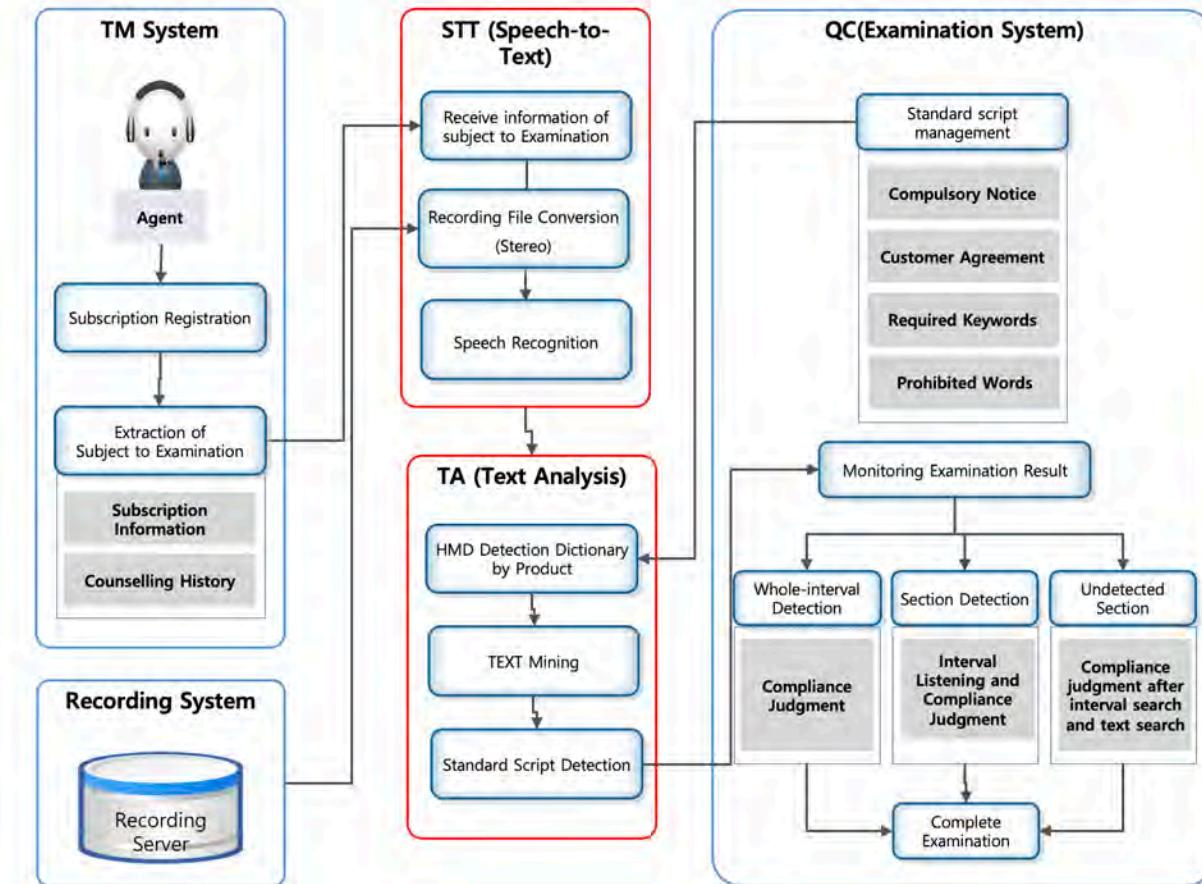
유의사항 제 3자 예금주 등의 스크립트 별도

[00112] 계속 보험료 결제는 자동이체로 등록을 해드리겠습니다
 [00113] 보험료 납입은 예금주는 000님 생년월일은 0000년 00월 00일이고 00은행 계좌번호는 ***** ***** 구요
 [00014] 보험료 출금에 동의 하십니까?
 [C] 예
 [00120]
 [00125] 요기는 계속 보험료와 동일한 지금 불러주신 000 여기 계좌에서 실시간 이체로 일회 보험료 0만 0천 0백 0원 출금에 동의하시지요?
 [C] 예

STT 전수결과 확인

Fire insurance A company AQC - Automated audit system detects incomplete sales

Every day, it processes about 200 telemarketing calls on average on a real-time basis. It summarizes calls using STT and TA engines.



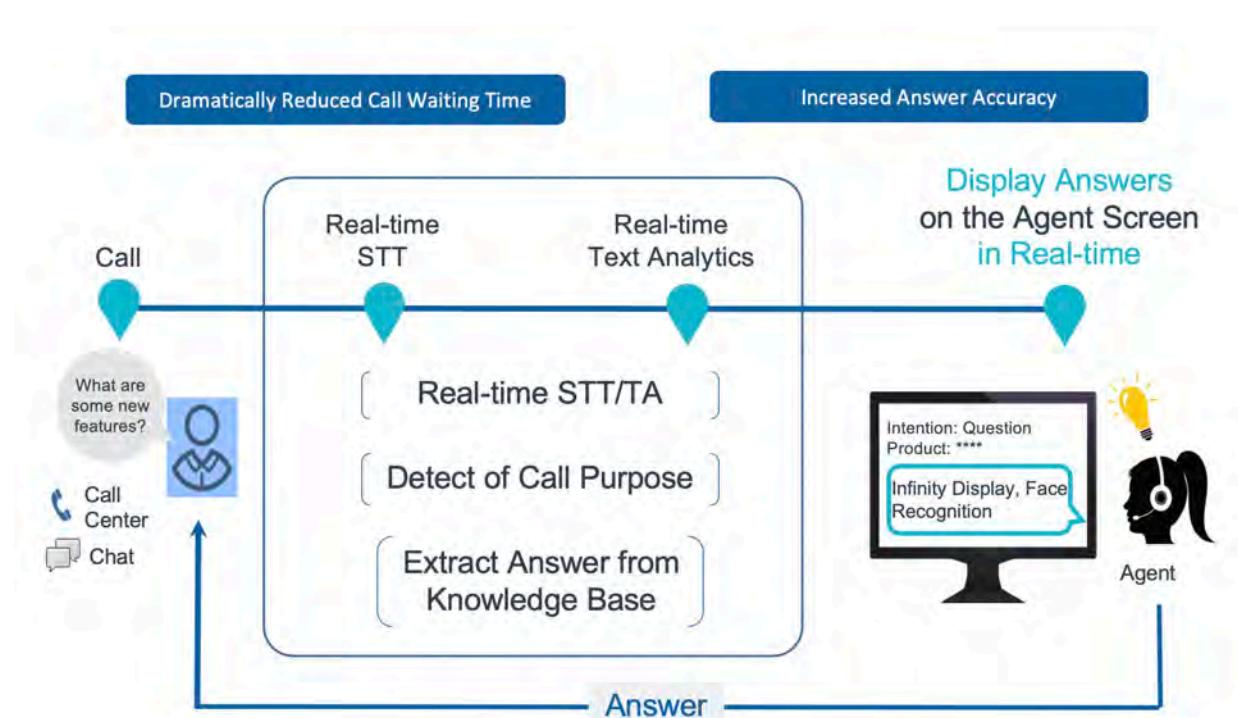
Real-Time Agent Support

maum RTA is a real-time agent support solution that automatically recommends the most appropriate answer to the agent during the call.

This dramatically reduces call wait time and improves the quality of customer service by increasing the accuracy of answers.

maum RTA, real-time agent support solution

The most advanced form of contact center solution, 'maum RTA' listens to the agent and customer conversations on a real-time basis and automatically recommends the most appropriate answer to the agent.



Intelligent Robots

Korean, English

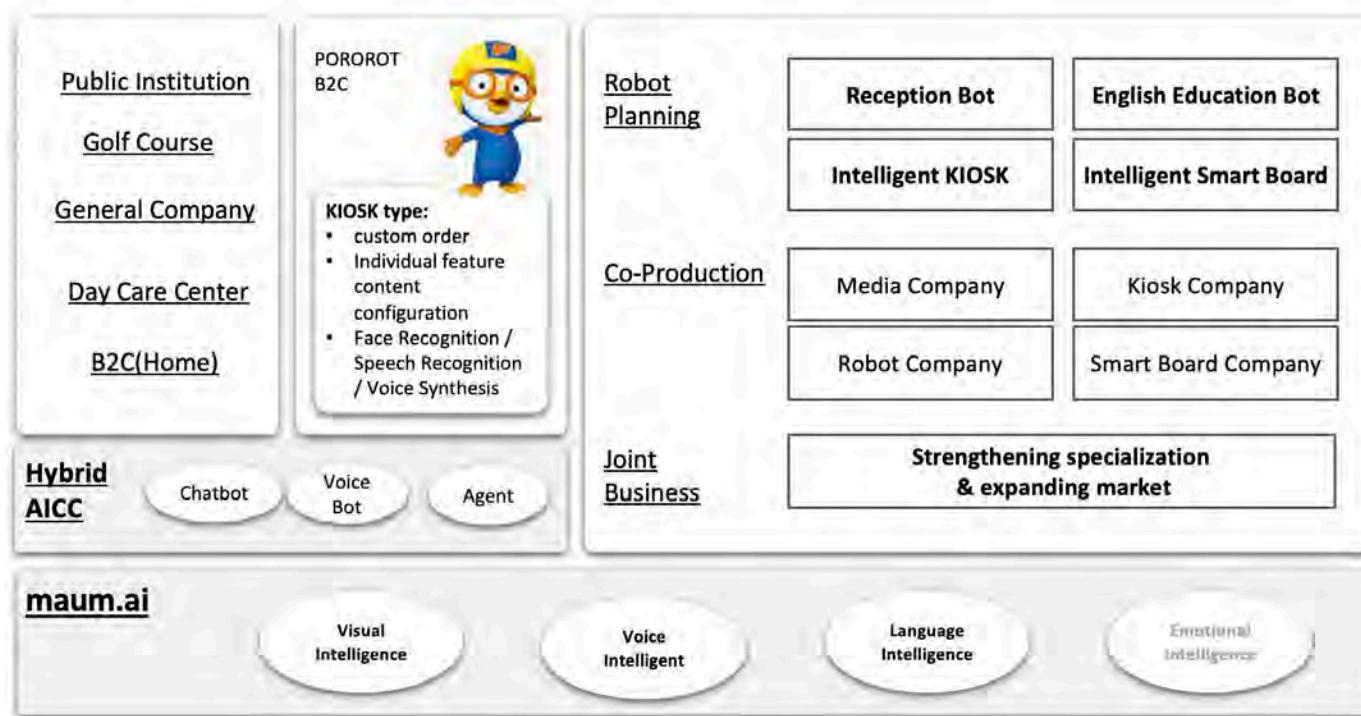
Products and Services
Applications

MINDsLab's intelligent robots are built based on the AI platform maum.ai
It is "Robot as a Service" that develops various types of intelligent robot products and services that customers want and provides artificially intelligent robot operation service.

It can be used in various forms such as reception bots, training bots, and kiosks.
Customized features and contents are also provided for each customer.

ChatBot Platform M2U (Maum to You)

Based on the AI platform “maum.ai,” M2U develops products and services such as reception bots, English training bots, and intelligent kiosks.



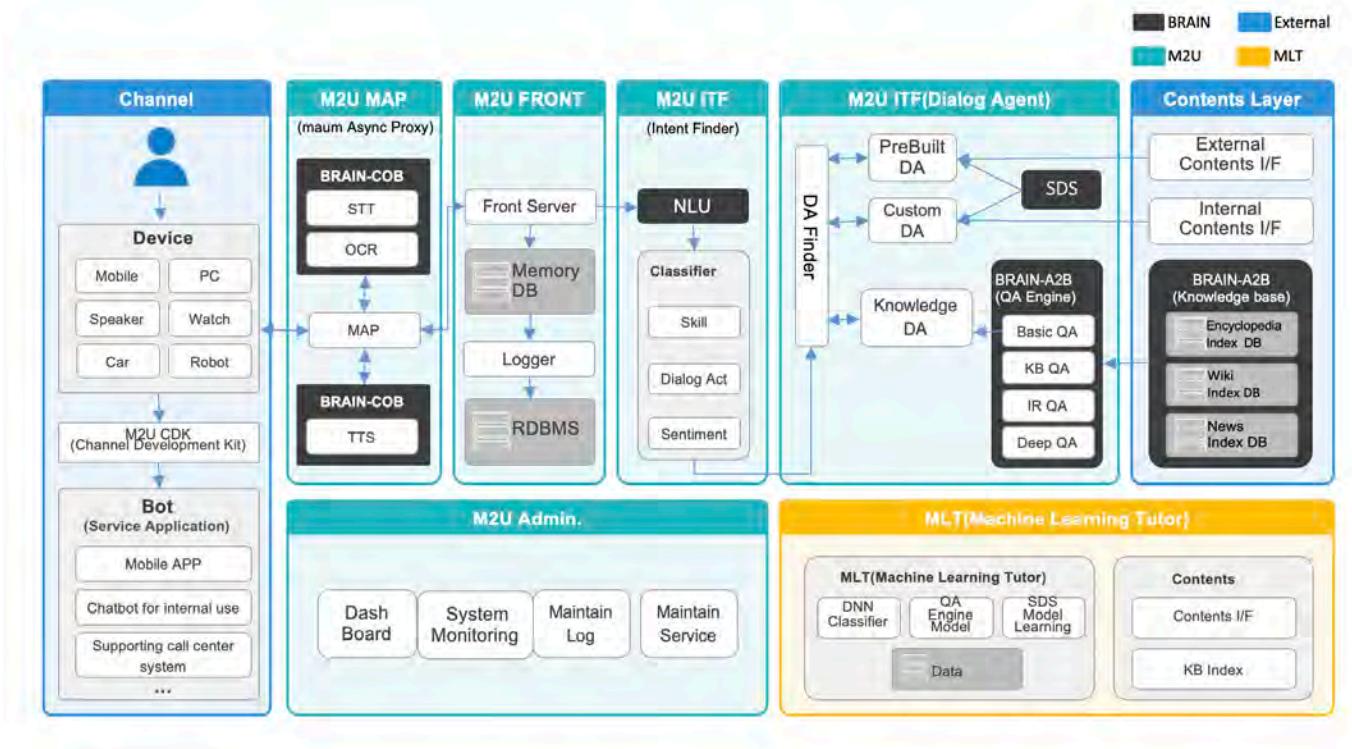
ChatBot Platform M2U

MAP/ Router/ ITF

Products and Services
Applications

MINDsLab's Chatbot Platform M2U is a module that provides an integrated interface between users and the platform. It is an interface where various devices and users meet. It handles the input and output of devices such as voice, video, gestures, and text.

Configuration of M2U Module



- **M2U MAP** Manage device and input / output used by people
- **M2U Router** Manage input sessions
- **M2U ITF** Identify intent and forward it to DA
- **M2U DA** Generate an answer to the input as a M2U application
- **M2U Admin** Manage the entire M2U module

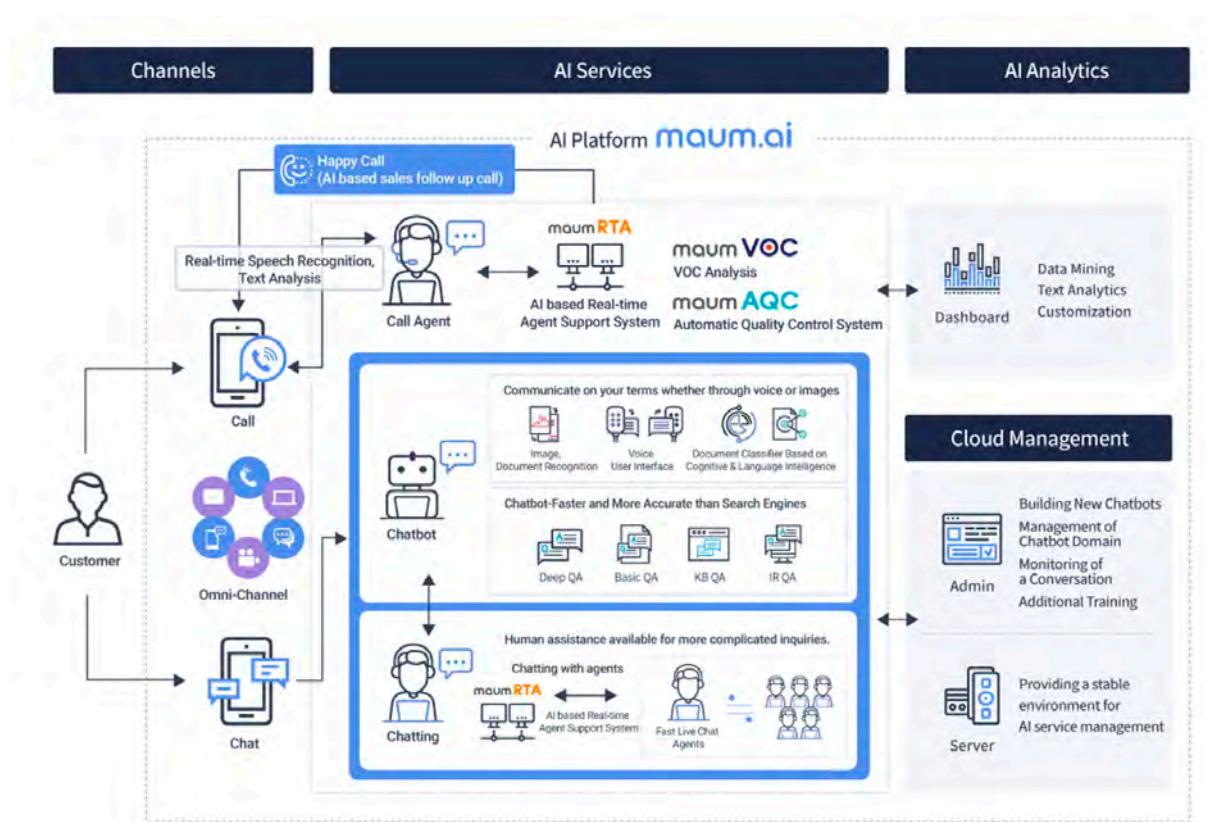
Hybrid AI Contact Center

Products and Services **Applications**

Hybrid AI Contact Center is an omnichannel contact center that integrates agents, chatbots, and analytic systems. Customers can receive the key information via agent calls and chatbot. Also, through Business Processing Outsourcing, the contact center can optimize its performance by integrating various services and applications.

