E

WIPO
WORLD
INTELLECTUAL PROPERTY
ORGANIZATION

WIPO/IP/ITAI/GE/18/1
ORIGINAL: ENGLISH
DATE: FEBRUARY 8, 2018

MEETING OF INTELLECTUAL PROPERTY OFFICES (IPOS) ON ICT STRATEGIES AND ARTIFICAL INTELLIGENCE (AI) FOR IP ADMINISTRATION

Geneva, May 23 to 25, 2018

SUMMARY OF THE REPLIES TO THE NOTE ON APPLICATIONS OF AI TO IPO ADMINISTRATION

Prepared by the International Bureau of WIPO

INTRODUCTION

1. National and regional Intellectual Property Offices (IPOs) were invited, through Note C. 8706 dated October 11, 2017, to respond to questions relating to the use of applications of AI to IPO administration. This document is a summary of information gathered following the invitation. A total of 35 national and regional IPOs responded to the Note as of February 8, 2018[1]. The original responses are included in document WIPO/IP/ITAI/GE/2. For any IPO which has not submitted its contribution, it is suggested that it should be sent to ai4ip@wipo.int.

2. In the Note, the following questions were asked:

(a) Any relevant business solutions making use of AI and big data (such as classification of application files, image search of trademarks, machine translation, etc.);

[1] Australia, Austria, Belarus, Brazil, Canada, Chile, China (State Administration for Industry and Commerce of China (SAIC) and the State Intellectual Property Office (SIPO)), Colombia, Finland, Gabon, Germany, Japan, Jordan (Copyright Office), Mexico, Morocco, Myanmar, New Zealand, Norway, Republic of Korea, Russian Federation, Saudi Arabia, Serbia, Singapore, Slovakia, Sweden, Switzerland, Syrian Arab Republic, Togo, the United Kingdom, the United States of America, Uruguay, Venezuela (Bolivarian Republic of), ARIPO and EUIPO (35).

(b) A description of specific AI systems in use (such as the name of a commercially available system or an in-house development system, a description of functions, data used to train the AI system, etc.); and
(c) Experience and other useful information to share with other IPOs (reliability, human interface, any impact on the work, lessons learned, etc.).

GENERAL REMARKS

3. At least 17 IPOs out of 35 IPOs that responded to the Note have started to use AI applications for at least one business solution. Among IPOs that replied to the Note, one IPO (the Patent and Trademark Office of the United States (USPTO)) has an advanced analytics program using AI to enhance an understanding of its policies, processes and workflows. However, the use of AI applications in all other IPOs appears to be limited to a few specific functions or in an infant stage of deployment. In general, IPOs indicate interests in the future use of AI applications for IPO administration. For instance, the United Kingdom Intellectual Property Office (UKIPO) stated in its reply that the UKIPO was undertaking a major portfolio of work to transform their digital systems, and that it planned to make more use of AI and big data in the future, but considerations were at a very early stage.

4. Some IPOs have identified business areas that could benefit most from AI applications in a systematic way. A few IPOs are in the process of developing their in-house systems powered by AI, while many other IPOs have started to use AI applications commercially developed by ICT service providers.

5. The following IPOs provided information about their plans and on-going pilot projects.

6. The Canadian Intellectual Property Office (CIPO) has the following on-going projects:

- CIPO is exploring the use of the IBM Watson suite of tools to conduct engagement with clients through social media outreach and analytics.
- They are also exploring the viability of using block chain to streamline our copyright registration process and attempt to encourage information sharing by rights holders.
- Finally, in the context of ongoing economic research, they plan to explore the feasibility of machine learning to answer IP policy and research questions.

7. The Oesterreichisches Patentamt of Austria is currently in trials with several commercial providers for application to pre-search, pre-classification and classification of patents.

8. The Deutsches Patent- und Markenamt (DPMA) of Germany has not yet used “strong” AI in the administration of patents, utility models, trademarks and designs. However, DPMA uses programs that can be categorized as “weak” AI. These are programs that simulate intelligent behavior by means of mathematics and computer science and perform certain tasks.

