ASEAN IT Business Strategy Workshop on Digital Government Services

Adoption of Emerging IT Technologies for JPO Service Delivery

Japan Patent Office

February 2023

1 Action Plan for Utilization of AI

2 Utilization of AI for patent examination

3 Machine translation services

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Development of a New Action Plan

- In FY2017, the JPO published the "Action Plan for Utilization of Artificial Intelligence (AI) Technology" (hereinafter referred to as the "Action Plan"), describing a six-year plan (until FY2022) for the utilization of AI technology to improve efficiency and quality of the JPO administrative work. Since then, the JPO has promoted the projects while revising the Action Plan annually.

- AI Research Project was conducted in FY2021 in order to consider how AI technology should be used in the JPO over the next five years in light of recent changes in the circumstances surrounding the JPO and rapid advancement of AI technology.

- The AI Research Project was mainly conducted on the following items
  (1) Review of the progress of the Action Plan to date
  (2) Recent advancement of AI technology
  (3) Recommendations on how to proceed in the future based on (1) and (2)

- A new Action Plan (FY2022-2026 edition) was developed considering the results of the AI Research Project and opinions from external experts.

Outline of the results of the AI Research Project and the direction of the development of new Action Plan

- The progress and achievements of the Action Plan to date (i.e., technology verification through Proof of Concept (PoC) processes, trial provision of tools developed in agile development processes) were positively evaluated in the AI Research Project. The past progress and achievements were also highly evaluated by external experts.

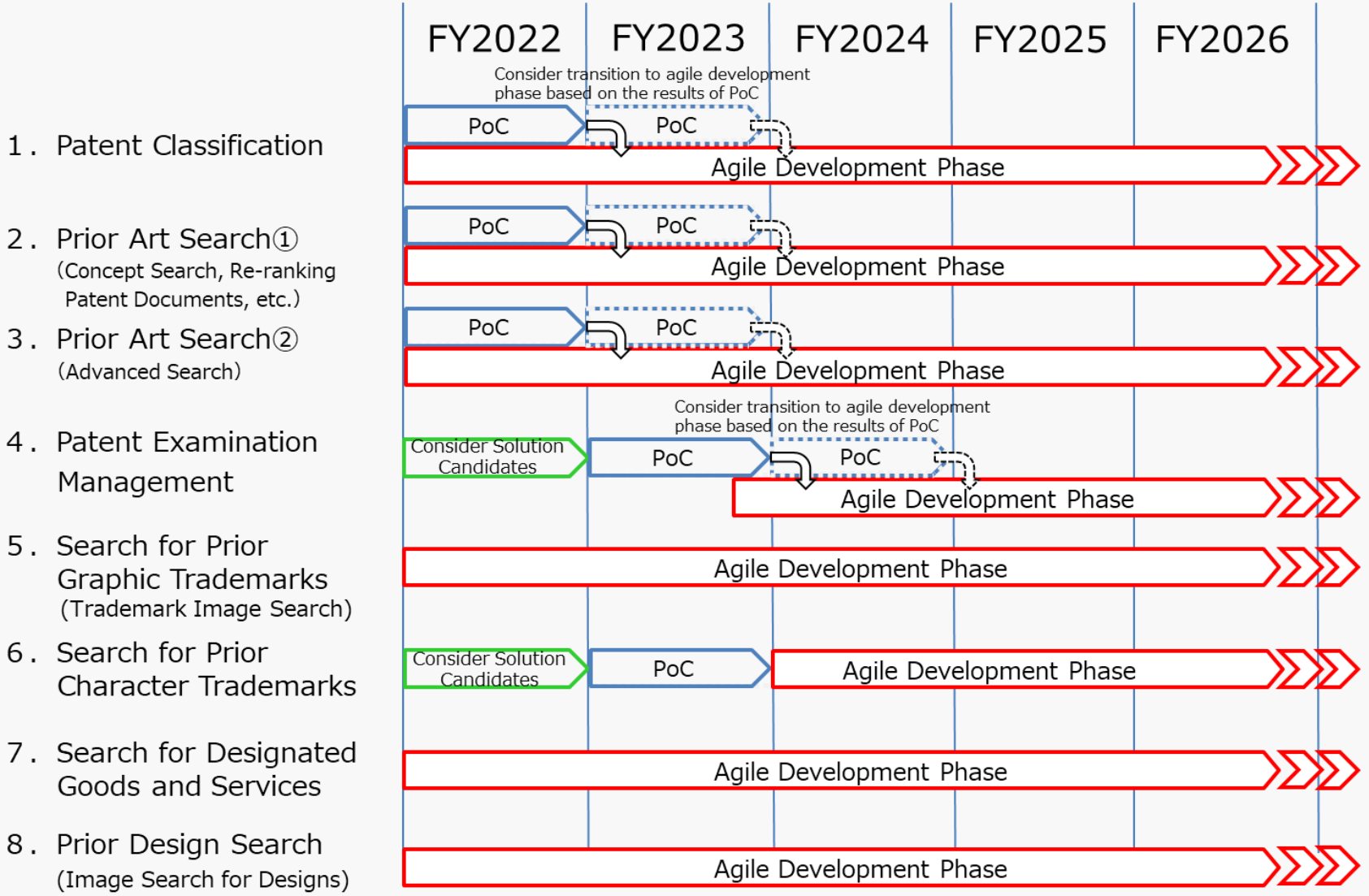
- Recent advancement of AI technologies (especially natural language processing technologies such as BERT) that are considered applicable to the JPO administrative work was confirmed in the AI Research Project.