MINDsLab's AI Contact Center, an omnichannel contact center that integrates agents, chatbots, and analytic systems.

Customers can receive the key information via calls with the agent and via agent calls and chatbot. Business can utilize the features and a real-time support system based on the artificial intelligence platform.



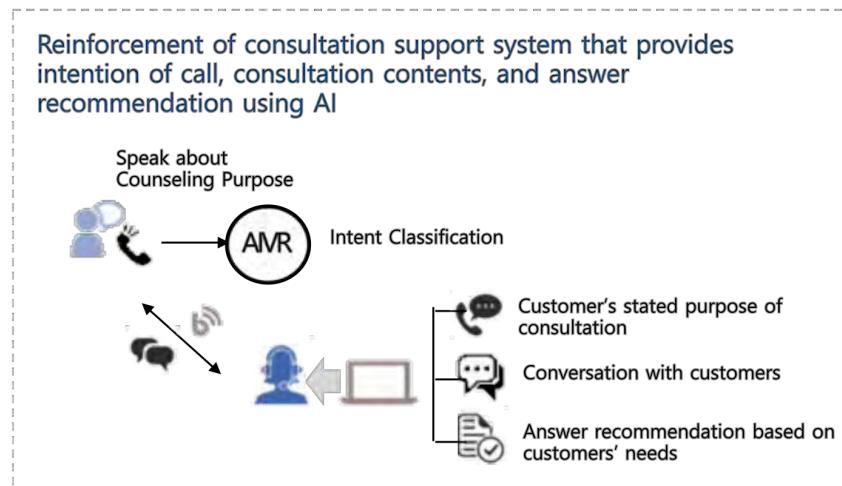
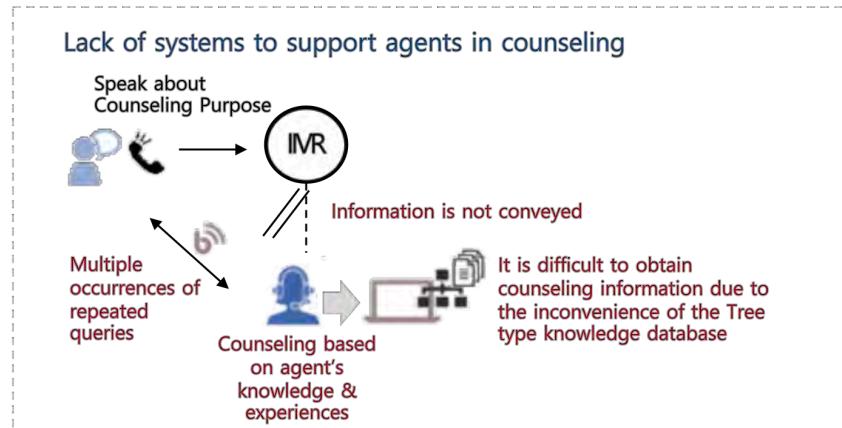
AI based Intelligent Voice Response

AIVR is an AI-based agent guidance system.

Through voice recognition, the user's intention in the call is determined and displayed to the agent in real time. The AIVR enables quick response and improves the quality of customer service.

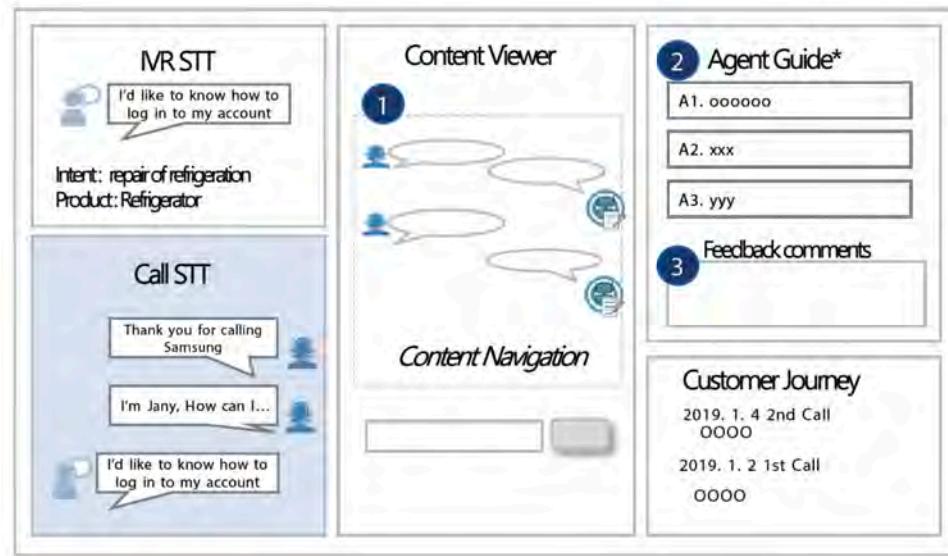
Implementation of AIVR(AI based Intelligent Voice Response)

The AIVR guides the agent by analyzing the user's intention of call and the content of conversation, thereby enhancing the quality of customer service.



Use case of AIVR

Some key factors of the agent support are the practicality of the contents and the structure that enables search and navigation. Since the organization in charge is segregated, the clear definition of roles and necessary rescheduling for each organization are important.



- 1 Clear R & R definition of content design and output design for consultation contents to enable navigation.
- 2 Analytical criteria
- 3 Process to reflect Feedback Comments.
(Feedback subject → content update decision → system reflection method)
(Ex.)The H bank records the feedback comments made by the person in charge, and reflects them in dialogue and DB after checking implementation contents.

Applications

Voice Bot

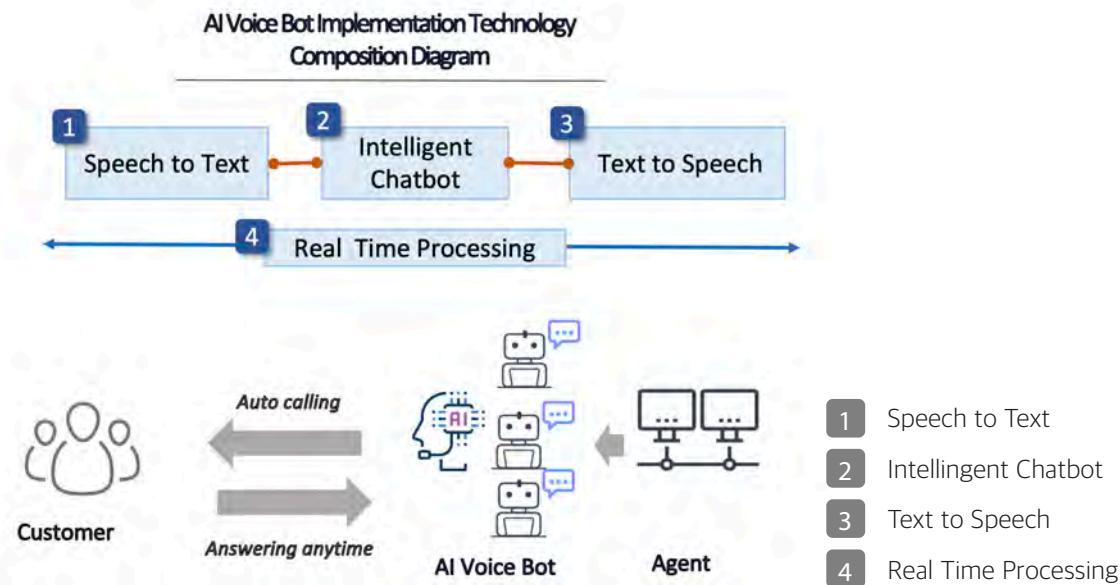
Even with little voice learning, AI voice bots replicate personal accents and can be used in various fields such as voice recognition, voice generation, and chatbot technology.

AI voice bots automate repetitive call services, including Happy Call(outbound call) services such as quality checks and customer satisfaction surveys.

This reduces costs and improves counseling satisfaction.

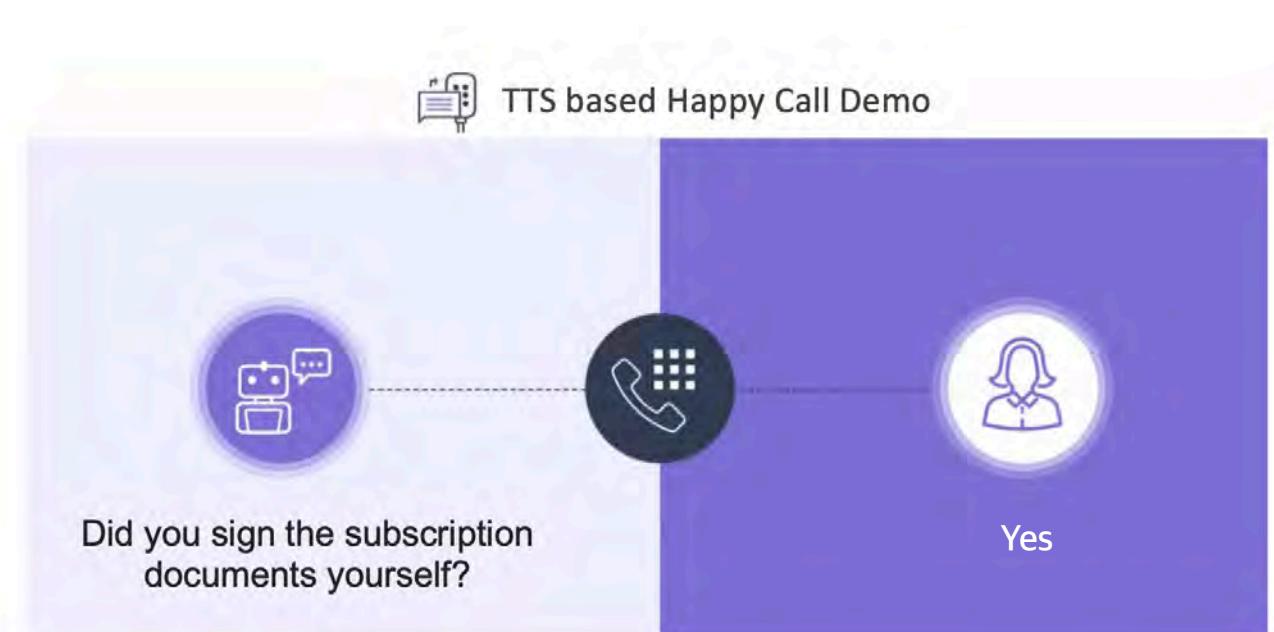
Main technology of maum Voice Bot

maum Voice Bot is consisted of MINDLab's core engines such as STT, Chat Bot, TTS and RTP.



AI Voice Bot (Happy Call Automated Outbound Call Service)

AI Voice can automate Happy Call services such as quality checks and customer satisfaction surveys.



English Pronunciation and Grammar Evaluation

AI based English Tutoring

Products and Services
Applications

Applying the speech recognition and text analysis technologies of MINDsLab, MINDsLab's AI training service recognizes the pronunciation of various users (STT) and provides an evaluation of personalized pronunciation and utterance. The pronunciation of Korean people who are not fluent in English can be corrected with the system. There are a variety of levels and scenarios, suitable for elementary school students to students who study TOEFL and TOEIC.

MINDsLab's AI English Education Service using MINDsLab's speech recognition and text analysis technology

Accurate Konglish Recognition (inaccurate way of speaking English)

- It is suitable for recognizing Korean people's English pronunciation who are not fluent in English by applying the Korean language specific voice learning image to the general English STT engine.
- 85% recognition rate was proven in both Fluent and Broken by the result of STT recognition rate test.



Pronunciation and semantic correction

- Koreans can train for pronunciation
- Improve reliability of pronunciation evaluation compared to existing services reflecting Korean pronunciation characteristics
- Various English expressions can be used to prepare TOEIC, TOEFL, etc.
- There is no similar service due to technical difficulty

Various levels and scenarios

- Suitable for elementary students to students who prepare for the TOEFL and TOEIC
- Various scenarios are prepared such as talking about hobbies, celebrating, talking on the phone
- Various paraphrasing expressions

Spoken Dialogue System

SDS Spoken Dialogue System

It is the engine that leads the conversation successfully through the scenario.

This is mainly used in scenarios where a continuous dialogue is required for a specific purpose, and it is possible to generate a dialogue according to the user's intention by grasping context, and post-matter situation. Based on various situations, it catches the intention of the conversation and provides accurate answers.

SDS Spoken Dialogue System

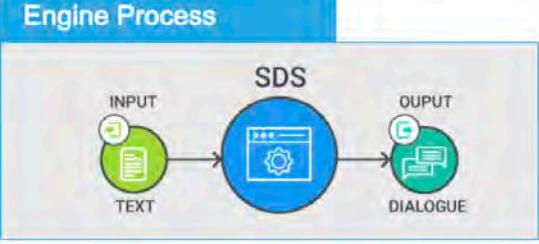


SDS

Spoken Dialogue System

Engine that enables conversation through scenarios. It is used most basically for composing chatbot conversation. It is able to create conversations that match users' intentions by identifying context.

Engine Process

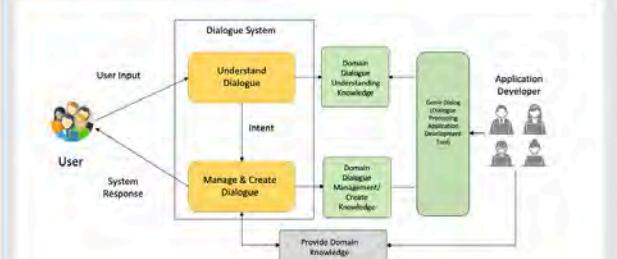


```
graph LR; A((INPUT  
TEXT)) --> B((SDS)); B --> C((DIALOGUE))
```

Engine Features

- It is mainly used in scenarios where continuous dialogue is required with a specific subject, such as money transfer, etc., and the dialogue model is designed and maintained on the engine
- Understand the intent of the conversation based on various features and navigate the answers accurately.

SDS 개념도



```
graph LR; User((User)) -- "User Input" --> DS[Dialogue System]; DS -- Intent --> DDM[Domain Dialogue Management/Create Knowledge]; DDM -- "Provide Domain Knowledge" --> AD[Application Developers]; AD -- "Domain Dialogue Management/Create Knowledge" --> DDM; DS -- "Domain Dialogue Management/Create Knowledge" --> AD
```

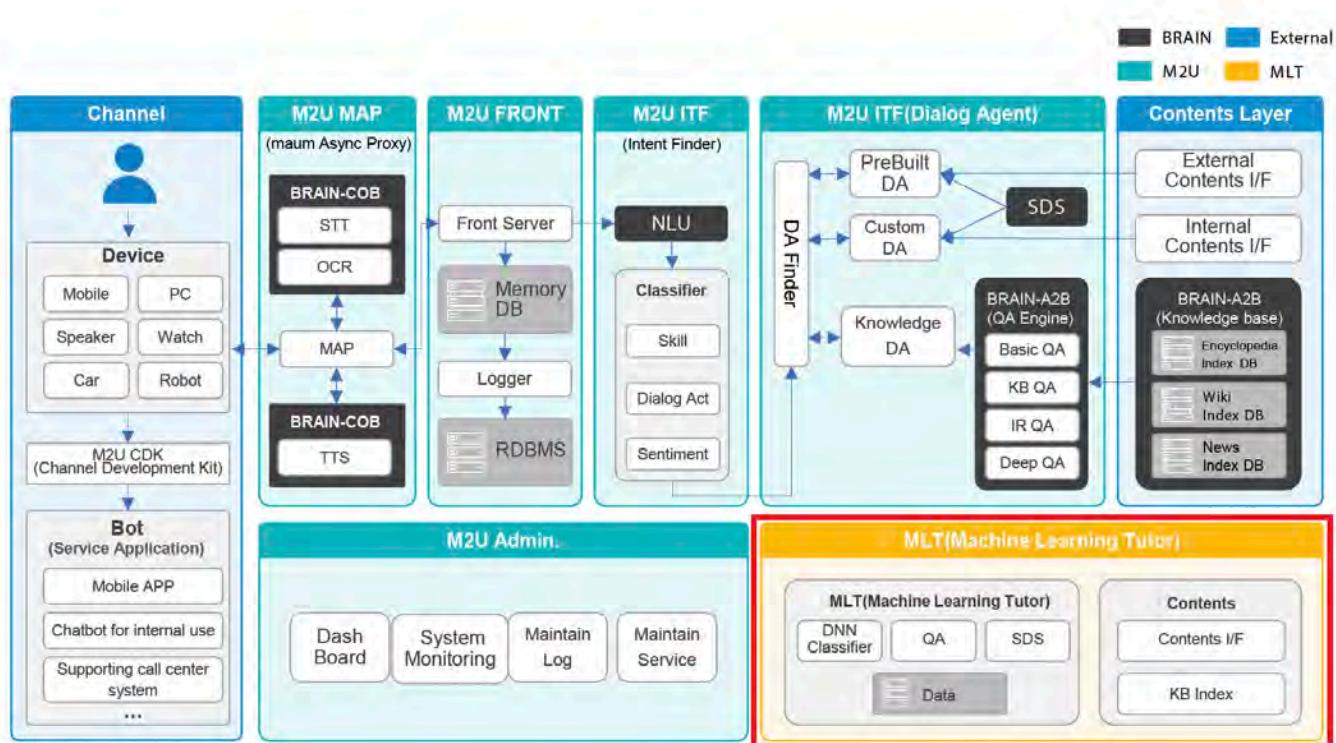
MLT

Products and Services
Applications

Machine Learning Tutor

MLT Machine Learning Tutor is for an individual company that uses maum.ai to improve its performance using its own data. A machine learning platform MLT that improves the performance of the AI platform provides an environment, in which the quality of AI service can be enhanced with stability.