9. In 2016, the Japan Patent Office (JPO) started studying ways that AI can possibly be utilized in its operations. In April 2017, JPO formulated and published an action plan for this. During this fiscal year (from April 2017 to March 2018), JPO started an initiative to validate how AI can be utilized in six of its business operations. The six are: (1) responding to questions from users (by phone, etc.); (2) digitizing filing procedures; (3) assigning patent classifications; (4) prior art searches (support for formulating search terms and queries); (5) prior searches of figurative trademarks; and (6) assigning trademark classifications of designated goods and services.

10. It should be noted that by “validate” JPO means validating the technical accuracy of AI-based systems, but this does not yet include any trials of using AI-based systems in its operations. Based on the results obtained from validation works in this fiscal year, JPO plans to consider whether to continue the validation works in the next fiscal year and beyond and whether to start conducting trials. JPO started validating its systems to verify possible uses for which AI can be implemented as a means of supporting the said business operations. JPO has not gained any information yet on the reliability of AI-based systems that they are working to verify, with the exception of the services responding to questions from users.

11. The Korean Intellectual Property Office (KIPO) is working to build a patent knowledge base for AI learning and cooperate on research with the Korean Electronics and Telecommunications Research Institute (ETRI) to apply their developed AI system to IP administration. KIPO has been engaged in several activities to advance in the area of AI and Big Data, in December 2016, KIPO participated in a project to create infrastructure for the AI industry.

12. The Federal Institute of Industrial Property (FIPS) of Russian Federation conducts research on application of AI. Within the first half of 2018, they will obtain the first results of using artificial neural networks and methods of deep learning to increase the efficiency of similarity search for examination of inventions and utility models. Search quality criteria that consider the peculiarities of searching tasks for examination of inventions as developed by FIPS are used in the research.

13. The USPTO has a program combining AI with big data and machine learning for application in several fields. The provision of the most useful and relevant information to determine patentability by an examiner, textual analysis of patent applications and subsequent office actions to analyze the entire patent prosecution history and improving the application programming interfaces to provide better access to the public to USPTO data. A proof of concept, Sigma, is also being delivered using AI and machine learning to search whole documents against a corpus in the current version patent applications were searched against granted patents and pre-grant publications. The efficacy of deep machine learning for image searching for Trademarks is also included in the program.

SPECIFIC BUSINESS SOLUTIONS

14. The following business areas are initial beneficiaries of AI applications in certain IPOs.

1) Automatic Patent Classification

15. It is probably one of the most advanced areas where AI applications are being tested or used. Several IPOs are using AI applications to automatically allot patent classification symbols.

16. IP Australia reports that Australia’s Patent Auto Classification (PAC) Tool aims to analyze the contents of patent applications in unstructured PDF documents and predict relevant technology groups enabling prioritization and allocation to appropriate patent examiner sections. The PAC application uses internally developed software/machine learning technologies to build sophisticated hierarchy classification models to analyze the contents of each patent case in unstructured PDF documents. The predictive models have been trained using the Office’s specific patent data, and will be extended with larger patent datasets from USPTO and the European Patent Office (EPO). The PAC pilot is undergoing final review and testing before being released to production.

17. DPMA in Germany has used an electronic classifier which uses statistical procedures for the classification of patent and utility model applications according to the IPC since 2011. This classifier is currently being revised (project launched in 2016) and aims to provide more precise proposals for the classification by using artificial neural networks. DPMA provided technical details about this electronic classifier and its current revision (see the original response) and the revised system uses a methodology based on neural networks with “distributed word representations“. Experiments with different training sets consisting of selected publications of German patent applications, granted patents and utility models from the year 2010 to the end of the year 2015 were carried out. DPMA obtained the best results from a training and test set consisting of approximately 350,000 documents of publications of patent applications and patent grants, with which a Top Prediction of 81 per cent and Three Guesses of 89 per cent were achieved. DPMA plans to provide the following business solutions: Automated pre-classification of incoming patent applications, Interactive classification with suggestions of several predictions at a given IPC level, re-classification, and continuous quality improvement of IPCs of prior art patent documents.

18. Accuracy is the priority at another IPO which is looking for the best technological choice. The Instituto Nacional da Propriedade Industrial (INPI) of Brazil is focusing on a pre-classification task as one of the first AI applications and reports that INPI, Brazil currently has an initiative for the development of a neural network focused on pre-classification and distribution of applications among the technical divisions. INPI, Brazil indicates that there is urgent need in regards to adequacy, with implied learning and retraining processes, for greater reliability and evolution. Based on their research, the most adequate tool would be the Math Lab solution.