- In parallel with the AI Research Project, interviews on business issues were conducted with each section and division of the JPO, and new project candidates were discussed while also seeking opinions of external experts.

New Action Plan was developed based on the following policies.

- Continue with the existing overall approach
- Incorporate new technologies
- Add new projects to solve newly identified business issues

New Action Plan for Utilization of AI technology (FY2022-2026)



(※) The initiatives of each project are rough assumptions and may change in the future depending on the progress, budget conditions, and other various circumstances.

(Appendix) Projects under consideration to be listed in the Action Plan

The following projects will be listed in the Action Plan when they meet certain conditions after preliminary preparations have been made, including the establishment of a staff organization, study of solution candidates, clarification of technical standards, and examination of cost-effectiveness.

- Responding to inquiries by phone, email
- Digitization of paper documents into text data
- Support for confirming the designated goods and services of international trademark applications
- Support for prohibiting public access to certain types of submitted documents
- Suggestion of trademark distinctiveness

（※） There may be changes, such as the addition of new projects to the Appendix or the deletion of projects from Appendix, depending on the results of future consideration.

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Details of each patent project (Projects listed in the Action Plan)

1. Patent Classification [Continued + new PoC]	
Aims	Improve efficiency and quality of prior art search for foreign patent documents
Outline	Predict JPO patent classifications (theme codes, FIs, F-terms) for foreign patent documents using machine-translated Japanese text as input
The Way Forward	In parallel with continuing the agile development phase, a new PoC project* will be conducted in FY2022. Transition to agile development phase (incorporation of new technologies) will be considered based on the results of the new PoC project

2. Prior Art Search (1) (Concept Search, Re-ranking Patent Documents, etc.) [Continued + new PoC]	
Aims	Improve efficiency and quality of prior art search
Outline	・Retrieve similar documents to the application being examined based on similarity of text data ・Calculate scores representing the similarity based on text data and meta data contained in the application being examined and the target prior patent documents and re-rank the documents in order of the scores
The Way Forward	In parallel with continuing the agile development phase, a new PoC project* will be conducted in FY2022. Transition to agile development phase (incorporation of new technologies) will be considered based on the results of the new PoC project

3. Prior Art Search (2) (Advanced Search) [Continued + new PoC]	
Aims	Improve efficiency and quality of prior art search
Outline	・Display patent documents with figures that are highly relevant to the figures of the application being examined ・Suggest useful keywords for creating search queries based on text data of the application being examined ・Consider new search paradigms that utilize AI technology, etc.
The Way Forward	In parallel with continuing the agile development phase, a new PoC project* will be conducted in FY2022. Transition to agile development phase (incorporation of new technologies) will be considered based on the results of the new PoC project

4. Patent Examination Management [New]	
Aims	Conduct management tasks around the patent substantial examination process more effectively and efficiently
Outline	Consider how to implement management tasks such as appropriate distribution of applications effectively and efficiently, taking account into the use of AI technology, etc.
The Way Forward	Solution candidates will be considered in FY2022 and a new PoC project will be conducted in FY2023. Transition to agile development phase will be considered based on the result of the PoC project