MLT Machine Learning Tutor



The data collection platform is a tool for collecting data to be used for accurate and efficient machine learning. The administrator creates the project, the worker collects the data from the created project, and the inspector views and inspects the work so the systematic data collection becomes possible.

Project Management Screen

The administrator who wants to collect data can create the project. The detailed work that can be selected is divided into text, voice, and image, and detailed work can be added as needed.

The screenshot shows a web-based project management application. At the top, there's a header bar with a logo, the URL 'admin@domain.com', and a 'Using API' link. On the left, a sidebar titled 'Choose project' contains three buttons: 'Text' (white), 'Voice' (blue, currently selected), and 'Image' (white). Below this, under 'Choose detail action', are several options: 'Voice extraction', 'Disabled speech filtering', 'Separate voice sentence units', 'Transcription', 'Voice Recording', and 'Remove noise before and after speech'. On the right, a main panel titled 'Project being created' lists fields for 'Name of Project' (input field), 'Project Category' (input field), 'Detail Action' (input field), 'Due date' (input field), 'Point' (input field), 'Notes and Guides' (input field), and two buttons at the bottom: 'Reset' and 'Create'.

Choose project
- Please select the project category you want to create

Text Voice Image

Choose detail action
- Please select the details you need to proceed in the project:

Voice extraction Disabled speech filtering
Separate voice sentence units Transcription
Remove noise before and after speech Voice Recording

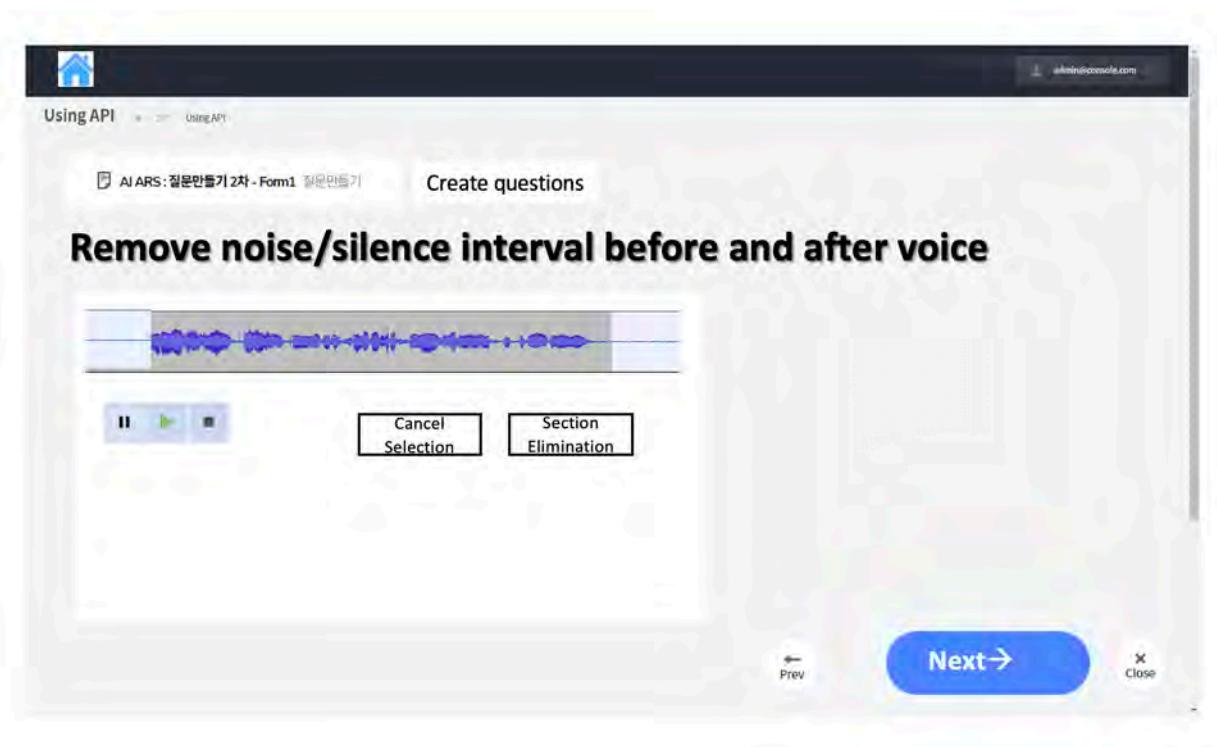
Project being created

Name of Project
Project Category
Detail Action
Due date
Point
Notes and Guides

Reset Create

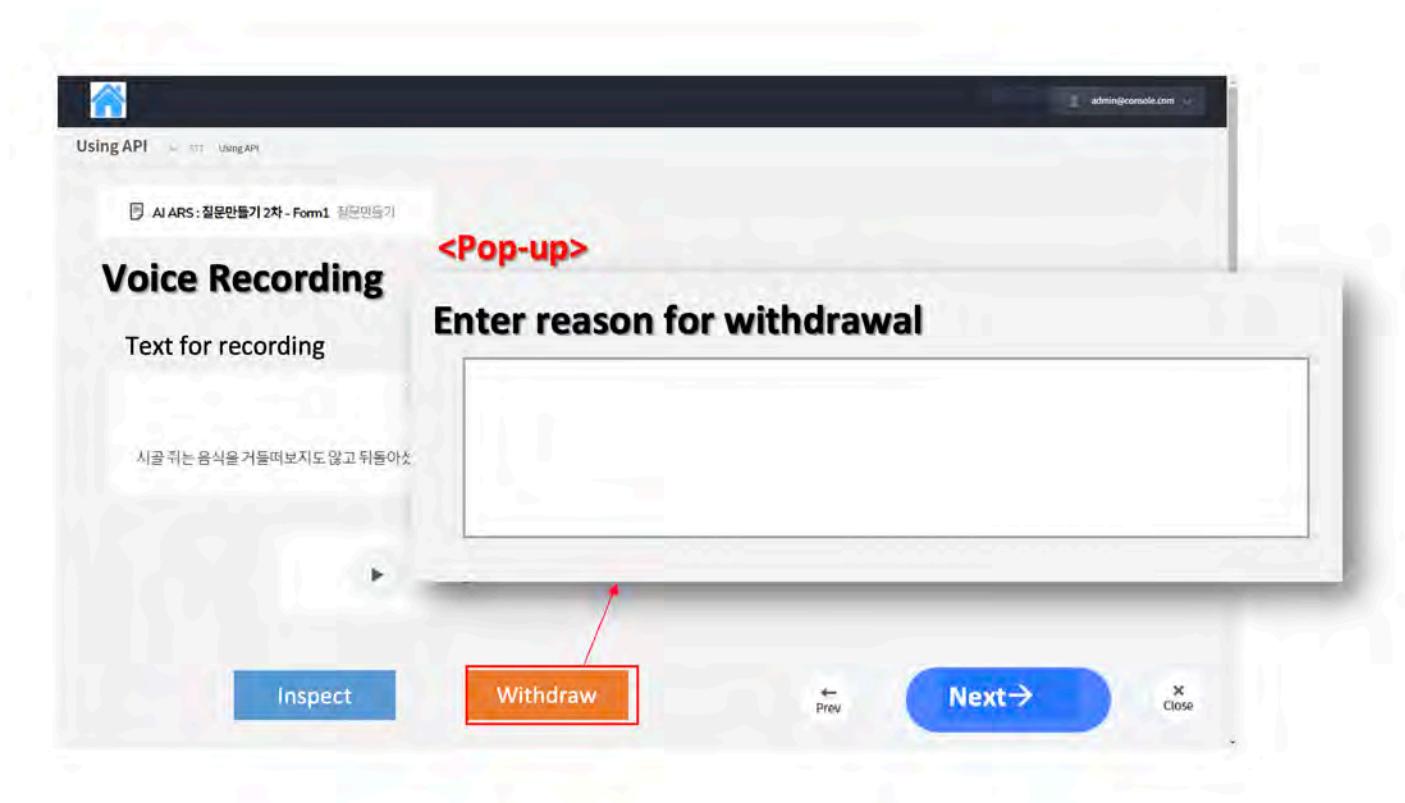
Actual Data Collection Work Screen

The operator clicks on the generated project to collect the actual data



Reason For Withdrawal Input Window Screen

The inspector can view, check or refuse the work done by the worker





Success Stories & Use Cases

3.3 Platform

maum.ai Platform

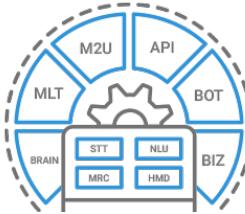
maum.ai is the most evolved AI platform.

The flexible structure, which includes a total of six modules such as Brain Module, provides the best performance. maum.ai can reliably implement various AI services.

It supports powerful AI services in an easy way.

It maintains the latest AI algorithm and increases the competitiveness of the enterprise.

Our Solution, **maum.ai**



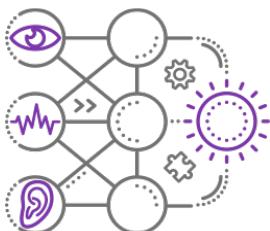
1. maum.ai, an AI platform that can implement various AI services, **maum.ai**

Consisting of a total of six modules (Brain, M2U, MLT, BOT, API, BIZ), maum.ai has a robust structure that can flexibly cope with numerous AI services that companies want. With only one AI in mind, companies can implement any AI services that fit their business direction robustly and reliably.



2. maum.ai, an easy to use AI service by Plug & Play method, **maum.ai**

If you have maum.ai, you can tailor it to any AI service your business wants. You do not need to build each system individually. Instead of a complicated and cumbersome structure due to the individual system construction, it is possible to use various business applications by Plug & Play method with only one platform.

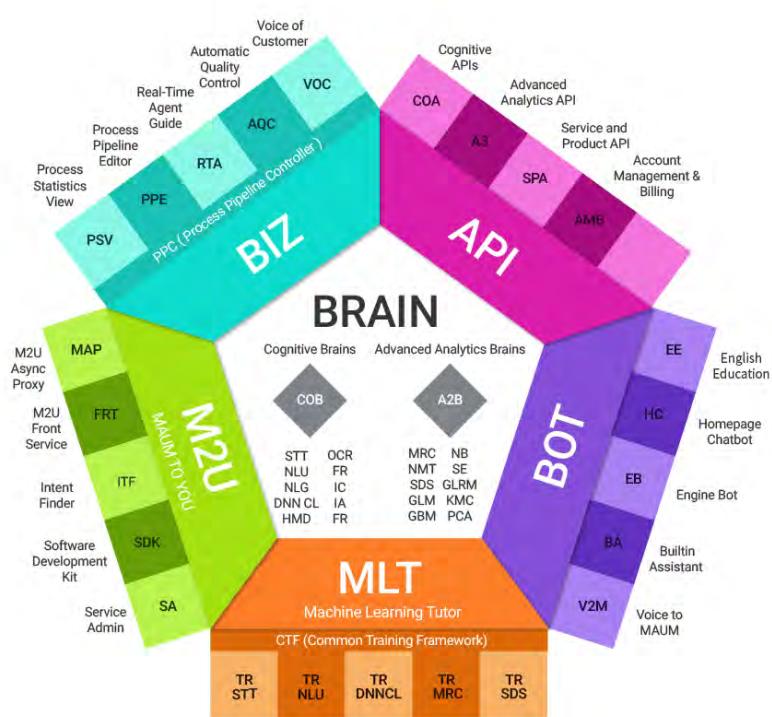


3. maum.ai, rapidly upgraded to the latest AI algorithms, **maum.ai**

On maum.ai, individually packaged AI engines are updated with the latest algorithms without breaking the flow of the entire system. New technologies and new algorithms can keep AI services up-to-date quicker than others without having to update them every time they need it.

AI platform maum.ai's module configuration diagram

All MINDLab's AI solutions and services are built on maum.ai. It has a flexible structure composed of 6 modules including Brain module, MLT, M2U, BOT, API, and BIZ, which enables a powerful AI service.



- **Brain module**

A package of AI engines designed to function independently, and has a structure optimized for applying rapidly evolving AI technology.

- **M2U (maum to you) module**

Handles input and output for various interfaces and device status of the user.

- **MLT module**

Learns machine learning data so that various algorithms are used appropriately.

- **BOT module**

Chatbot module of maum.ai.

- **API module**

Configured to use the maum.ai platform through API requests.

- **BIZ module**

A business application that is designed to be applied to various vertical markets such as voice of customers' analysis, quality control automation, and agent real-time support..

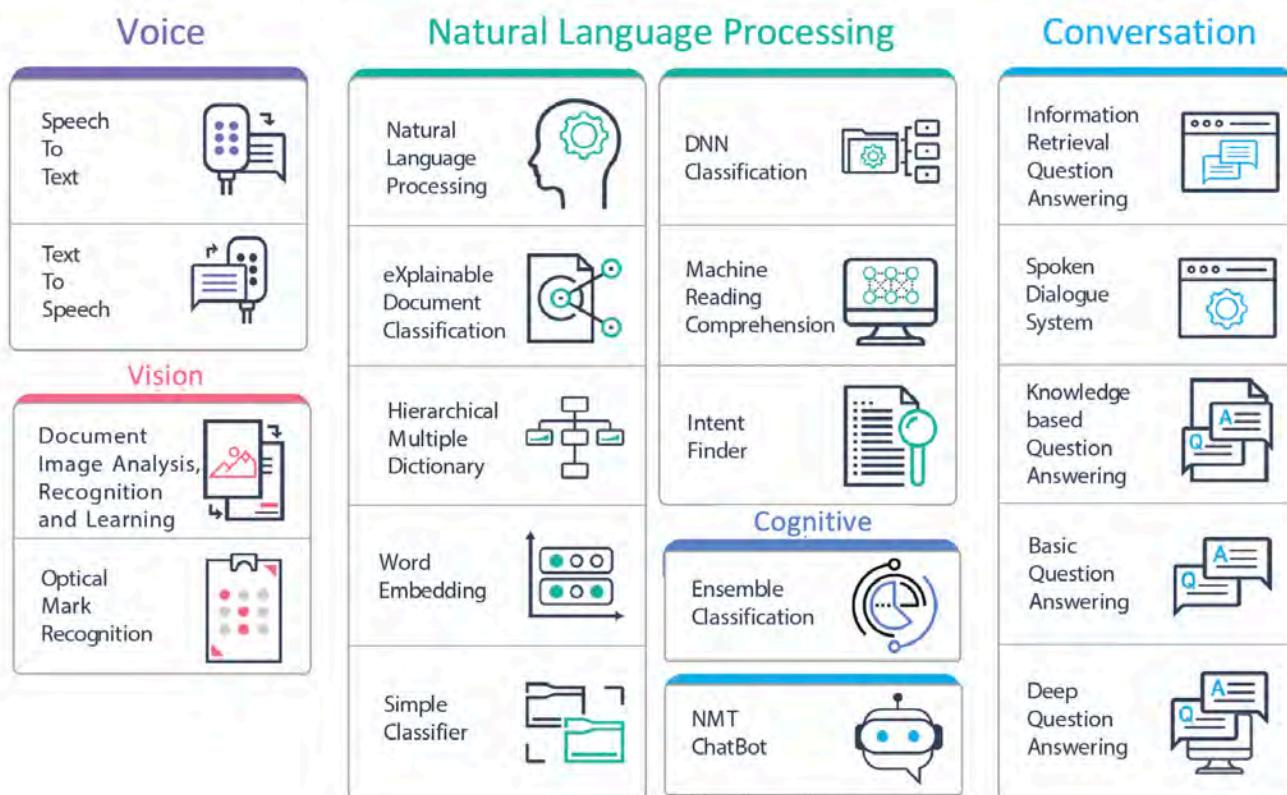
 Success Stories & Use Cases

3.4 Engines

Money • Bills recognition
IRQA • KBQA
WiKi MRC • News MRC • Bank MRC
XDC • NLP • NQA
8K Korean STT • 8K English STT
16K Korean STT • 16K English STT
Korean TTS • English TTS

Artificial Intelligence Engines with MINDsLab

From natural language processing to voice, visual, and knowledge fields, MINDsLab has a variety of artificial intelligence engines.



Engines

The money & bills recognition engine

The money & bills recognition engine is an engine that recognizes visual images.

It uses DIARL and OCR engine to accurately detect and recognize objects
in various types of documents.

It can receive automatic payment of bills or automatic exchange of currency rates
just by taking pictures.

DIARL Document Image Analysis, Recognition and Learning

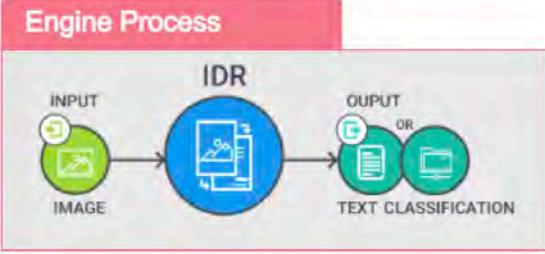


DIARL

Document Image Analysis,
Recognition and Learning

A document processing engine that can detect, recognize, and analyze text on images such as documents, scans, and faxes. DIARL is used in areas where it is necessary to automatically detect necessary information in various images.