19. JPO is also testing an AI application in automatic patent classification and explains the method of the evaluation test is on a business solution to assign patent classifications (suggestions for patent classifications (F-terms), and grounds for assigning these classifications). Its system uses the text data of already filed documents, to which patent classifications were assigned.

20. The Intellectual Property Office of Singapore (IPOS) utilizes natural language processing to understand patent documents and to automatically sort them in the relevant specialization, saving work for the Patent administration team. IPOS is currently exploring the feasibility of implementation of this system.

21. UKIPO has conducted small-scale trials of automated tools, both for allocating patent applications to examining groups based on areas of expertise, and for applying classifications to applications. So far, the Office has found that results would seem to suggest that commercially available tools are not mature enough and cannot be relied upon to correctly classify the application on all occasions without human intervention, but could potentially be used to aid the examiner during the classification process by suggesting possible classification terms for ratification by the examiner. When used in the allocation process, results seem to suggest that existing tools could not match the 80 per cent manual success rate currently achieved by human allocators, but again could be used to aid the allocators by suggesting possible destinations for the application which alone might speed up the allocation process. However, the Office is currently looking for new tools in this area which could be deployed as part of a redesigned workflow process in future.

2) Automatic Recommendation of Class for Goods and Services of Trademark Applications

22. AI is effective at predicting the result of matching in hierarchically-structured terminologies as demonstrated in automatic patent classification. Similarly, to identify the most relevant class for goods and services for which a trademark protection is sought could be effectively automated by AI applications. Some IPOs have already found solutions in this area.

23. In China, the State Administration for Industry and Commerce (SAIC) uses "the Standard Goods System". This system allocates all goods items into similar groups so as to establish the Goods Relation Dictionary. With this dictionary, the system automatically allocate newly-supplied goods into the respective similar group. For goods supplied for the first time, a mother goods would be designated to begin a group.

24. IPOS of Singapore utilizes Natural Language Processing to automatically recommend relevant classes for a trade mark application, helping applicants choose correct classes and thus reducing the rejection rate due to incorrect class selection (Class Recommendation Tool). This help saves applicants costs and decreases turnaround time by reducing resubmissions. It also automatically selects the registered text descriptions that are most similar to each text description in a trade mark application. This helps officers speed up the examination step of similarity to other trademarks and thus reduce turnaround time. IPOS has partnered with A*STAR, a local Research Institution to implement this system. Projected completion date is mid-2019.

25. JPO is also testing a pilot system empowered by AI, for assigning trademark classifications of designated goods and services so that the system may assign tentative similar-group codes to unclear designated goods and services in trademark applications, and the system checks whether or not the fundamentals of applicants' designated goods and/or services need to be modified after amendments have been made to their trademark applications.

3) Patent Prior Art Search and Analytics

26. This is an area where services using AI applications have been made available for a while. Certain IPOs have taken advantage by using several services.

27. The Canadian Intellectual Property Office (CIPO) provides feedback on their usage of commercially available services and evaluates tools relying on machine learning algorithms to better detect linkages between citations, applications, and provides the list of tools with short descriptions as used at CIPO:

Patent Search Services:

- Questel – Orbit (https://www.questel.com/): web-based services for productivity and collaboration dedicated to intellectual property with search, monitoring, analysis and idea-to-asset management capabilities.
- STN (https://www.cas.org/products/stn): access the world's disclosed scientific and technical research
- Clarivate Analytics (https://clarivate.com/product-category/patent-research-intelligence-and-services/): gives access to a large scientific citation index and an editorially-enhanced patent database with over 1.75 million journal publications and more than 200,000 clinical trial records.

- Google Suite (Translate, Patent, and Scholar): machine translation and access to full-text documents and claims forms from contributing international patent offices in real time with the added addition of being translated, providing citation metrics and related scholarly publications.

Data Manipulation:

- Vantage Point (https://www.thevantagepoint.com/): text-mining tool for discovering knowledge in search results from patent and literature databases while provided methods to refine, automate, import, etc. the raw data produced.