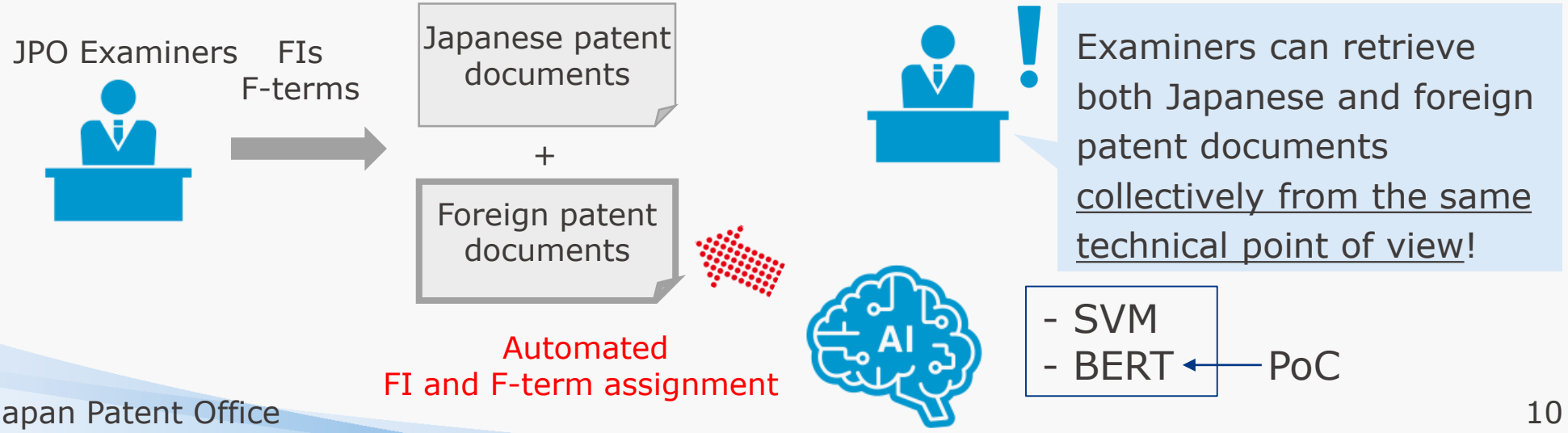
* AI technology that can be commonly utilized in projects 1-3 will be verified in the new PoC project.

Patent classification

Main Points

Issue: JPO examiners couldn't use FIs and F-terms (JPO-specific search indexes) to retrieve foreign patent documents though they are useful to retrieve relevant documents to Japanese applications.

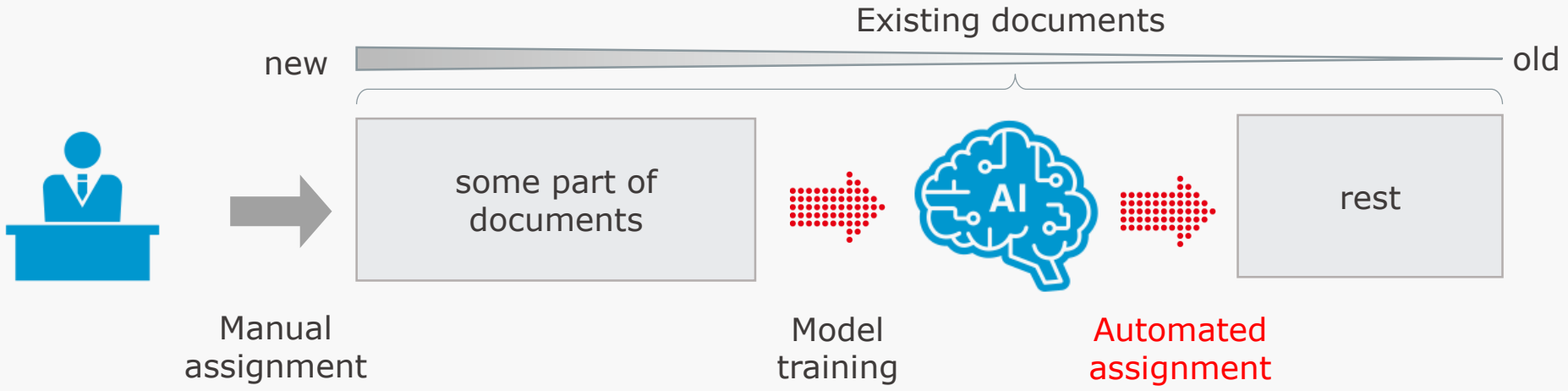
Solution: Assigning FIs and F-terms to foreign patent documents automatically, JPO examiners can conduct collective search on Japanese and foreign documents with the indexes.



Further consideration for patent classification

- The JPO is considering applying BERT to auto classification.
- The JPO is considering applying auto classification to the re-classification.