Engine Process

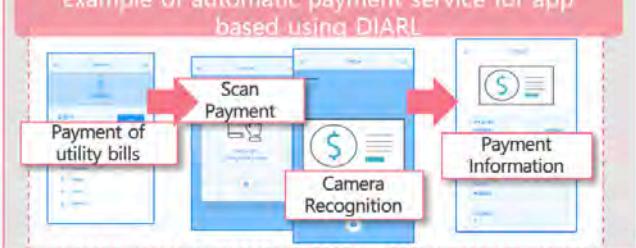


```
graph LR; A((INPUT  
IMAGE)) --> B((IDR)); B --> C((OUTPUT  
OR  
TEXT CLASSIFICATION))
```

Engine Features

- Various objects existing in the document such as **bill unit and type, resident registration numbers, photographs, fingerprints, check boxes, signature boxes, and tables** are detected accurately
- It has a **high recognition rate regardless of noises in the image** such as different types of fonts or distorted fonts in the documents or images.
- It provides web-based learning, detection, analysis, recognition, management UI for user convenience, and each function can be provided as an independent cloud service.

Example of automatic payment service for app based using DIARL



```
graph LR; A[Payment of utility bills] --> B[Scan Payment]; B --> C[Camera Recognition]; C --> D[Payment Information]
```

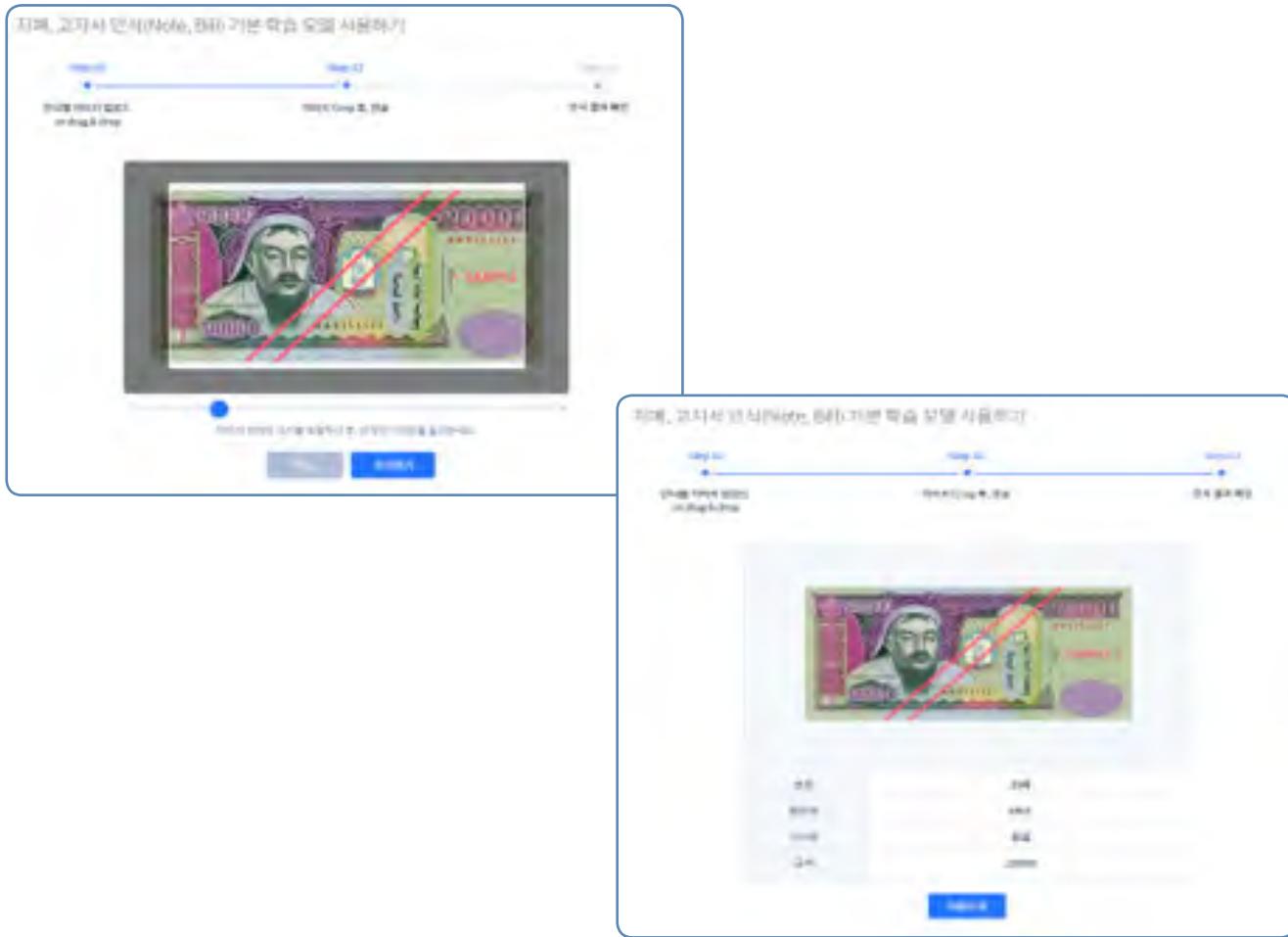
DIARL Document Image Analysis, Recognition and Learning



An engine that correctly recognizes various objects in a document. Distorted videos and various fonts are accurately recognized and provided to customers.

It can be applied to various fields such as converting money, receipts, bills and other informal data into standardized data, automatically paying bills and automatically recognizing receipts.

DIARL [Money Recognition]



DIARL [Money Recognition]

At a glance

DIARL Money Recognition
Document Image Analysis, Recognition and Learning

The diagram illustrates the钱分析 (Money Analysis) process. It shows a document image of a bill being processed by the DIARL system, which extracts the text information (text) from the image.

The flowchart shows the system architecture: INPUT IMAGE feeds into the IDR (Image Recognition and Processing) module, which outputs TEXT.

Features

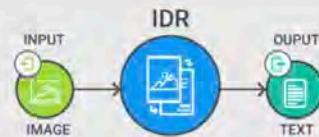
API for monetary recognition that identifies the bill information and unit using the image of a bill.
It is used in the foreign exchange business of commercial banks and has an excellent recognition rate even with various forms of fonts and colors of money.

Demo Site is Coming

DIARL [Bill Recognition]

At a glance

DIARL Bill Recognition
Document Image Analysis, Recognition and Learning



Features

API that allows you to see the relevant information in the image of a bill. It can be used for automatic payment service through application and can increase the processing speed and efficiency of business.



Demo Site is Coming

IRQA is a Wikipedia-based QA engine that provides all of the knowledge in the world. IRQA, equipped with ETRI's exo-brain engine which won the EBS quiz show, is able to grasp user questions and accurately identify the correct type of answer by using the world's best natural language technology.

IRQA can be widely used not only for chatbots but also for interactive educational content and knowledge portals.

MINDsLab IR QA [WiKi](#)

IR QA



The IRQA API service is a Wikipedia-based question and answering API service that provides all of the knowledge in the world. You can implement the most convenient artificial intelligence service for knowledge communication by receiving various knowledge information in the form of a conversation. IRQA is equipped with ETRI's EXO Brain engine which won the EBS scholarship quiz.

The IRQA reflects the technology with the world's highest level of understanding of natural language, which includes understanding the grammar and meaning of sentences and extracting time and space information.

MINDsLab API Service

MINDsLab IRQA API Service - Wikipedia

At a glance

IR QA Information Retrieval Question Answering

사용자 질문 > 답변제시

World-class natural language skills help you accurately identify user questions and the type of answers. IRQA can be widely used not only for chatbots but also for interactive educational content and knowledge portal.

Demo site is available

Features

Wikipedia-based IRQA API service that provides conversation knowledge in various fields such as history, culture, science, entertainment, and sports.

KBQA

Knowledge Base Question Answering

KBQA is a Q&A engine that understands user speech accurately and provides immediate answers concisely. Through the triple-form knowledge base, the answers are given instantly without inference process, and only the pre-established answers are presented in a certain structure form, so it is possible to provide the answers with high accuracy. In addition, the response time is faster and the server cost is cheaper than the inference based query response engine.

KBQA Knowledge Base Question Answering

KB QA

Q&A engine that understands the user's speech and provides instant answers in the form of a short answer. By building a triple-form knowledge base, it is possible to respond immediately without inference.

Engine Process

```
graph LR; A((QUESTION)) --> B(SEMANTIC TRIPLE); B --> C(KB QA); C --> D(ANSWER)
```

Engine Features

- Can be applied to **chatbots that require only accurate answers**, because only the answers that have been established ahead of time in a stable structure are presented.
- Compared to other query engines based on inference, the **response time is much faster and the costs are less**.

① Query Term Analysis (NLU)
What is the height of Baekdu Mountain?
Who is the height of Baekdu Mountain?
2,744m

② Semantic Triple QA

Entry	Attribute	Value
Baekdu Mountain	Type	Stratovolcano
Baekdu Mountain	Final Eruption	1925
Baekdu Mountain	Height	2,744m
Baekdu Mountain	Feature	One of the tallest and the most active

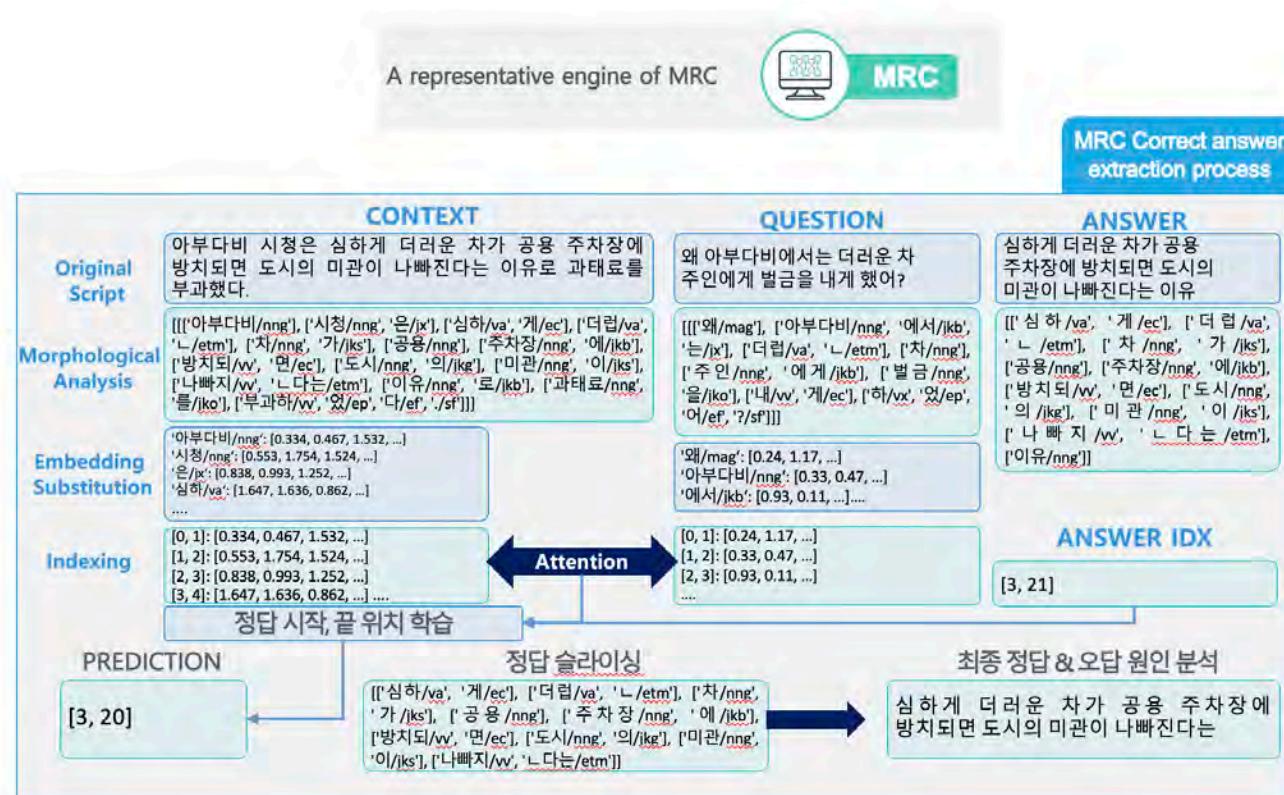
③ Unique Instant Answer Output
2,744m

Machine Reading Comprehension

Machine reading Comprehension[MRC](#) algorithm is a high-level technological system which reads the given text and finds the final answer. MINDsLab is leading the development and commercialization of MRC in the global market.

MRC Machine Reading Comprehension

Machine reading Comprehension (MRC) algorithm is a high-level technological system which reads the given text and finds the final answer. MINDsLab is leading the development and commercialization of MRC in the global market.



MRC - for News

MRC technology is applied to techniques to read news and find answers in a given text. Entering text finds the correct answer to the various questions that exist in the text and provides it to the user.

When the MRC algorithm is applied to the enterprise, various business possibilities arise. It can be applied to texts such as databases of companies or documents of companies, and various applications are possible.

NLP

Natural Language Processing

NLP is a process of converting human language into machine language, and it is a basic technology of artificial intelligence which expresses phrases that are used in daily life into a form that the computer understands.

The performance of all human languages based AI ultimately depends on the NLP. MINDsLab is implementing various engines and services through the highest performance NLP.

NLP Natural Language Processing

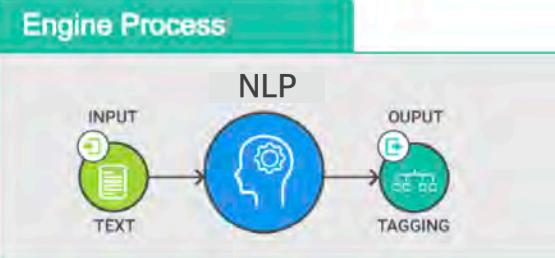


NLP

Natural Language Processing

Basic skill of artificial intelligence that expresses common phrases into a certain form so that the computer can understand the words we actually use. It is widely used for all language-based artificial intelligence services.

Engine Process



```
graph LR; A((INPUT  
TEXT)) --> B((NLP  
[Head with gear icon])); B --> C((OUTPUT  
TAGGING))
```

Engine Features

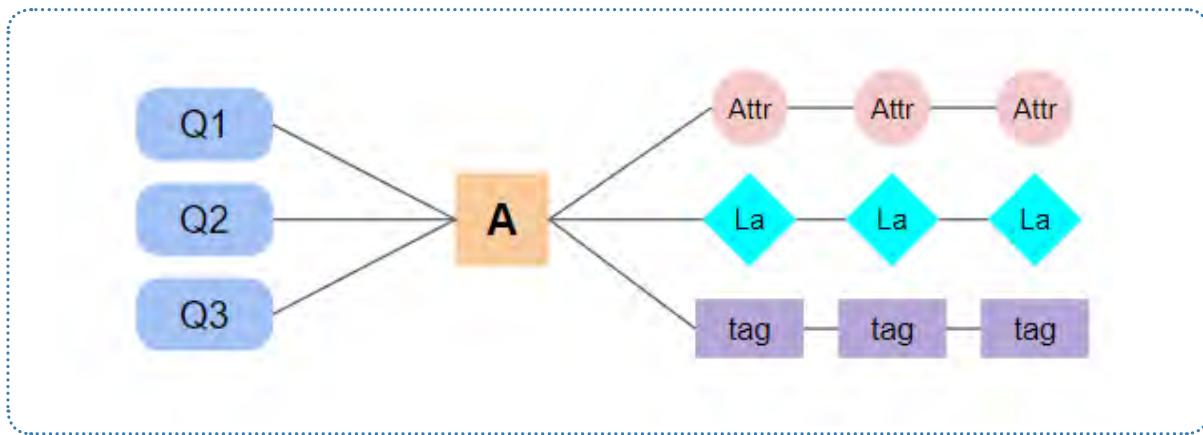
- Natural language processing engine whose **stability has been secured through tests** in various fields.
- Based on various language resources and technologies of Seo-jong plan corpus of National Korean Language Institute, and global research institutes, it shows **robust natural language processing performance in Korean**.
- With the **world's largest classification system** and the access to the user's dictionary, MINDsLab's **NLP can respond effectively to newly coined terms**.

Natural Questions - Answering

NQA is a QA engine for finding the right answers to different types of questions. There is a lot of information and questions linked to the answer, so you can find the answers you want at once, or you can try them in multiple ways to infer the answers you want.

NQA Natural Questions - Answering

Natural Language Processing



- There is a lot of information and questions linked to the answers, so you can find the answers you want at one time (Score).
- A QA system that searches for related answers to questions entered in the natural way of the language, narrows candidates through user selection based on common layers. Or if there are multiple candidate answers it finally selects the answers you want.
- Try the question multiple times to find the answer you want (Layer selection).
- When constructing data, NQA provides indexing and modeling hierarchically using layer / tag / attribute / ner in addition to question / answer index.

It supports various indexes and searches such as layer / tag / attribute / ner, rather than simple search engine answers.

- While searching, in addition to question / answer search, it supports layer / tag / attribute / ner search to narrow the answer by selecting layer if there are multiple candidate answers.

eXplainable Document Classification

XD**C** is the latest deep-learning based document classification engine that can provide reasons for text classification results.

It overcomes the weaknesses of existing deep-learning-based engines, which can classify only short-length texts, and shows excellent performance for accurately classifying long-length documents.

In addition, there is no limit to the number of classification categories, so more sophisticated classification is possible.