28. The IPO of Finland has also tested a system called Teqmine by Teqmine Analytics Oy for patent classification and prior art search. The system finds publications that are similar to the application being analyzed by using the vocabulary and bigrams of the application. The input to the system is the text (description, claims, and abstract) of the application. Based on the frequency of the words and bigrams extracted from this input file, the system determines the activity levels of a number of topics, and determines a number of similar publications where these topics are active at similar levels. These topics were generated when the system was trained on the whole patent corpus (WO, US, and EP patent publications from the past few decades). The system processes a patent application in less than two seconds. The publications in the output file are usually broadly related to the topic of the application. Often at least a portion of the most common patent classes of the publications are related to the application in a meaningful way. However, sometimes the publications are not related to the application or invention, especially when the application uses very common words to describe the invention. The system thus cannot be relied upon to find the relevant prior art, but it may in some cases point towards a useful direction. Currently, the system does not significantly speed up the prior art search. The Office's near-term aim is to compare the system to existing commercial systems (such as Innovation Q Plus) for finding documents that are similar to a given sample text.

29. UKIPO has also conducted a trial of a commercially available tool, Derwent Innovation. The Office explains that this patent search tool comprises, amongst other features, a semantic/smart search functionality that allows large amounts of plain text (e.g. claims, description) to be used as a search input. The search tool also has the ability to search non-patent literature alongside patent documents. Further features include the ability to manually set weightings of individual search terms in order to rank results in an answer set.

30. JPO is currently testing an AI application for prior art searches in support of formulating search terms and queries and explains that a system developed in-house would allow examiners to find keywords and patent classifications, which should be included in search queries. Closely related keywords and patent classifications would be grouped together. The system uses the text data of examined patent documents and the retrieval history of search queries used in the examinations.

31. In collaboration with the national public research institute, Electric Telecommunications Research (ETRI), in April 2017, the KIPO started to undertake a pilot model that would allow for intelligent patent searching as well as AI-assisted customer service. To enhance the quality of prior art search, KIPO is moving away from keyword search to a search system based on syntax and semantics. Presently, claims in patent documentation are being used to analyze patent language and to study semantic patterns among claims. A pilot model is hoped to be finished by 2019.

32. FIPS of Russian Federation is conducting research on application of AI methods in the IP field. FIPS considers AI most effective in information retrieval for the examination of inventions and utility models. In the first half 2018, FIPS will obtain the first results of using artificial neural networks and methods of deep learning to increase the efficiency of similarity search for examination of inventions and utility models. FIPS has provided initial results of developing "similar" documents search functionality based on co-referential links, elements of synonyms and semantic links metering. FIPS is also studying the possibility of significant improvement of "similar" documents search based on technologies of AI systems, namely neural network technologies. FIPS provided technical details of convolutional neural network algorithm to be used for similar patents search (for further details, see the original response). FIPS has evaluated the use of AI applications and states that first experiments offer the prospect of getting the result that allows finding document references that can be used at examination as to novelty in the top ten search results with a probability of 60 per cent while searching for similar documents.

33. The IPO of Morocco (OMPIC) uses a commercially available AI-powered patent analytics tool for Technology and Innovation Support Centers in that country. The Office reported that it had a map-based analytical tool which searched global patent applications by technical domain or keywords. The search obtained all relevant information as well as statistical analyses of the searched patents. OMPIC currently used the Orbite Intelligence solution. The map-based analytical tool was introduced to meet the needs of the Moroccan Technology and Innovation Support Center network for searching the state of the art and the precedence of patents. Since 2011nearly 800 requests had been dealt with using this tool which as seen as adding significant value in the analyses of the network members.

4) Trademark Image Search

34. The use of AI for searching similar figurative elements of trademarks and device marks has already been proven successful. WIPO Global Brand Database launched an AI-empowered image search tool for trademarks that the public can use for free of charge in 2014. Since then, some IPOs have deployed either in-house developed or commercially available image search tools using AI applications for trademark searches.

35. IP Australia uses Australian Trade Mark Search – Image Search (Live) – to search for existing trademark images, based on a given image. Australian Trade Mark Search uses the commercially available TrademarkVision Image Recognition software for image search functions.

36. Instituto Nacional de Propiedad Industrial (INAPI) of Chile has a cooperation with the Engineering School of the University of Chile to develop an image searching system based on an algorithm developed by the Engineering School. The system is under evaluation with the trademark examiners.