Auto re-classification

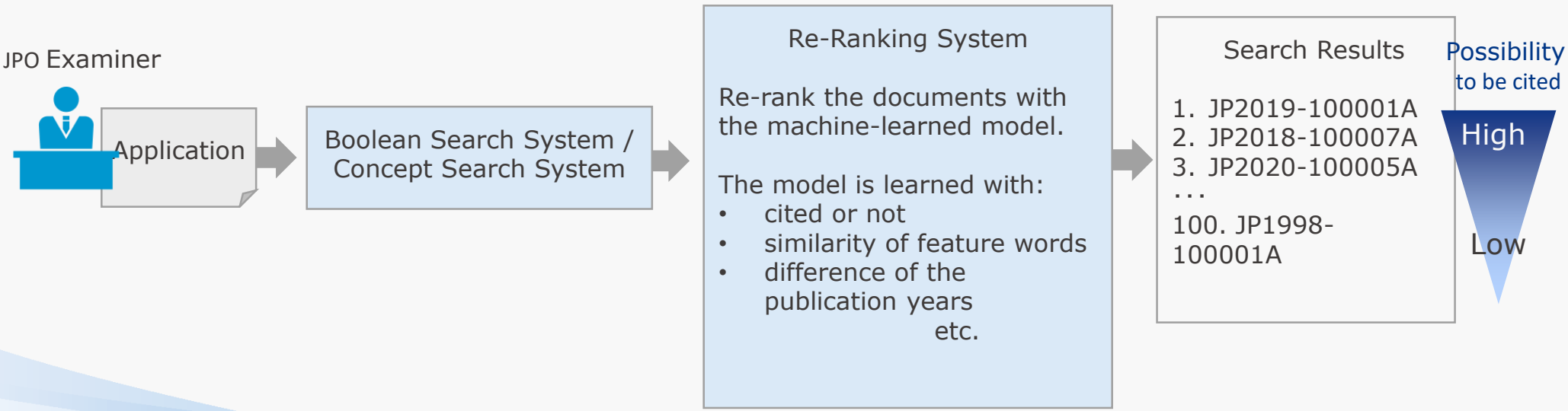


Concept Search and Re-Ranking Patent Documents

Main Points

Issue: Examiners had to read hundreds of documents to retrieve a relevant document.

Solution: Examiners can read the most important document first if the candidate documents are ordered by the possibility to be cited.

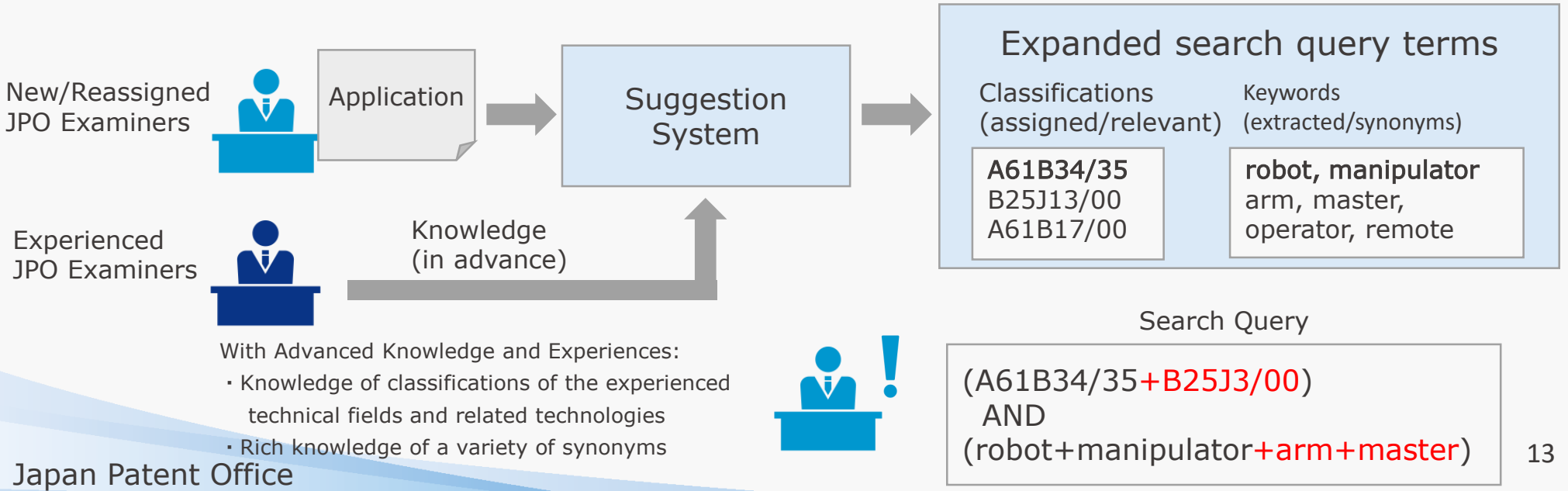


Advanced Search - Expanding search query terms -

Main Points

Issue: It's difficult for new/reassigned examiners to select effective search query terms.

Solution: Possible classifications, keywords and synonyms based on the accumulated knowledge and experiences of experienced examiners help new/reassigned examiners a lot.