XDC eXplainable Document Classification

It is the algorithm that is the basis of the document classification engine XDC, ‘the artificial intelligence that can describe’. Since the ‘Exploding Gradient’ phenomenon can be prevented so that there is no limit to the number of classification categories, classification can be happened without limit for more than ten categories.

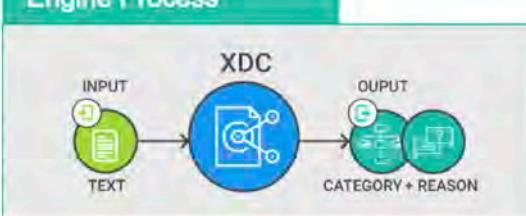


XDC

eXplainable Document Classification

A recent deep-learning-based document classification engine that can provide reasons for text classification results. It solved the Black Box problem of deep-learning unknown results. Unlike existing classifiers that can only classify short-length texts, they have excellent performance in classifying long-length documents correctly as well.

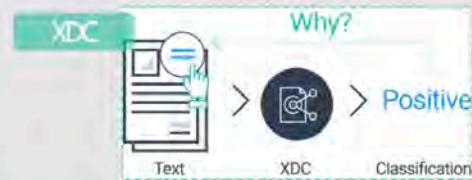
Engine Process



The diagram illustrates the XDC engine process. It starts with an 'INPUT' circle containing a document icon labeled 'TEXT'. An arrow points from this to a central 'XDC' circle, which contains a speaker icon. Another arrow points from the 'XDC' circle to an 'OUTPUT' circle containing a document and a speech bubble icon labeled 'CATEGORY + REASON'.

Engine Features

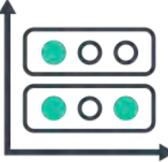
- Explainable artificial intelligence, XDC, is the most recent algorithm-based document classification engine that overcomes the weaknesses of existing deep-learning-based engines that could not provide reasons for classification results.
- You can get a variety of **insights through the data**, as you can see the reason for the result of the classification, and you can get inspiration for the results or find improvements.
- There is no restriction on the number of classification categories.



The diagram shows the classification process: 'Text' leads to 'XDC', which leads to 'Classification'. A callout box labeled 'Why?' points to the 'XDC' step. The 'Text' step has a document icon. The 'XDC' step has a speaker icon. The 'Classification' step has a document and speech bubble icon.

Word Embedding

Word embedding is a representative method of expressing words as vectors in the field of natural language processing.



Word Embedding

It is a representative engine of the natural language processing field which expresses the similarity of each text as a multi-dimensional vector for the computer to understand. It can be applied to services to recommend similar words.

Engine Process



Engine Features

- It is a **multi-dimensional vectorization** engine that allows a computer to recognize a word and to determine the similarity between words.
- Because similar words are clustering, you can easily **identify similarities and characteristics between words**.

Word Embedding Result

올해/Noun
따르다/Verb
지난해/Noun
월/Noun
오다/Verb/Noun
지난/Noun
이후/Noun

272

Hierarchical Multiple Dictionary

Hierarchical Multiple Dictionaries are used to detect specific patterns or events based on rules.

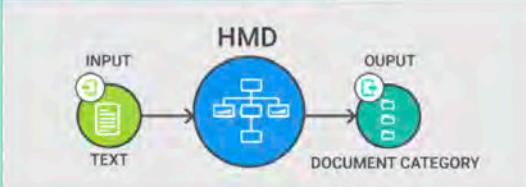


HMD

Hierarchical Multiple Dictionary

An engine that can detect patterns or classify sentences through dictionaries built by users in units of random morpheme. Because it allows detailed intent classification on one sentence, it improves accuracy when used in text analysis.

Engine Process



The process starts with an **INPUT** **TEXT** (represented by a document icon). This input goes into the **HMD** (represented by a blue circle containing a hierarchical tree icon). The output from the **HMD** is a **DOCUMENT CATEGORY** (represented by a list icon).

Engine Features

- Recommended for **categorizing by rule-based method**.
- Ideal for **simple keyword searches or tasks that need to be classified correctly**.
- Used to **clarify predefined data and data with less variability**.

Simple Classifier

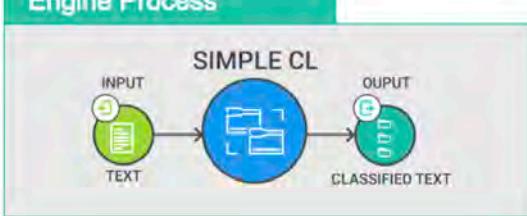
Simple classifier is an engine for classifying explicit intentions within a fast computation time using regular expressions.



Simple Classifier

It is a simple rule-based intent classifier for almost all chatbots. If the user's intent is clear, the engine finds and classifies the vocabulary in a given sentence. The performance of the engine is much more accurate and faster than other engines.

Engine Process

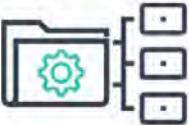


Engine Features

- As an **intent classifier that uses regular expressions**, it is a basic classification engine that finds vocabulary based on sentences and classifies intent by rules.
- Frequently used to classify categories by prioritizing key contents in the beginning steps of chatbot systems.
- A core engine that performs **overall intent classification prior to the DNN classifier**, and **plays an essential role in almost all chatbots**.

DNN Classification

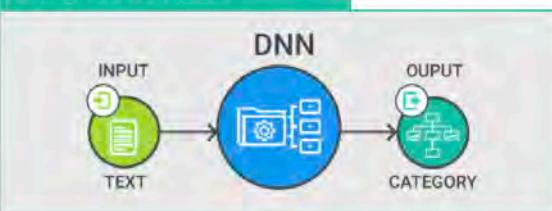
DNN classification engine is a classifier engine which is constructed using deep-learning data and in-depth neural networks.



DNN Classification

Deep learning based classification engine that understands the contents of a sentence when the user's intention is unclear or complex and automatically classifies it into a specified category. Various categories can automatically be classified with more than 90% accurately.

Engine Process

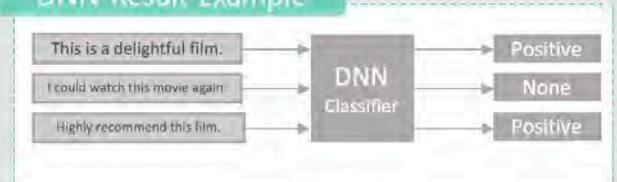


The diagram illustrates the process flow: INPUT TEXT → DNN → OUTPUT CATEGORY.

Engine Features

- Can be used in a variety of fields; e.g., news with 54 categories.
- Even without learning the keyword dictionary in advance, it is **useful for maintenance tasks because it functions by learning the whole sentence.**
- With over 11,000 learning data, word-embedding is performed in 50 dimensions.

DNN Result Example



INPUT Sentence	OUTPUT Category
This is a delightful film.	Positive
I could watch this movie again.	None
Highly recommend this film.	Positive

Intent Finder

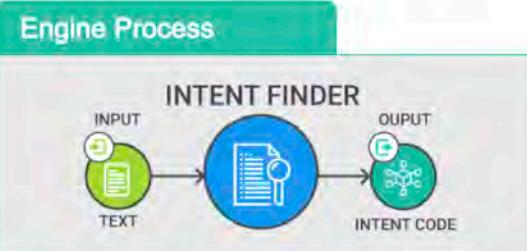
Intent Finder is a classification engine for analyzing the intentions of the user and continuing the conversation.



Intent Finder

Engine that can understand and classify users' intentions. It helps you to find the engine that will give you the most appropriate answer by identifying the various features that appear in the conversation, user profile, and past history.

Engine Process



Intent	Unified Intent Classification Attribute					Information extracted	Related Intent (1/2)	Related Intent (2/2)
	Domain	Role	Object	Location	Key-words			
Question about location	general	Where	addr	nearest	Location	plane	- Using p. address - Re-instr. - Passen- - vehicle re- - generation	Question about transpor- tation mode
Question about destination	general	What	Delivery	addr	nearest	Rail	- Location question - Using p. report...	none

Example of Intent Finder

MRC Machine Reading Comprehension

MRC is a technique to find the correct answers in a document by understanding the overall context in a given document and question.

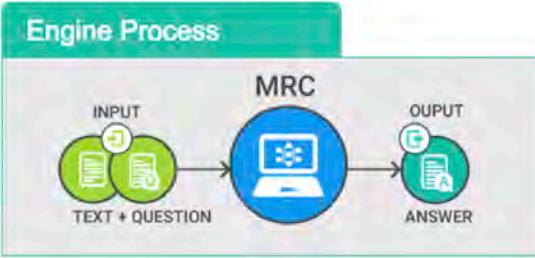


MRC

Machine Reading Comprehension

A deep-learning algorithm that any machine can instantly read and understand. Even if the machine does not learn certain contents in advance, it will read the text that is given to it and find the most appropriate answer.

Engine Process



Engine Features

- An artificial intelligence engine specialized in unstructured data that can instantly read any amount of text and find the most accurate answer.
- Since it can quickly understand paragraphs and grasps the facts, it is being used as the most popular technology in the field of chatbots and knowledge portals.
- Reinforce learning technology enhances readability by allowing machines to create learning data on their own as self-learning entities.
- MINDsLab's patented technology allows users to find answers in remodeling articles that are divided by numbers, special characters, or in tables.

8K Korean - English STT

Speech recognition converts human speech into text.

8K means 8,000 signal sampling per second and the most well known type is the voice carried through the telephone network via cables. The voices of customers at call centres can be analyzed by converting them into text using STT services. The performance of the STT service in Korean and English out of the 8 different language. STTs that MINDsLab owns is proven through the projects with call centres of Korean and global major companies.

STT Speech to Text

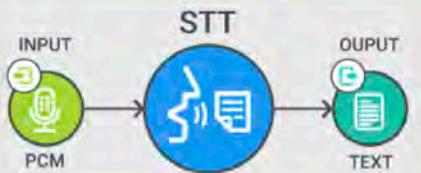


STT

Speech to Text

It is a representative engine of the speech field that can convert human voice to text. It can accurately recognize Korean and English.

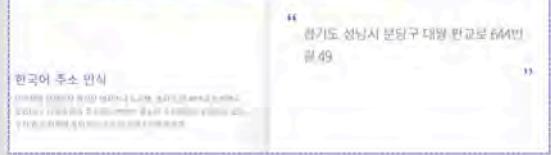
Engine Process



Engine Features

- Deep learning based STT engines which applied **Deep neural network(DNN)** and **high-speed noise processing**.
- A universal speech recognition engine that is **proved to be superior to other speech recognition engines** and is actually used in various industrial fields.
- Since it has learned the call center data by field, it can be used immediately according to any field of interest.

Example of Korean STT



MINDsLab Voice Recognition STT - Korean Call Center

At a glance

STT Korean Call Center SPEECH TO TEXT



Features

MINDsLab's speech recognition engine utilizes ETRI's latest deep-learning STT engine technology, which has the best voice recognition technology in Korea, to receive user's voice in any environment. A little adaptive learning can dramatically increase recognition rates.



*It can be customized to various call center fields such as manufacturing, finance, and communication.

MINDsLab Voice Recognition STT - English Call Center

At a glance

STT English Call Center
SPEECH TO TEXT

```
graph LR; INPUT((PCM)) --> STT[STT]; STT --> OUTPUT((TEXT))
```

Features

STT engine applied to Speech Recognition API for MINDsLab English Call Center. Thousands of hours of English speech learning data have been learned in advance to understand various tones of English voices. Check out the proven English speech recognition API which has been applied to real global manufacturers' call centers.

*It can be customized to various call center fields such as manufacturing, finance, and communication.

16K Korean - English STT

Speech recognition converts a person's voice into text.

16K means signal sampling of 16,000 times per second.

It can be used for device control with human voice by converting high quality voice used in mobile devices or smart speakers into text.

Products and Services

Engines

TTS

Korean, English

MINDsLab's Speech Generation TTS engine is based on deep learning technology, which creates a natural voice just like the actual voice even including the speech habit from the actual speaker, making it difficult to distinguish from the original.

It is possible to extract characteristics using only a very small amount of voice data, and it can be utilized for various services that require a voice such as automated AI outbound call service and vocaloid.

MINDsLab's Speech Generation [TTS](#)



The MINDsLab's Speech Generation (TTS) API service is based on deep learning technology that emulates the speaker's voice, speech, and speech habits, which are very natural. It is hard to distinguish the AI speaker's characteristics from the actual human voice. Since the characteristics of a speaker can be extracted using only a small amount of voice data, anyone can easily synthesize or create an AI voice.

Using the MINDsLab's Speech Generation (TTS) API, you can use it as an automated AI outbound call service or vocaloid instead of using an actual agent. You can also customize it for various other fields.

MINDsLab's Speech Generation TTS

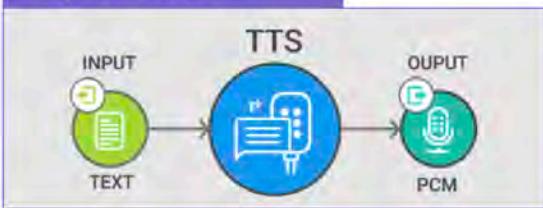


TTS

Text to Speech

Speech generation engine that converts text into human voice. It can synthesize and generate speech.
Recommended for automated AI outbound call service, vocaloid and other services that utilize voice.

Engine Process



Engine Features

- By using the actual speaker's characteristics such as their voice, accent, and speech habits, users can create a **natural voice that is almost identical to the actual speaker**.
- By utilizing the latest deep-learning algorithms, **it enables voice synthesis and generation with very little data**.
- Users can implement it to AI Customer Center, by replacing recurring calls with automated AI outbound call service and vocaloid.

 Success Stories & Use Cases

3.5 Data

MRC Data

CCTV abnormal behavior data

STT Data

TTS Data

MINDsLab Data

MINDsLab supports data-driven business innovation through learning data.

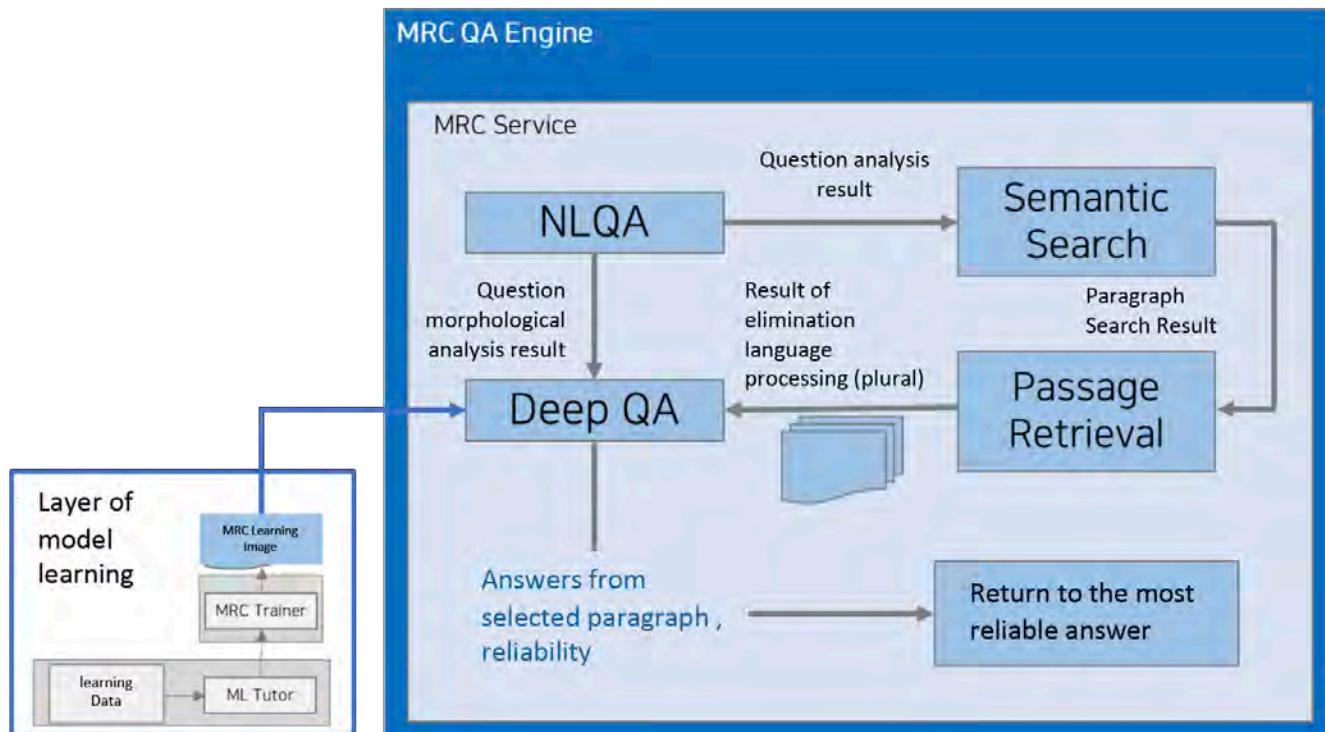
 HMD	Data Korean Multi-Text Pattern Detection: 7 domains including Financial Wiki, Bible, News Briefing, Kids English multi-text pattern detection	 NLP	Data Deep Learning Korean Natural Language Processing Deep Learning English Natural Language Processing
 DNN	Data News Automatic Classification Korean Language Sentiment Automatic Classification English Sentiment Automatic Classification Domain Classification Identify and Classify Questions' Intentions DNN Legacy Classification	 Embedding	Data Word Vectorization Engine Learning Data Sentence Vectorization Engine Learning Data Paragraph Vectorization Engine Learning Data Document Vectorization Engine Learning Data

MRC Data generates learning data through Q-A-P (Question-Answer-Passage) process. After analyzing the text in the NLU process, a question is created to find the correct answer.

Data is generated and displayed to the user in a manner as to indicate the location of the answer corresponding to the question.