37. SAIC in China is developing an Image Search System which provides relatively accurate and reliable results. This system can search backwards to give figurative elements and results would be input into the system after examiners' confirmation. In this way, the system can achieve self-innovation and self-learning and search efficiency would be improved.

38. JPO is testing AI applications for searches of figurative trademarks. JPO plans to eliminate noise in search results based on the International Classification of the Figurative Elements of Marks or the Vienna Classification (so as to eliminate trademarks that are clearly dissimilar to claimed trademarks).

39. The IPO of Norway (PRH) uses a commercially available tool (Acsepto for trademark version 10, by Sword-Group, France) and reports a very good experience in that the Office finds AI applications useful to prioritize search results (hit list). The AI technology used is commercially available trained algorithms for coding. While the most "similar" trademarks often were the same, there are very large differences if AI and non-AI solutions are compared for their results in reporting hits of lower degrees of similarity. PRH considers that this comparison shows that a mix of strategies, training with larger amounts of data, and a user-assisted search setup, or a setup covering more different strategy would give even better results.

40. IPOS of Singapore allows customers and examiners to search by providing a search image versus the traditional keyword search (Trade Marks Image Search). It utilizes AI to enhance processes such as:

- recognizing non-abstract elements which enables the finding of conceptually similar yet visually dissimilar marks,
- finding of conceptually similar words and devices from words of different languages,
- assisting in mark segmentation such that individual elements within a composite mark could also be searched for.

41. The European Union Intellectual Property Office (EUIPO) developed its image search system integrated in its trademark database called TMVision, which is made available to examiners of EUIPO and to the public on its Website.

5) Trademark Examination

42. Some IPOs further expanded AI applications to trademark examination as a whole.

43. IP Australia is developing and using "Smart Assessment Toolkit" (under development), which is a collection of advanced models designed to support trade mark examination and predict objections. Smart Assessment Toolkit uses a combination of natural language processors and internally developed software, trained by a dataset of historic adverse reports from 2008 to 2016 to detect similar existing trademarks. Once trained, it provides high ranking results to the user.

44. IPOS of Singapore utilizes machine learning to automatically measure the distinctiveness of a given word mark and also to suggest evidence for the measurement (Trade Marks Distinctiveness Checker). This helps officers speed up the examination step of distinctiveness and thus reduces turnaround time. The automatic measurement of this task can be also used by applicants, in order to reduce rejection rate due to undistinctive word marks. IPOS has partnered with A*STAR, a local Research Institution to implement this system. Projected completion date is mid-2019.

6) Helpdesk Services and Assisting Tools for Applicants

45. This area is also a promising area for AI applications, as replies to questions are predictable by AI algorithms. Some IPOs have started to use AI applications to assist IPO staff at the helpdesk.

46. IP Australia developed and uses "Trade Mark Assist (Beta)" which is IP Australia's in-house developed system and is an interactive 24/7 tool designed to educate and assist unrepresented trade mark applicants (in particular Small and Medium Enterprises) through the initial stages of the application process. According to IP Australia, Trade Mark Assist uses publicly available word association models for searching Goods and Services and classifications. The model is being trained by trade mark examiners on a regular basis, who are given a list of terms and rank result relevance.

47. JPO has gained some experience on its system to respond to questions from users by phone, e-mails etc. and reported that the AI-based systems suggests possible answers to the staff responsible for responding to questions from users and the system also provides an automatic answering function (AI-based systems will answer questions submitted by e-mails, chat messages, or verbal messages). JPO has completed the evaluation of the system and reports on reliability and accuracy of the system that, although the scope of learning was limited to responding to questions related to only certain business operations, the system achieved a top-five accuracy rate of 80 per cent (Top-five accuracy rate means the rate at which the correct answer is among the five most likely answers suggested by the system).

48. KIPO plans to develop and refine a pilot model of an AI patent customer service system based on text and voice recognition over the next three years.

49. The IPO of Uruguay uses its in-house developed Notifications System. The online filing system works along with the notification system. The Office is developing a more sophisticated algorithm that intends to learn when a particular user is no longer using the system or has not been using it for a while. In these cases, the idea is to put notice in the corresponding area of the Office so that other notification efforts could be started. Considering that the notification system is properly backed up with the appropriate laws and decrees, the Office could put all confidence in it and consider that an event is notified when the corresponding amount of days went by without notice from the owner. The idea is that the Office could work along with the owner, trying to do its best to achieve a good resolution for a specific application and therefore for the owner. The Office provides further details of the algorithm (see the original response).