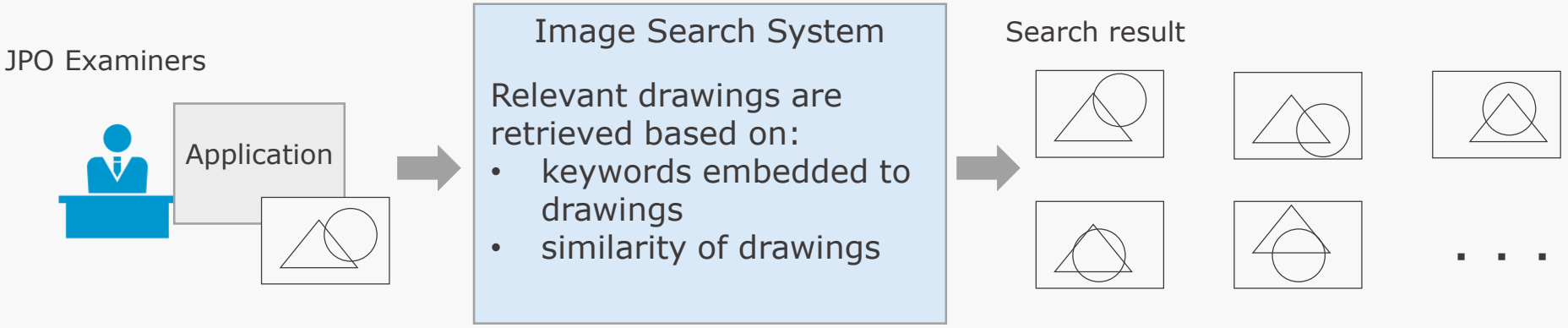


Advanced Search - Patent Image Searches -

Main Points

Issue: Sometimes drawings contain very important information especially regarding shapes or structures of things. But text search queries are not so effective to retrieve such useful drawings.

Solution: The information originated from drawings of the application is thought to be useful to obtain relevant drawings.

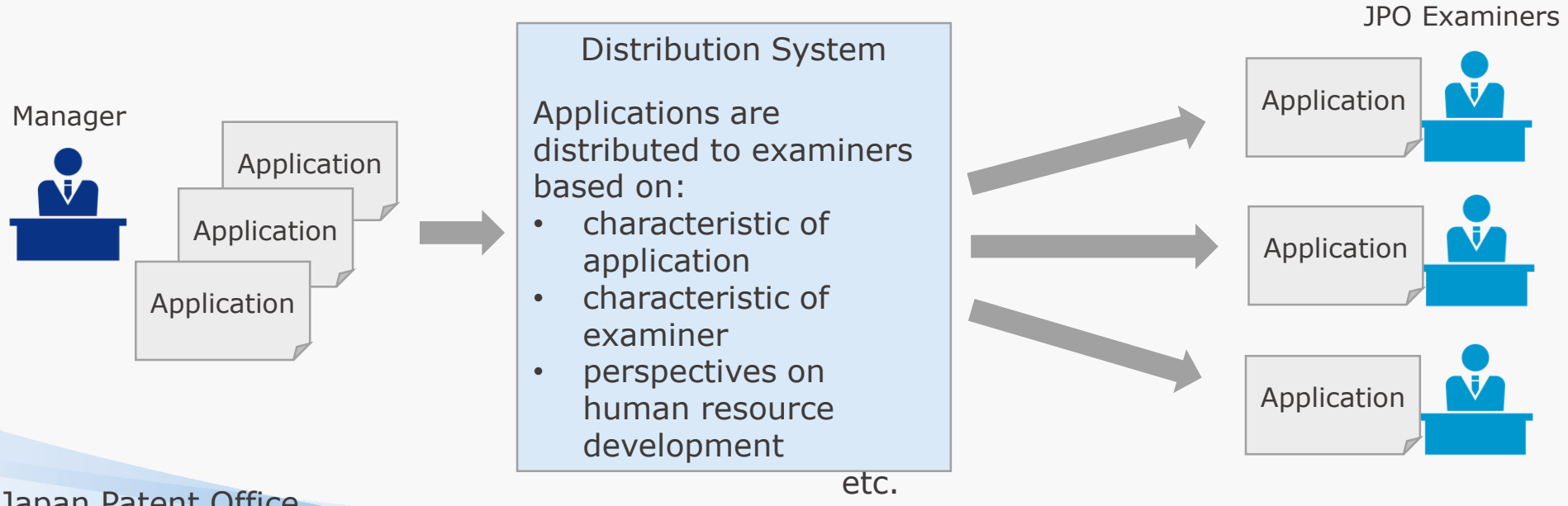


Patent Examination Management

Main Points

Issue: It is preferable to conduct management tasks around the patent substantial examination process more effectively and efficiently.

Solution: Candidate for solution is being considered in FY 2022. A case under consideration is distribution of applications.