MRC QA

The process of the MRC engine is as follows.



MRC Data Set Production Process

MRC Data is created by coming up with a question that can find the correct answer in the text and marking the location of the answer that corresponds to the question.



- Generate learning data by Q-A-P process (Question-Answer-Passage)
 - Classify categories and IDs to get KEY values.
- SQuAD data is provided by Stanford University in the United States. In Korea, data needs to be produced independently.

MRC Learning Outcomes

The screenshot displays a JSON object representing a Multiple-Choice Reading Comprehension (MRC) task. The object is structured as follows:

```

{
  "paragraphs": [
    {
      "context": "[...]", // Redacted context
      "text": "Main Text"
    }
  ],
  "question": "Question", // Question section
  "answer": "Answer", // Answer section
  "answers": [
    {
      "id": "c0_sports_25-1",
      "text": "[...]", // Redacted question text
      "start": 0,
      "end": 4, // Answer index (Start/End)
      "index": 1 // Answer index
    },
    {
      "id": "c0_sports_25-2",
      "text": "[...]", // Redacted question text
      "start": 0,
      "end": 4, // Answer index (Start/End)
      "index": 2 // Answer index
    }
  ]
}

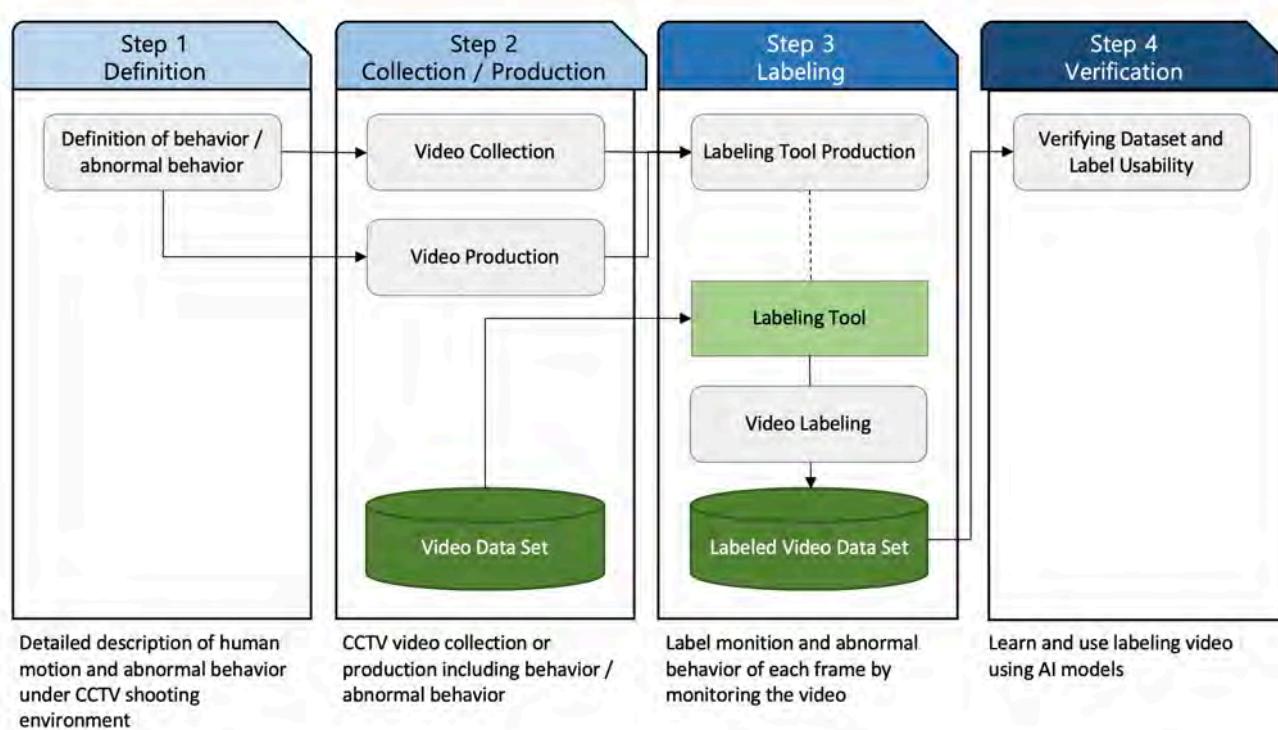
```

A green arrow points from the "Answer" index value "1" in the first answer object to the "Answer Index (Start/End)" label.

- Analyze the text through the NLU process.
- After analyzing the question, analyze the part related to the correct answer.
 - Correct indexing of the start and end points of the embedded sentence.

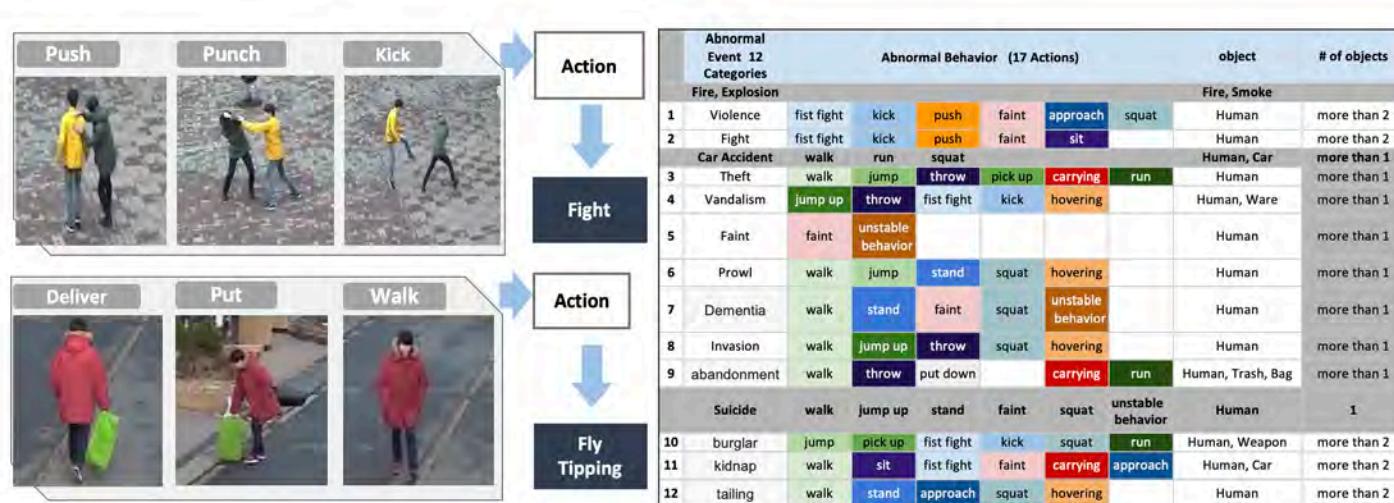
The abnormal behavior image is constructed through the definition step, the collection / production step, the labeling step, and finally the verification step. It is possible to learn the abnormal behavior data by collecting the flow and the relationship each data.

Abnormal behavior CCTV image data construction process



Definition of abnormal behavior (1)

By labeling in frame (Action), the flow of objects and actions in relation to one or more actions can be known in chronological order. This means that it is possible to obtain a wide variety of data to derive one or more behaviors by collecting the flow and relationship of a large number of objects and actions, so the learning becomes possible.



Definition of abnormal behavior (2)

MINDsLab has developed a comprehensive list of behavior and anomalous behavior through a survey on a wide range of data such as Global Open Data, KISA, CCTV, Suwon City, and so on.

The diagram illustrates a process flow from 'Human Behavior' to 'Abnormal Event' and finally to 'Final Abnormal Behavior'. A vertical blue bar on the left is labeled 'Human Behavior'. To its right is a large matrix divided into three main sections: 'Action' (top row), 'Abnormal Event' (middle section), and 'Final Abnormal Behavior' (bottom section). The 'Action' section lists various human movements. The 'Abnormal Event' section lists various types of events. The 'Final Abnormal Behavior' section lists numbered items corresponding to the events in the middle section. A blue arrow points from the 'Abnormal Event' section towards the 'Final Abnormal Behavior' section.

Action		Abnormal Event			Final Abnormal Behavior
Global Open Data		Open Data	KISA	Suwon City	
Human Behavior	Walking	Fire, Explosion	Arson, Fire	Fire, Explosion	arson, fire, explosion
	Jumping	Violence		Violence	1 violence
	Push	Fight	Fight	Fight	2 fight
	Sit	Traffic Accident		Traffic Accident	3 car accident
	Standing	Theft		Theft	4 theft
	Punch	Public Property Damage	Faint	Public Property Damage	5 vandalism
	Kick	Faint	Prowl	Faint	6 faint
	Fallen		Invasion	Dementia	7 prowl
	Hovering		Unauthorized Speculation		8 dementia
					9 invasion
Daily movement		Prowl		Attempted Suicide	10 abandonment
Labor		Burglar			11 suicide
Sports Action		Kidnap			12 burglar
Interaction (handshake, embrace)		Tailing			13 kidnap
		Abuse		Dating Violence	14 tailing
		Shooting			

Data

STT Data

The STT learning data consists of a pair of transcription files, each of which receives a speech signal file and a sound as text. The result of the transcription includes not only symbols or Arabic numbers, but also phonetic writings.

For example, "1st class" is transferred to "first class".

TTS Data

Data

Korean, English

TTS data is created by recording a pair of text documents and voice files in sentence units.

MINDsLab has a large number of files recorded while the speaker reads the script. According to the speaker, there are announcers, child male voice actors, child female voice actors, call center counselors, the voice of Pororot, etc. According to the nature of the text, it holds data such as information relating to the call center, senior care counseling, or the Bible. It is possible to generate voices of celebrities or animated characters with a small amount of data.



Success Stories & Use Cases

3.6 Algorithms

The Latest Cutting-Edge AI Algorithms

The latest AI algorithms from MINDsLab, which are leading innovation in each field

MINDsLab's technology, which provides intelligent solutions across the industry and leads innovation, incorporates the latest and most reliable artificial intelligence algorithms.

Language Intelligence Algorithm	Applied Technology	Visual Intelligence Algorithm	Applied Technology
RNN Encoder-Decoder for Statistical Machine Translation	▪ MRC	Optical Character Recognition	
RAE (Recursive Auto-encoder)	▪ Word Embedding	Fingerprint / SSN / Checkbox Recognition	
CNN (Convolutional NN)	▪ Word Embedding, MRC	Note Recognition	▪ DIARL
LSTMs(Long Short Term Memory Units)	▪ STT	Document Structure Analysis	
GRUs(Gated Recurrent Units)	▪ DNN	Document Classification	
MRC	▪ MRC	Object Detect	
XDC	▪ XDC	Object Recognition	
Deep Learning Chatbot	▪ Chatbot	Face Recognition	▪ Video Analytics
Object Tracking		Object Classification	
		Video Search	
Smart Factory Algorithm	Applied Technology		
IoT Data Analysis			
IoT Data Estimation	▪ MaAL		
IoT Data Anomaly Detection			

Algorithms, Currently in Development

■ CNN-based STT(Speech to Text)

End-to-End deep learning based STT that can be trained only with voice-text dataset

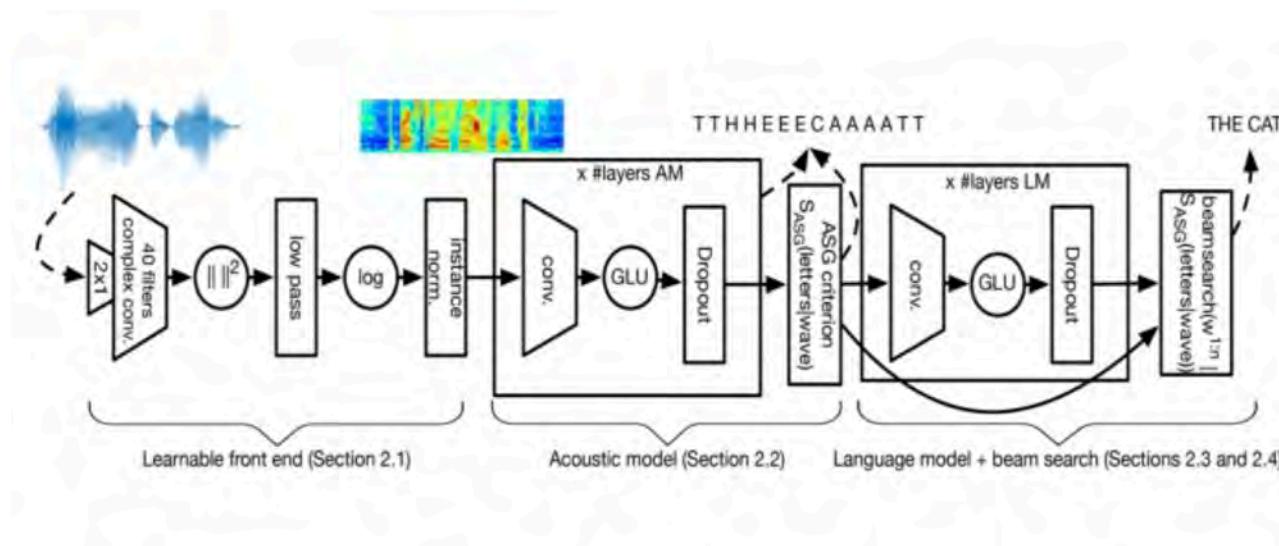
Until the adaptation of deep learning, professionals in statistics and phonetics had to study the characteristics of the voice and handpick significant features. Often, however, a set of features handpicked by experts for a language could not be used for a different language. End-to-End deep learning based STT presents a breakthrough with superior accuracy and easy adaptability that only requires a set of characters in order to adapt to a different language.

Parallel processing of voice with CNN-based STT

Previous STT deep learning algorithms used LSTM or RNN. Due to the serial nature of LSTM and RNN, such algorithms suffered from staggeringly low throughput. In contrast, the parallel nature of CNN allows for a process that is 10x faster than the older algorithms.

Dramatic throughput acceleration with Flashlight DNN framework

Unlike other CNN-based STTs which use DNN Frameworks built with high-level script languages like Python, our STT uses Flashlight built with C++ programming language. Lower overhead and compilation process of C++ provides throughput orders of magnitude higher than Python-based algorithms.

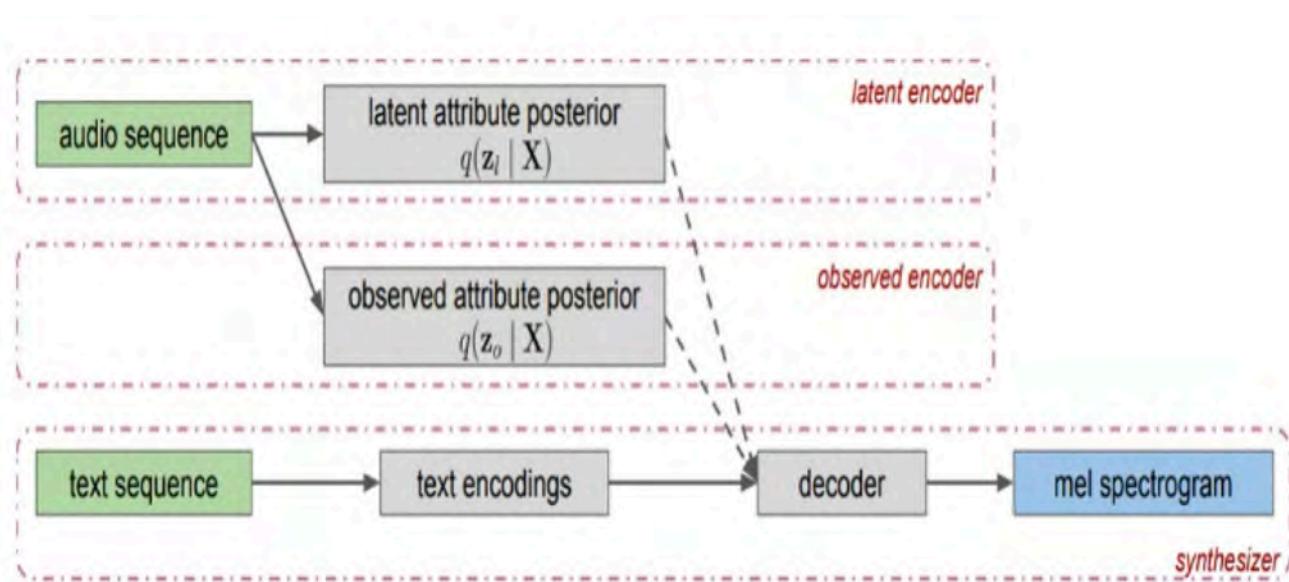


Source: N. Zeghidour et al., “Fully convolutional speech recognition,” arXiv reprint arXiv:1812.06864

■ Advanced TTS - Style Transfer and Continual Learning

Style Transfer extracts a unique vector of an individual's voice

Style Transfer extracts a unique vector of an individual's voice that encapsulates all of the characteristics (unique intonation, emotion, accent, and pronunciation) necessary to reproduce the individual's voice. By utilizing this style vector, we provide TTS that can emulate the style and tone to a level that makes it indistinguishable to the human ear. Furthermore, by manipulating the style vector, we can generate speech with pronunciations ranging from that of a news presenter to an ordinary person's voice.



Source: W. N. Hsu et al. Hierarchical generative modeling for controllable speech synthesis. arXiv preprint arXiv:1810.07217

Add a new voice with ease by using Continual Learning

Previously, after having trained 100 people's voices with the Multi-speaker training method, the algorithm had to be trained all over again with 101 voices in order to add a single new voice . If we simply train with the new person's voice, other 100 voices that it had previously learned to speak became obsolete. However, with the adaptation of the Continual Learning method, we can now teach the network to speak a new voice without having it relearn all the voices it had previously learnt.