7) General Administrative Tasks to manage IP Files Prosecution and Formality Checks

50. IPOS of Singapore is exploring a tool “Patents auto checker” which utilizes Natural Language Processing (NLP) and other machine learning technologies to perform the formalities check automatically. IPOS is currently exploring the feasibility of implementation of this system.

51. SAIC of China uses “the Automatic Administrative Region Matching System”. By using this system, administrative region can be fixed to provide data support for future regional statistical analyses.

52. JPO uses AI to enhance the quality of digitized data from image data in converting patent filings into machine-readable data and reported on the methods, waiting for the result of the on-going evaluation test.

53. OMPIC of Morocco also reported on its AI-assisted OCR. The system uses the digital methods for the translation of images of printed text based on the ABBYY recognition engine. The method obtains information from pdf files and to introduce them into OMPIC databases following a well-defined structure (template). Check rules are then applied to ensure accuracy. Incorrect data are passed for video-coding. Optical Character Recognition permits a reduction in processing delays in extracting data managed by OMPIC within these activities and to reduce the cost of manual entries of more than 1 million documents. The positive experience also extended to the processing of patent documents.

54. IPO of Serbia uses WIPO Patent OCR Proofreading Platform. The WIPO OCR platform has potential capabilities to use machine learning for improved OCR proofreading. Due to limited local language resources in ABBY OCR (inadequate dictionary and grammar rules), machine training still adds minor value to OCR proofreading quality. The major problem which degrades OCR correctness in their experience was the presence of multiple scripts used in documents (Serbian Cyrillic, Serbian Latin, English, Chemical and Mathematical formulas).

8) Machine Translation, Linguistic Tools and Terminologies

55. AI-empowered neural machine translation has been made available in the market for a while. WIPO has also developed neural machine translation to launch WIPO Translate in 2016 in order to cater for specific needs of translation in patent area. WIPO Translate was integrated into PATENTSCOPE for the public to freely use.

56. A few IPOs also developed AI-based machine translation specific to the IP area. The European Patent Office provides such machine translation in its patent databases. The Swedish Patent and Registration Office and UKIPO report that their patent examiners are trained to use EPO's patent translate tool, which is also made available to the public.

57. KIPO established a database using Patent Publication Data on the IPC Section H for machine learning. The database will be compiled with 100,000 terminological entries of patent technology and one million pieces of patent language analysis and drawing tagging information.

58. IPO of Serbia is planning to take advantage of machine learning during manual OCR proofreading (provided by WIPO), in order to enhance dictionaries and design specific processing rules for patent documents in the Serbian language. In the scope of EPO Patent machine translation project, IPO-RS provided corpora of full-text patent specification document pairs (Serbian/English) for specific machine translation learning purposes. The specific machine translation tool for Serbian language in currently available databases has not produced satisfactory results.

59. EUIPO uses a commercial Multilingual natural language tool called Babelscape for internal examiners.

9) Data analysis for economic research

60. CIPO, Canada and its Economic Research and Strategic Analysis Unit uses AI to help them conduct semantic searches and to collect, scrub, and analyze large datasets.

61. OMPIC of Morocco also uses AI for data analysis and describes it Qlikview system as follows: The decision making solution at OMPIC under Qlikview permitted the handling of the megadata from different databases at OMPIC wherever they were stored and created a statistical database for reporting and quality control. The solution permitted the generation of new views of the information on the fly, compressed the data and stored them in memory, permitting their availability for immediate searching by multiple users without being limited by predefined paths in the hierarchy or preconfigured dashboards. The decision solution responded well to the needs of OMPIC and its clients. Reliable and easy to use, it has permitted the automation of the different reporting dashboards and to present them in graphical or tabular form. The tool was used to generate a statistical barometer for industrial property for the general public and available under the link www.barometreompic.ma.