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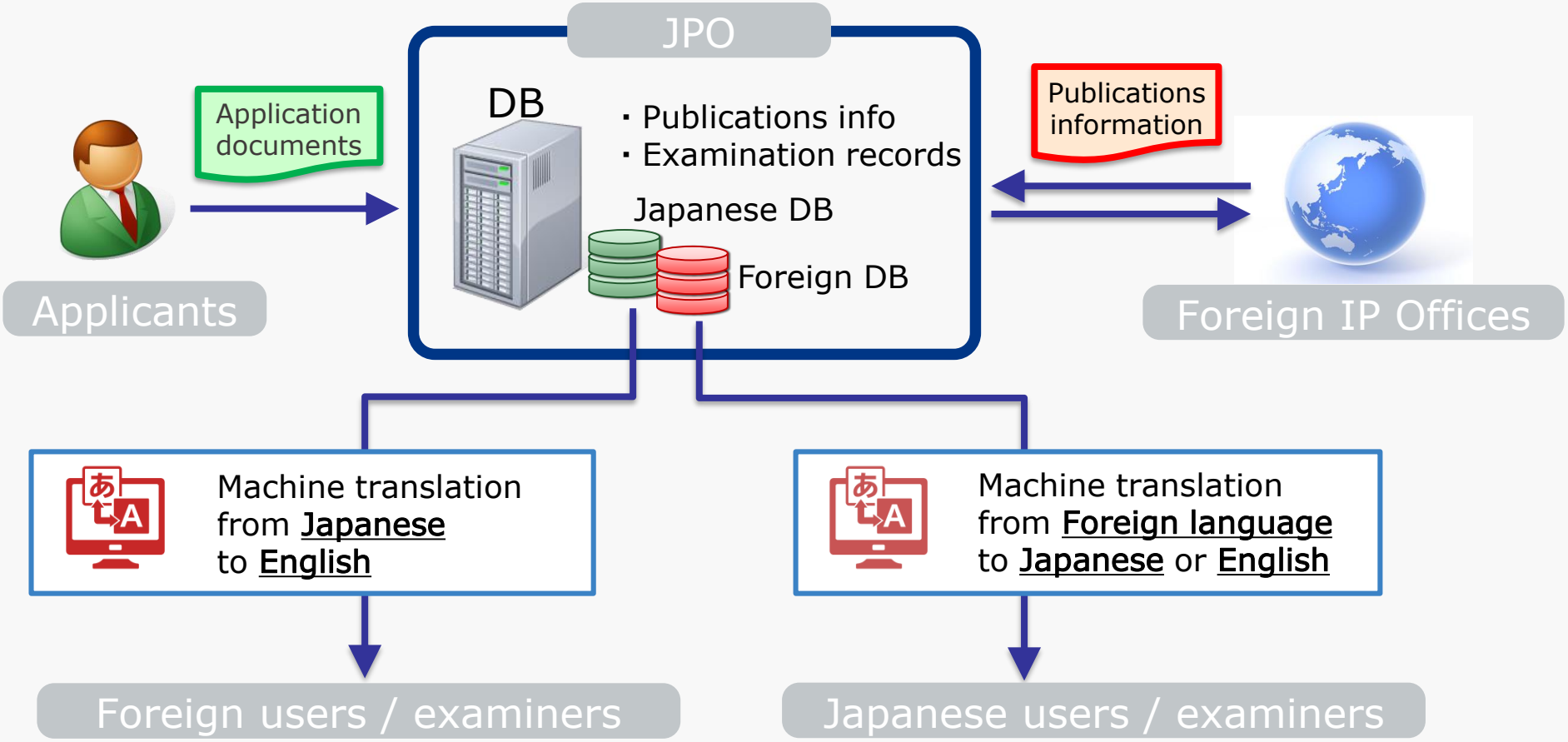
3 **Machine translation services**

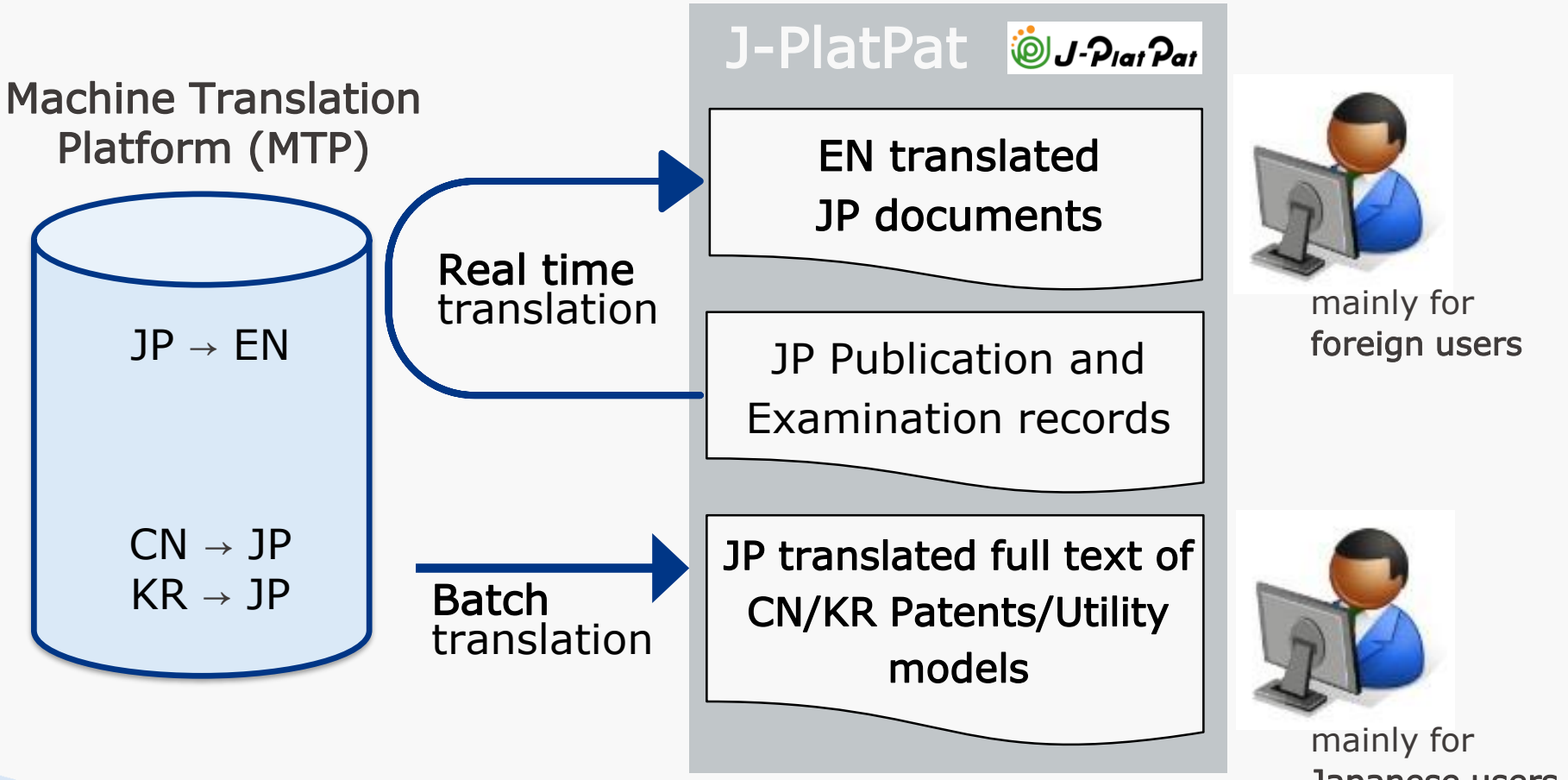
Machine translation services (1)