■ Voice SeparationTechnology

Automatic recording service with speaker diarization

The biggest challenge of recording meetings or calls is speaker diarization. STT engines understand what is being said, but not who it is spoken by. To tackle this challenge, we have implemented speaker diarization with 3 engines: 1) Speaker Verification, 2) Speaker Diarization, and 3) Voice Separation.

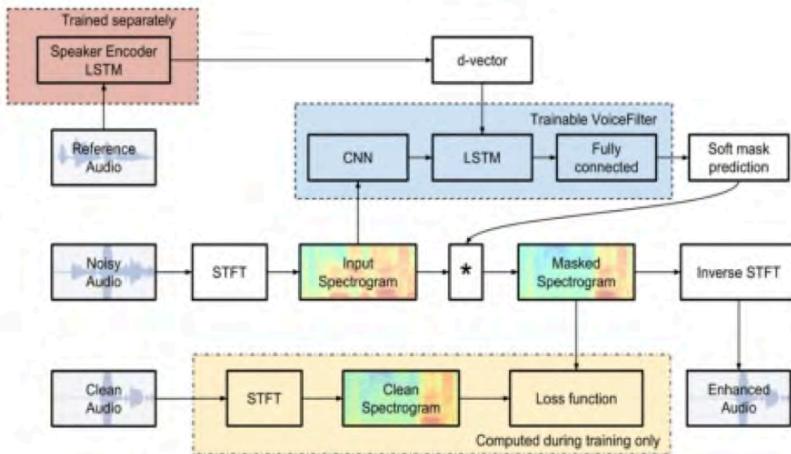
Discern registered voices from unregistered ones with Speaker Verification

Speaker Verification engine extracts a unique speaker vector from a voice. The speaker vector is generated such that the same speaker's vector is closer and a different speaker's vector is further apart. It is typically utilized in verifying if the speaker's voice had previously been registered or separating each person's voice from a conversation involving many speakers. Naturally, it is a crucial component of an AI speaker that only respond to the registered user's voice. Notably, the engine can tell apart a new unregistered voice from a registered one without requiring any additional training.

6. Acknowledgements

The authors would like to thank Seungwon Park for open sourcing a third-party implementation of this system.² We would like to thank Yiteng (Arden) Huang, Jason Pelecanos, and Fadi Biadsy for the helpful discussions.

²<https://github.com/mindslab-ai/voicefilter>



Source:: Quan Wang et al., "VoiceFilter: Targeted Voice Separation by Speaker-Conditioned Spectrogram Masking", arXiv preprint 1810.04826

Detect who is speaking at what time period with Speaker Diarizationer Diarization

Speaker Diarization engine listens to a conversation involving multiple speakers, recognizes when a different person is speaking, and marks regions of the conversation accordingly. The engine listens to snippets of the conversation multiple times to mark when the speaker changes, and, with the help of the Speaker Verification engine, assigns a speaker ID to each region. If the speaker is not registered beforehand, it assigns arbitrary indexes (starting from 0) to time periods of the conversation.

Extract different speakers' voices with Voice Separation

The biggest challenge in separating speakers is when multiple speakers are talking over each other. Voice Separation engine can extract the voice of a specific speaker by registering the speaker's voice beforehand and constructing the speaker's voice vector. MINDsLab proudly released the very first open source of this engine with state-of-the-art performance.

■ Revolution in Natural Language Processing (NLP) - BERT and GPT2

Complex natural language processing can be accomplished in one step with BERT

The Natural Language Processing (NLP) field has been a challenging field to provide a complete end-to-end service. Complex natural language understanding (NLU) processes, such as tokenization, POS tagging, and NER, were essential to make the computer understand the text, and this technique required a significant level of linguistic knowledge. After properly breaking the text, the tokens were vectorized by the Word Embedding algorithm before it could be used for tasks such as text classification and machine reading comprehension (MRC).

There are two problems with this process: one is that the process of splitting text appropriately in a way that is understandable to the machine cannot escape the rules that the person understands. The other is to use these tokens as vectors. The context was not taken into consideration during the making process. That is, the Korean word 'BAE' is used in various ways such as transportation, fruit, body of a person, expression of a quantity, etc. However, the problem is that this is not distinguished when it is converted into a vector.

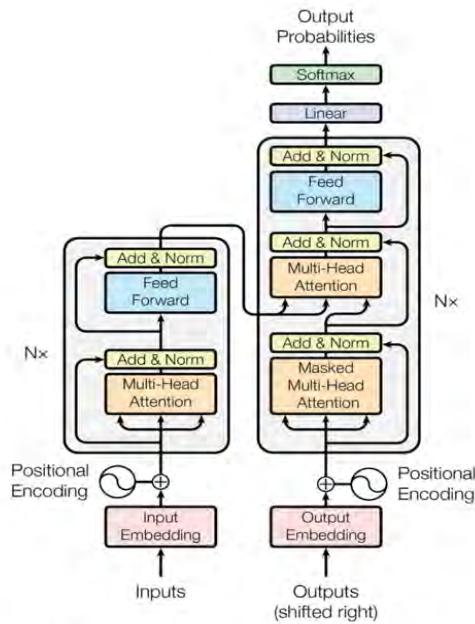


Figure 1: The Transformer - model architecture.

Source : Attention is all you need(Vaswani et al., 2017),

<https://arxiv.org/abs/1706.03762>

BERT is an algorithm that revolutionizes natural language processing by solving the two problems above at once. The BERT network is largely divided into two parts: inputting text and splitting it into appropriate units, and creating a vector of each of these tokens. BERT learns the most efficient way of understanding natural language by finding the way to split text in the process of learning a large number of documents in a non-coaching manner. The vector of each token is created each time considering the context of the text. Therefore, even the same word has different vector values depending on the context, and a completely original word can produce a specific vector value according to the surrounding context.

By using the vector values generated by the BERT as input values, various tasks such as text classification and machine reading can produce the best performance even if the BERT network is connected to the simplest linear layer.

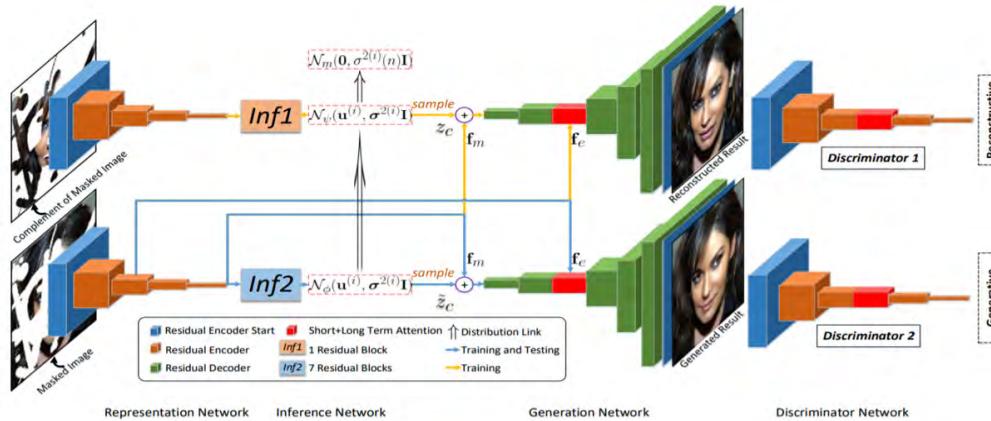
Natural language creation model GPT2

In the meantime, the field of natural language generation (NLG) has been recognized as one of the most challenging areas of AI. This is because the conventional RNN-based Seq2Seq algorithm had difficulty generating grammatically correct sentences. Now natural language generation technology has arrived at a new era by drawing on the revolutionary achievements of BERT. With GPT2, if you enter one or two sentences, it naturally rewrites the rest of the article, but it was switched to private only a month after it was released for performance. Using GPT2 technology, it is expected to be able to implement various services related to natural language generation such as literary writing, automatic article creation, and generative summary, which have been regarded as undefeatable.

■ Object Remover

Naturally remove only the desired objects from the image

It would be useful if it were possible to only remove certain objects, people, text etc. from an image. In order to prevent personal information being leaked, it would be possible to erase only the text of the license plate, the brand logo, or certain people from the photograph. It would be better if the system were to simply mosaic it or blend it with the surrounding image rather than paint it with a solid color. The Object Remover engine removes only the objects users want from the image.



Source: Quan Wang et al., "VoiceFilter: Targeted Voice Separation by Speaker-Conditioned Spectrogram Masking", arXiv preprint 1810.04826

Inpainting technology used for image restoration

The key principle of Object Remover engine is that it can naturally remove a particular object and the core technology is in Inpainting which is often used in image restoration. Inpainting technology uses the method similar to pouring ink on a photograph and reconstructing the stained area by looking at the surrounding image. Object Remover utilizes this inpainting technology to force a spot in an object to fill it with a natural background.

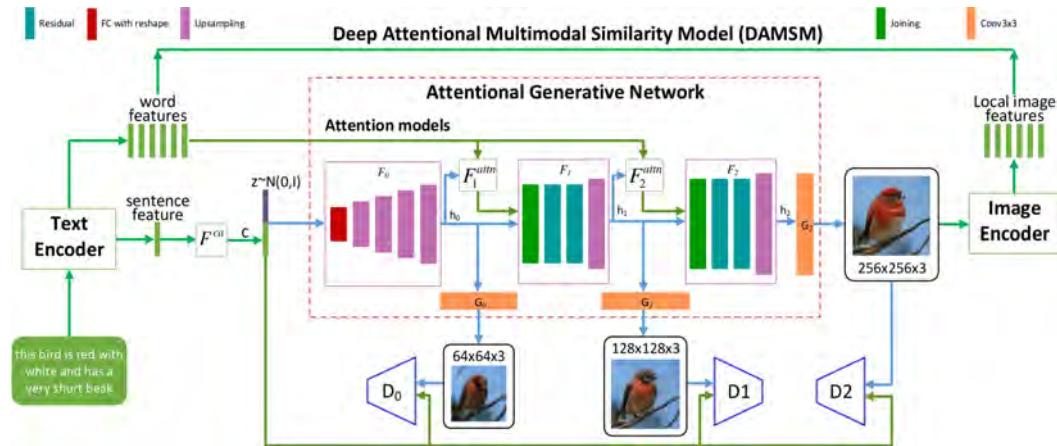
Used for Image Segmentation

MINDsLab achieved remarkable results in the course of Object Remover research. By using Inpainting technology to remove objects and filling the background in naturally, the difference between the original input image and the removed object image can be found with great precision. This is way beyond the state-of-the-art level of the Weakly Supervised Image Segmentation that is already well known to the world. As the existing Fully Supervised Image Segmentation is too expensive to generate the learning data, it is difficult to commercialize it. MINDsLab's research lab is expected to start a new chapter in the field of Image Segmentation.

■ TTI(Text to Image)

Generate images as described in words

The TTI (Text to Image) engine creates an image of a specific object when it is rendered as text. For example, if you say "a horizontal striped polo shirt with dark brown and white", it will create an image of the clothing described. The TTI engine is divided into an encoder section that understands the meaning of the text and a decoder section that generates the actual image based on the encoder section. The TTI engine is an innovative technology that combines the latest technologies of the natural language processing and the image generation field. It seems to be able to utilize the image users envision very effectively in various communication processes to communicate with other people.



Source: Tao Xu et al. "AttnGAN: Fine-Grained Text to Image Generation with Attentional Generative Adversarial Networks.",

<https://arxiv.org/abs/1711.10485>

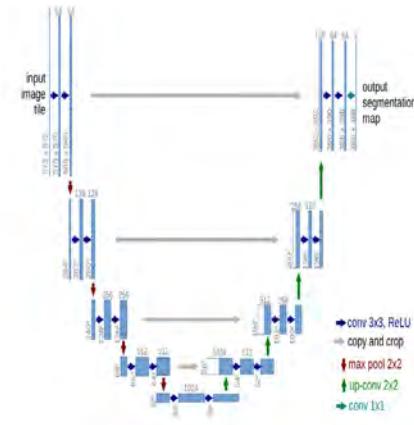
Applicable in the fashion field, childhood education, montage drawing, etc.

The TTI can be used to create customized design templates in the fashion field depending on the type of learning data. It can also be used to find a desired product by comparing images generated by text description with existing product photos. The engine can be used in a variety of fields such as childhood education, which helps children's imagination by drawing pictures as the child describes in words, or drawing facial composites.

■ Super Slomo

Convert regular image to high-speed camera image

The Super Slomo engine generates image frames at specific time points between two image frames by inputting a certain point in two image frames. If there is a general image of 60 fps, the time interval between two adjacent image frames is $1/60$ sec. If 3 additional images are inserted between these two images, it becomes 240 fps, that is, a camera image with 4 times slower speed. The Super Slomo engine is an algorithm that predicts and creates an image between two image frames in a very short time interval.



Create frames between images for animation work

The Super Slomo engine is not only used to create high-speed camera images. The principle of the Super Slomo engine can be used for animation work because it predicts the image to be inserted between two image frames in a short time interval of the moving images on the screen. Animations usually require 24 frames per second. Animation can be created with twelve frames by creating half of the frames with Super Slomo.



MINDs Lab Introduction

4

History

Award

Organization and Global Presence

EcoMinds & Partnership

History

Company History of MINDsLab, Artificial Intelligence Service Platform Company

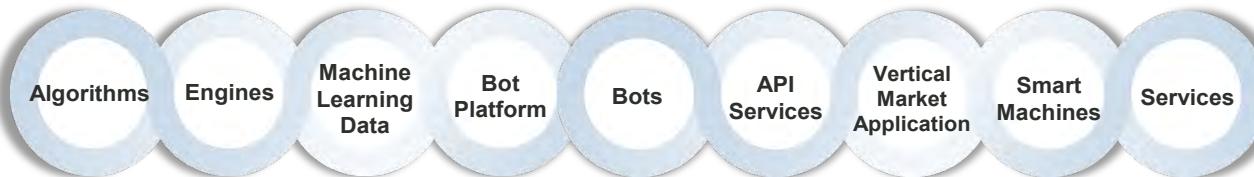
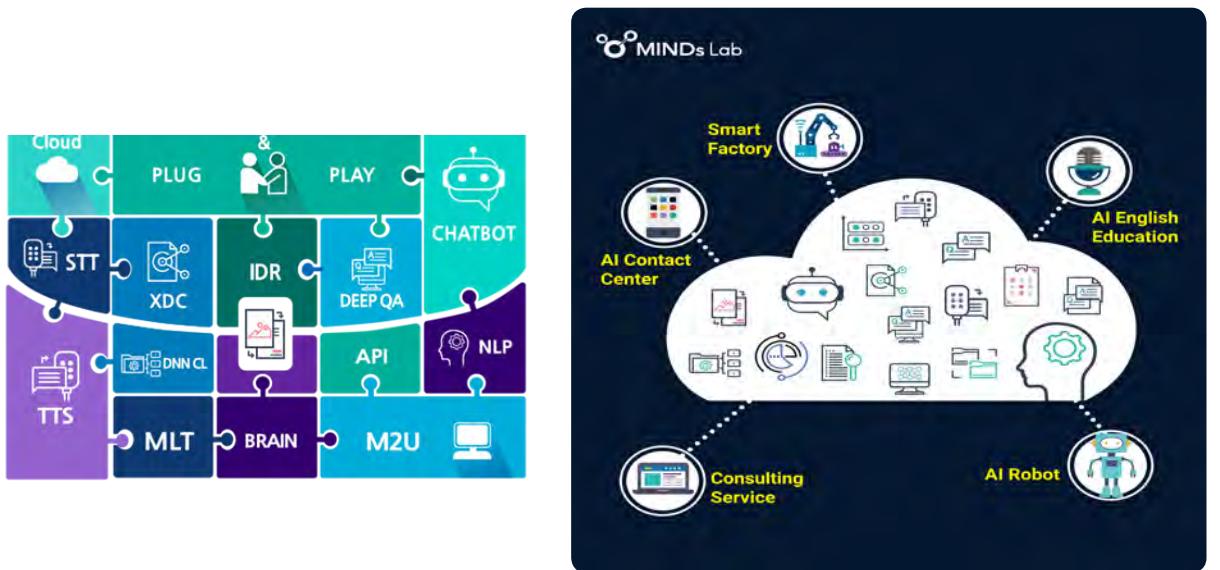
AI as a Service Company MINDsLab is a comprehensive AI service company that provides AI core algorithms to engines, platforms, and services.

MINDsLab has the speed and agility to swiftly apply the latest AI technology to the world of business.