WIPO'S AI APPLICATIONS

62. WIPO developed several in-house systems and tools using AI. A brief explanation of each tool is provided below.

Automatic Patent Classification System (IPCCAT)

63. This system has been publically available since 2004 and is currently available either through the International Patent Classification (IPC) publication platform, IPCPUB, or directly as a web service to help IP office examiners and public users to identify relevant IPC subclasses with text, for example, the specification of a patent application. IPCCAT uses neural network technology in the form of an algorithm based on a specific implementation of the Winnow algorithm and is retrained on an annual basis by using information from patent documents with updated IPC. Training sets consist of 27 million patent documents in English and 4.5 million in French, extracted and processed by using an original training set preparation algorithm. The three guesses precision at IPC main group level is 81 per cent. While the tool with this precision is helpful to provide clues or hints to applicants and classifiers for further classification at subgroup level and to categorize patent applications into technical units at IP offices, a fair level of precision in predictions at sub-group level is required in order to make intellectual classification work more efficient. In this regard, the project to expand IPCCAT to subgroup level started in 2017 and is ongoing at the time of the preparation of this document. Based on the preliminary assessment, it is expected that a similar level of precision could be realized even at subgroup level and could be introduced into production in the near future.

Trademark Image Search in Global Brand Database

64. Image similarity searching was introduced to Global Brand Database as a world premiere in 2014. Since introduction improvements to the algorithm have been made using open source software and the possibility of applying deep-learning to improve the image similarity software is planned.

Machine Translation - WIPO Translate and Cross Lingual Information retrieval (CLIR)

65. WIPO customized statistical machine translation software for patent texts (WIPO Translate). It has been available for internal applications since 2011 and also shared with the Eurasian Patent Office. Neural Machine Translation recently replaced Statistical Machine Translation in WIPO Translate and it is planned to make this available via a cloud application using an Application Programming Interface. The latest version of WIPO Translate is available to the public on the WIPO website for translation of short texts provided by the user and for gist translation of descriptions and claims included in PATENTSCOPE. It is used to improve efficiency in translating international applications of PCT and the possibility of providing machine translation services to external companies for a fee is being investigated. CLIR was introduced in PATENTSCOPE in 2010 using a statistical machine learning algorithm to provide multi-lingual search assistance. Since 2010 the number of languages has increased to provide searching in 14 languages. This software is provided free-of-charge to IPOs and to commercial users for a fee.

EVALUATION, EXPERIENCE AND LESSONS LEARNED

66. Most IPOs that reported on their use of AI seem to be generally satisfied with performance and positive impact of AI applications. The experimental use and in-house developed systems have more challenges such as reliability and accuracy. Business solutions being tested at the moment are essentially limited to largely predictable and patterned tasks. The extent to which AI applications cover is still limited probably with a notable exception of USPTO which has established its in-house advanced analytics program using AI to enhance an understanding of USPTO policies, processes and workflows. More sophisticated tasks are likely to be more difficult to use AI applications.

67. Nonetheless, responses from IPOs are optimistic and promising for further expansion of AI applications to IPO administration. For instance, one of the most apparent advantages is cost saving. IPOS of Singapore estimates cost saving of about 5,000 examiner man hours annually at current rate of filing and would increase proportionately with filing rates by using Trade Marks Outcome Simulator (Trade Marks Image Search, Class Recommendation Tool , and Distinctiveness Checker). On the other hand, no IPOs discussed negative impact of AI applications in their responses. The International Bureau of WIPO also shares views of the majority and sees promising possibilities of AI applications based on its own experience in the course of improving and providing WIPO's services. However, challenges for change management and a possible need for revising policies for IP administration have been already indicated by some IPOs.

68. IP Australia states that variation in examination decision making (over time and between examiners) makes it very difficult to determine the ground truth and test accuracy of machine learning algorithms. Australia has also experienced difficulties in documenting what a machine learning model has learned over time, and how this has impacted the models outputs. IP Australia has drafted a framework and policy to govern and help manage the risks associated with automating IP Rights administrative decisions (Automated Decision Making Governance Framework and Policy).

69. The Secretariat, based on experience gained through Machine Translation, considers that AI technology is very promising and can bring surprisingly good results, but that caution is needed to avoid overestimating the potential of AI technology and in order to manage expectations. Results are dependent on the availability of good-sized corpora and these can be very expensive to collect and curate. Member States may wish to consider the possibility of cooperation in this regard to further the common interest in obtaining mutually beneficial results.

70. Many IPOs are expected to gain more experience in coming months and it may be useful to provide an opportunity to IPOs for the exchange of experience and lessons learned.

[End of document]