The JPO is utilizing machine translation for foreign and Japanese users.



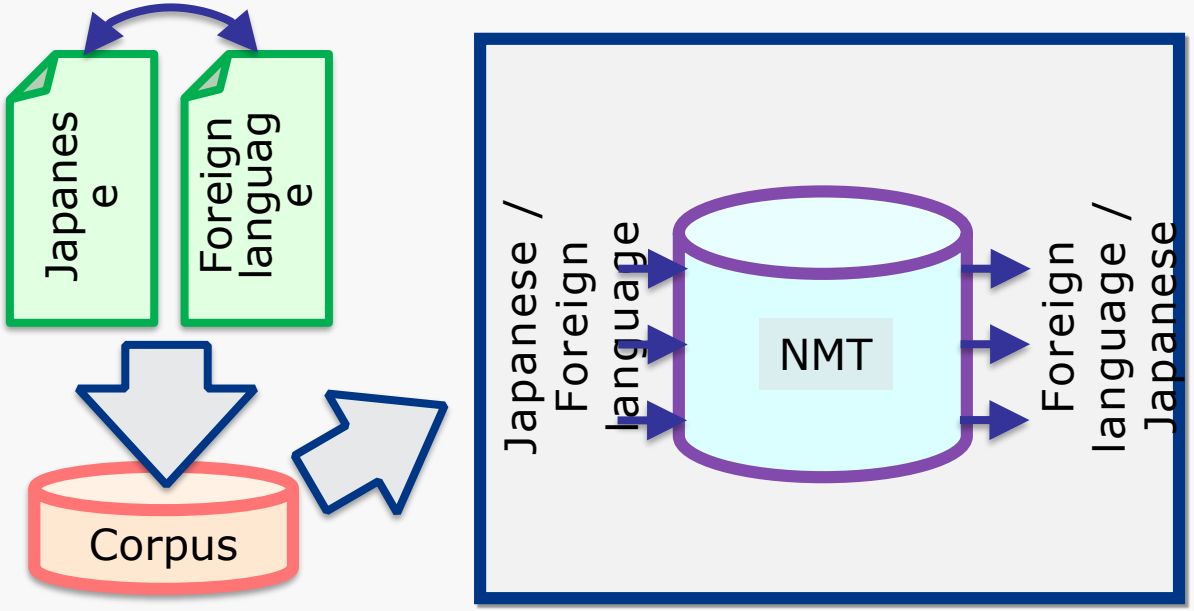
Machine translation services (2)

The JPO has developed Machine Translation Platform (MTP) which translates in real-time mode and in batch mode.