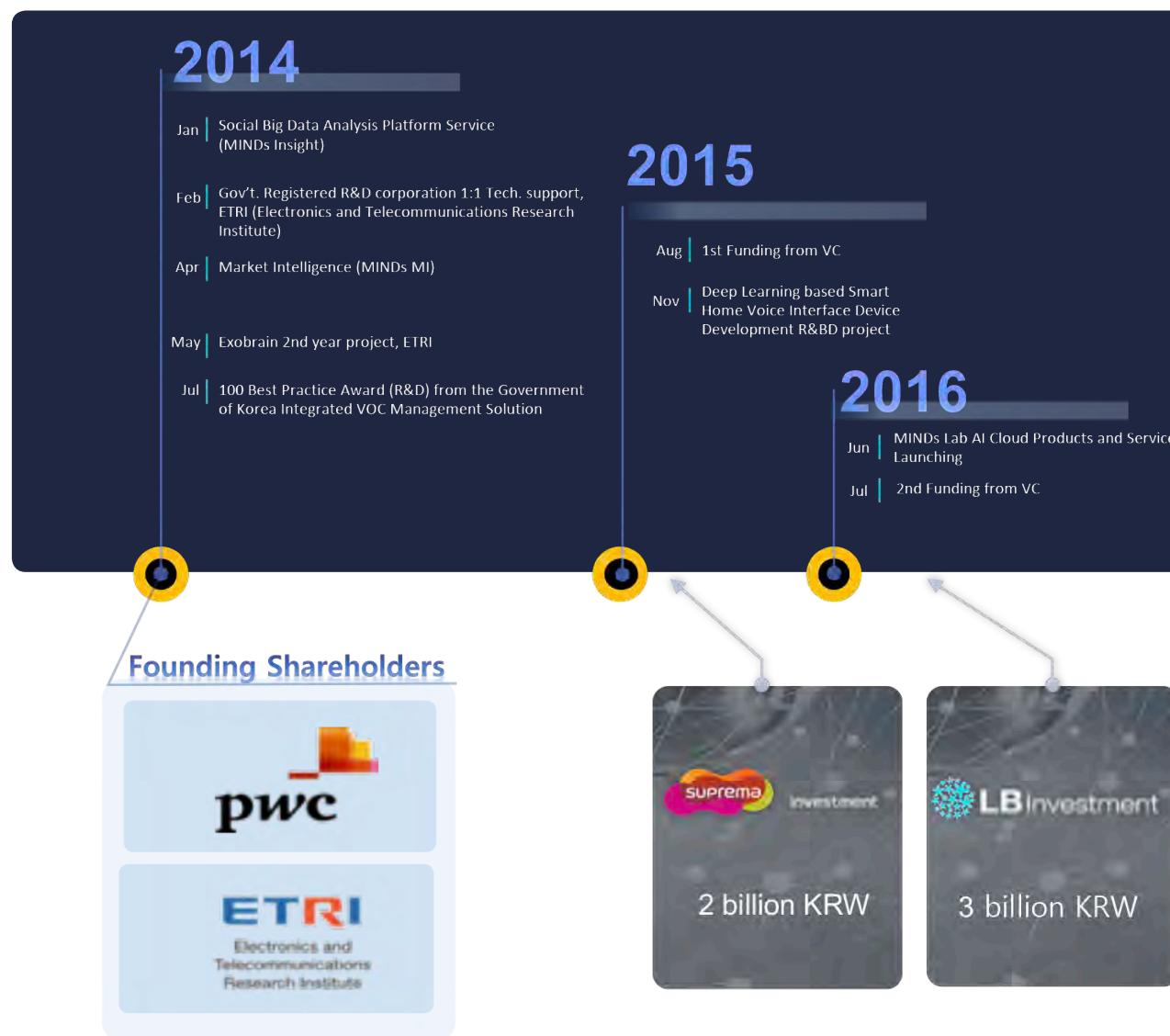
With robust technologies, MINDsLab has been rated with the highest corporate value among domestic AI companies within four years of establishment of the company.

MINDsLab offers AI experience for all businesses

It has the fastest speed and agility to commercialize the latest AI technologies



MINDsLab History





MINDsLab Proves Results in Numbers

Growth! Revenue! We make numbers.

Sales Status

MINDsLab has grown exponentially in five years since its establishment attracting domestic and international attention.



Investment Status

MINDsLab, which completed the series c investment, received the highest level of corporate value among domestic AI companies.

Cumulative investment

26.3 billion KRW

Enterprise value

93 billion KRW

Series A 5 billion KRW

(2015~2016)

IBK인베스트먼트

BSK인베스트먼트

Series B 4 billion KRW

(2017)

KDB산업은행

KEB하나은행

Series C 17.3 billion KRW

IBK-NH 스몰자이언트 PEF

하나금융투자

IBK인베스트먼트

큐리피탈

IBK기업은행

BNK캐피탈

ETRI홀딩스

BSK인베스트먼트

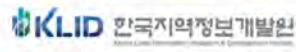
MINDsLab Solves All Questions About AI

MINDsLab understands what companies are struggling when they plan to implement AI into business and provides the best solution.

Our Customers

MINDs Lab's products and services have been recognized by global leading businesses, government organizations in Korea and many others.

Government / Public Institutions / Public Corporations



Financial Sector



Telecommunication/IT



Manufacturing / Distribution / Others



Education / Publishing



Award

MINDsLab, The most notable AI company in and out of the country

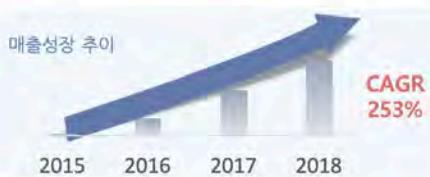
MINDsLabs is committed to R & D and ongoing capacity building using its research staff and global network. As a result, it has won various awards both at home and abroad and is recognized as an AI company with potential of success, and its technological capability is recognized.

Major Achievement of MINDsLab



Recognition of Excellence ITU Telecom World 2017

- Best innovative exhibitor within each National Pavilion at ITU Telecom Word, 2017
- International certification granted to SMEs with the most innovative future technology competitiveness



FORBES ASIA Top 10 South Korean Startup by Forbes Asia, 2017

- From big data to machine learning to artificial intelligence, this three-year-old enterprise service startup is raking in \$2.1 million a year. It's a young but fast-rising competitor among Korea's advanced technology startups, backed by \$5 million in investments.



Winner of FinTech Awards Excellent Company

- Organized by the financial services commission and the Korea FinTech Support Center
- Selected as an excellent FinTech company in FinTech area



Prime Minister Prize 4 years in a row

- 2016 Minister Award, Ministry of Science, ICT and Future Planning
- 2017 Minister Award, Korea ICT Award
- 2018 Prime minister Award, ImpaCT-ech
- 2018 Minister Award, Ministry of Trade, Industry and Energy



National R&D excellence and selected for K-Global 300

- 2014 National R & D excellence
- 2016 Selected as the future K-Global ICT promising technology development



2nd Development Project of EXO Brain

- Interactive QA Industrialization Solution Development in SW Grand Challenge EXO Brain
- Text and voice chat Wise QA services based on AI platform



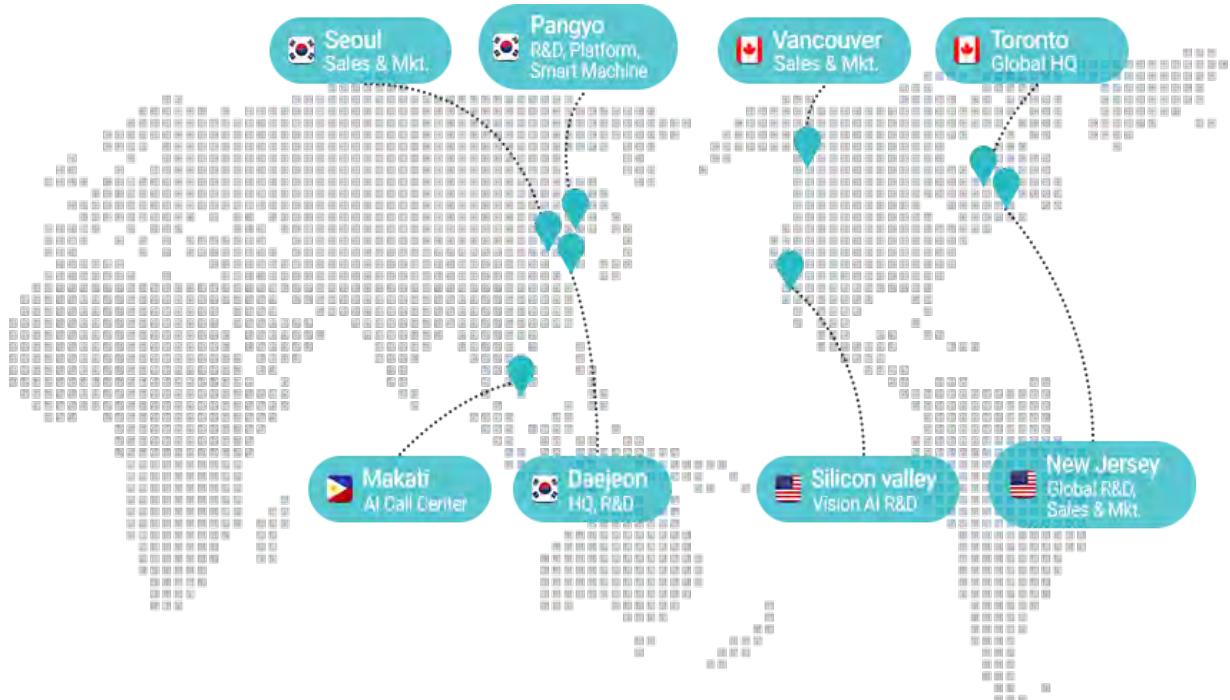
Organization and Global Presence

Toward the world, Global AI company **MINDsLab**

The global AI specialist MINDsLab is at the forefront of the world of AI technology. MINDsLab is implementing innovative AI services that are not based on the AI value chain, from AI core algorithms to engines, platforms, and services. It also provides services that reflect the latest AI trends through an excellent human resource pool.

Resources and Networks

As of 2018, 100 professionals (200 including subsidiaries) work across four different countries. Our global offices instantaneously catch the most recent AI trends, readily apply that to our products and services and distribute them to different continents.



MINDsLab, Providing Innovative AI Services Based on Integrated AI Chain



Collision 2019, North America's fastest growing Tech event

MINDsLab's AlaaS service platform, maum.ai was introduced with customer success stories and actual examples of commercialization.



VIVA Tech 2019

European start-ups and global IT companies to share the latest technology trends

Various APIs and AI services have been introduced by maum.ai



MWC Barcelona 2019

A Tech event that shares the technology of global companies and start-ups with the world's largest mobile industry exhibition. MINDsLab explained the concept of maum.ai and introduced various AI services on maum.ai and let AI local companies experience it firsthand.



MWC Americas 2018

A Tech event that shares the technology of global companies and start-ups with the world's largest mobile industry exhibition. The concept of the AI Contact Center was introduced and a portfolio of key references was presented to the commercial VOC (Voice Of Customer).

The Future of AI, MINDsLab

A group of AI experts with technical experiences

- An AI specialist group consisting of experts who can handle major AI areas such as machine learning, computer science, and linguistics
- Build and manage various projects based on AI platform maum.ai
- It operates an internal research organization specialized in each area of AI such as language intelligence and visual intelligence

Products and services recognized globally

- MINDsLab's products have been recognized for their performance and reliability from more than 20 global leading companies in various industries including finance, telecommunications, and manufacturing.
- Company that has proven its capabilities from international organizations such as government agencies, Forbes Asia, and the United Nations, the International Telecommunication Union (ITU)

Apply the latest technology at the fastest stage

- AI Platform maum.ai is optimized to implement the latest AI technologies to customer's business.
- MINDsLab's employees apply the latest technology directly to its products.

Implement the AI services in the most efficient way

- Save time and money through AI platform maum.ai and provide environment that can implement various AI services in most efficient way.
- From AI algorithms to professional consulting, it offers the most efficient way for companies to introduce AI-based innovation processes

EcoMinds & Partnership

Cooperate with the Global AI Network Market, **MINDsLab**

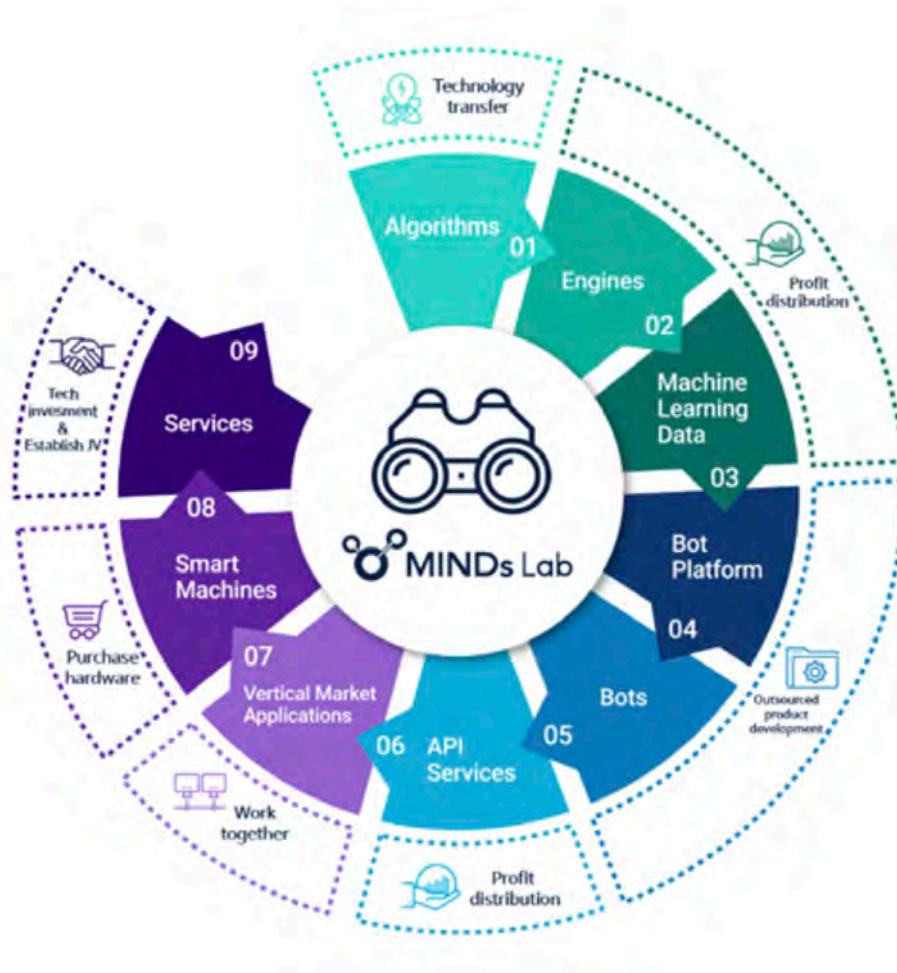
MINDsLab is aiming for a win-win situation, and has formed various start-ups and research institutes including EcoMINDs, an AI ecosystem, which have core technologies in each area of the AI value chain. In addition, MINDsLab has a global network for strengthening R & D, and AI learning capabilities to the highest level in the world.

EcoMIND

The EcoMINDs project is a win-win project for MINDsLab, which builds and revitalizes the AI ecosystem along with various start-ups and research institutes.



EcoMIND



Signed a partnership with AMII, one of Canada's top three AI research organizations



Tae-joon Yoo(right), CEO of MINDsLab,
participated in AMII agreement ceremony



AMII employees meeting with MINDsLab
staff

The AMII Alberta Machine Intelligence Institute in Edmonton is one of the top three research institutes in Canada along with the Element AI and the Vector Institute. It has partnered with the University of Alberta and Google DeepMind to develop AlphaGo under the guidance of Richard Sutton, who is a founder of reinforcement learning, to lead the research about deep learning in each field. MINDsLab was the first Korean company to join this research institute as an AI specialist.

Canada is called, 'Holy Land of AI', and its soil for the growth of AI research soil is so fertile that the world's leading companies are setting up AI laboratories. Among them, the University of Alberta and AMII have a very strong reinforcement study capability. MINDsLab holds multiple successful AI references in Korea and is on its way to emerge as a player in the global markets. Paired together with AMII and Canada's active AI ecosystem, MINDsLab expects great synergy in AI development.

Press Release**MINDsLab • GNS Bio, AI-based Brain Tumor Treatment of New Drug Development**

2019.02.10
Global Economic

GNS Bio, a bio-venture specializing in immune cell therapy, and MINDsLab have entered into a business agreement to cooperate in the research and development of biopharmaceuticals using artificial intelligence (AI). Using AI, Genomic Big data extracted from brain tumor tissue will be analyzed, and the results will be used as a database to develop new drugs based on immune cell therapy. MINDsLab and GNS Bio are planning to convert the RNA data extracted from brain tumor tissue cells into AI, analyze the nucleotide sequence in each tumor showing different characteristics and apply it to the development of new drugs.

Press Release**MINDsLab, Awarded for Best Finetech Company**

2019.05.27
IT Daily

MINDsLab's AI Hybrid Customer Center Service is a FinTech service that provides AI-based customer consultation by combining AI technology and services such as AI voice bots, chatbot, and customer center analysis. Specifically, voice bots implemented through conversation technology can be used for insurer's full sale monitoring and telemarketing. As a result, MINDsLab has been recognized as a successful company in the field of FinTech in AI technology.

Press Release**MINDsLab to Activate AI Ecosystem with 'Eco-MINDs Project'**2017.12.11
IT Daily

MINDsLab is working with the start-ups and research institutes in the AI field and the Eco-MINDs project to activate the AI ecosystem. EcoMINDs is a partnership project to collaborate on the basis of MINDsLab's AI platform, maum.ai. Companies that need to combine their technology with AI services expect to see the net effect of activating the entire AI market by securing new technology and maximizing profit through Eco-MINDs.

Press Release**MINDsLab joins 'Amii', one of the top three AI research institutes in Canada**2019.03.20
The Korea Economic
Daily

MINDsLab is an official member of AMII, an AI research institute, and works with global researchers, including Google DeepMind, to study deep-learning. MINDsLab plans to carry out the latest deep learning R & D in major areas of AI research and development, including natural language processing, visual intelligence (computer vision), and reinforcement learning, together with researchers at one of the three major AI research institutes in Canada. MINDsLab will be focusing on expanding its business on the North American market, focusing on its competitiveness while raising its own technological capabilities to a global level, starting with its partnership with AMII.



Make your own AI Service

Written by MINDs Lab

Edited by MINDs Lab

First published : 2019. 07.

Telephone : +82-31-625-4340

Website : <http://maum.ai>

Email : hello@mindslab.ai

Copyright © Minds Lab. All rights reserved.



MINDs Lab