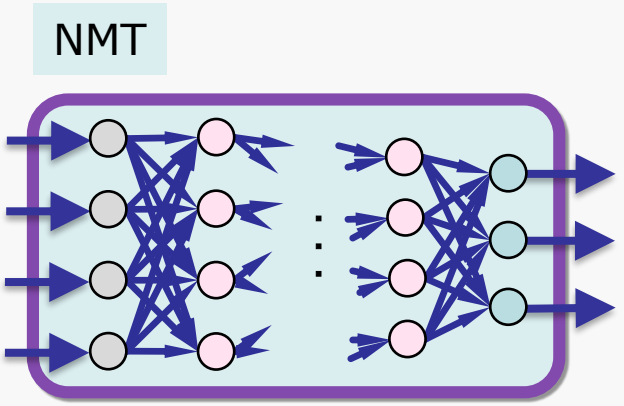


Machine translation services (3)

One of machine translation engines equipped with MTP is a trained Neural Machine Translation (NMT) engine.



Training using corpus with deep learning and representation learning



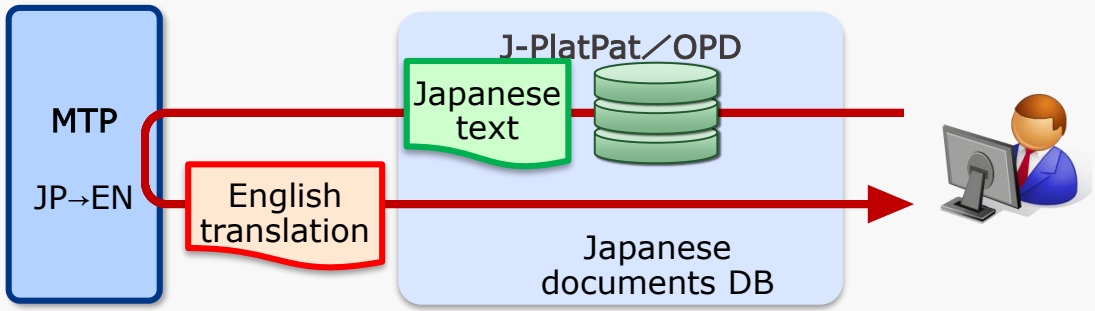
Artificial neural network

Machine translation services (4)

There are pros and cons in real-time translation and batch translation.

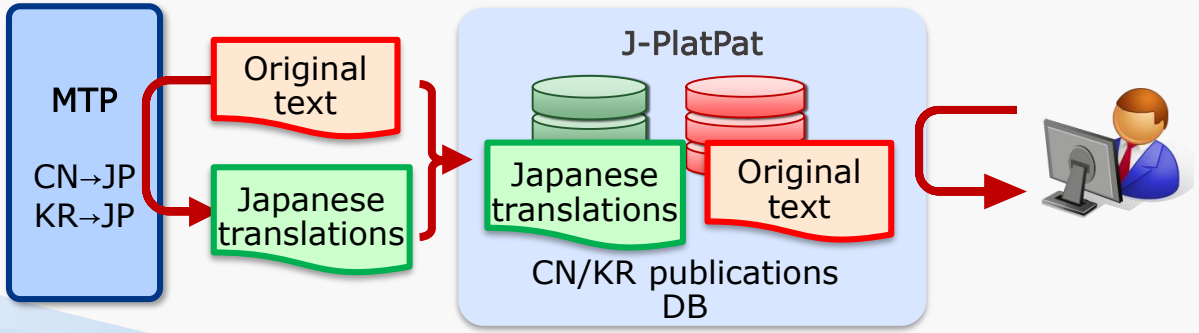
(⊕ pros ⊖ cons)

Real-time translation (no accumulation / translating each time)



- ⊕ no need for time to translate and accumulate
- ⊕ be able to use the latest translation engine
- ⊖ not be able to do keyword search for translated documents

Batch translation (with accumulation)

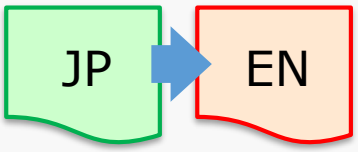


- ⊖ need time to translate and accumulate
- ⊖ not be able to use the latest translation engine
- ⊕ be able to do keyword search for translated documents

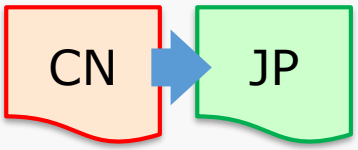
Machine translation services (5)

The MTP uses different translation engines depending on target documents or bibliographies.

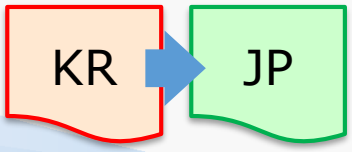
NMT: Neural Machine Translation
SMT: Statistical Machine Translation
RBMT: Rule-Based Machine Translation



Translation target	Main translation engine
Patent publications (description, etc.)	NMT
Patent publications (title of the invention)	SMT
Examination documents, etc.	NMT
Bibliographic information/ Non-patent publications	RBMT



Translation target	Main translation engine
Patent publications (description, etc.)	NMT
Patent publications (title of the invention)	SMT



Translation target	Main translation engine
Patent publications	SMT

Thank you