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Art of Possible with AI/Generative AI in Patent Search



1. Abstract

Intellectual property (IP) is important from the perspective of fostering innovation, protecting inventions, and driving economic growth. IP Management process has undergone phenomenal development over years with an improved efficiency, effectiveness, governance and transparency. Novelty search plays a vital role in the process and continues to be on the critical path taking the majority of the time in the IP Management Process. Hence businesses are considering proactive management of IP especially novelty or originality search phase for securing competitive advantage.

Advancement in technology over years especially during and post pandemic period demands protecting innovations and their ownership to retain competitive edge and promote continuous development. The overall patent search process today faces numerous challenges across data availability, technology adoption, governance and political aspects.

Artificial Intelligence (AI) is contributing to technological development across various industries, driving transformation and radical changes which contribute to modernization initiatives. The adoption of Artificial Intelligence (AI) and Generative AI (GenAI) in the intellectual property (IP) domain presents numerous opportunities to enhance efficiency, accuracy, and strategic decision-making.

Patent management software are tools and platforms designed to help various personas across patent life cycle. Patent search software in particular designed to help individuals and organizations in search, retrieve, and analyze information related to patents. While AI/GenAI has a potential to contribute across life cycle, it is pertinent to prioritize adoption opportunities considering the impact areas such efficiency, accuracy or any other benefit. The integration of AI/GenAI into patent search software enhances the overall user experience, increases the accuracy of search results, and enables more sophisticated analysis of patent landscapes.

This paper appreciates the importance and complexities of IP search process, technology advancement especially with AI/GenAI technologies in focus along with deliberating possible opportunities for implementation within IP management life cycle.

Keywords: implementation, deliberating, technologies, adoption

2. Intellectual Property across the Globe

2.1. Growing traction in IP activities across the Globe

Innovation and creativity are fundamental human qualities. The ingenuity of innovators and creators in developing countries goes unrewarded, and as a result their countries miss out on many potential advantages. That is where the intellectual property (IP) system can play a critical role. Used strategically by governments, businesses and the non-profit sector, IP can generate huge economic, social, and cultural benefits.

Over the past two decades, the policy debate over IP's role has come under an increasingly active and coordinated attack, driven by Intellectual Property Rights skeptics' and opponents hailing from a variety of academic and multilateral institutions, nongovernmental organizations (NGOs), and some developing nations and policymakers therein.

With global digital disruption coupled with unprecedented situations like Covid-19 pandemic there has been a significant increase in innovative activities across the world. This has caused steep rise in demand for Intellectual property (IP) titles resulting into the stress on IP offices. Though Intellectual Property (IP) domain globally is catching-up off late through various initiatives, IP offices continue to face challenges around longer processing time, bureaucratic delay and lack of transparency.

Businesses are increasingly considering IP as a strategic asset essential for growth and competitive advantage. They are proactively managing IP through development of extensive IP portfolios, licensing, and aggressive efforts to protect IP rights are considered to be of strategic importance for the companies. In the knowledge-based global economy, importance of IP activities will continue to increase, driving innovation and economic growth of the organizations. The ongoing evolution in IP frameworks will be critical in managing new challenges and opportunities in this continuously developing environment.

The advancement in technology has further amplified the importance of IP. The spread of digitalization, and adoption of technology platforms has increased the need for robust IP protection. In response, governments and international organizations are enhancing regulations and enforcement mechanisms. The World Intellectual Property Organization (WIPO) plays a pivotal role in harmonizing global IP policies and facilitating cross-border IP protection.

2.2. Challenges faced in the patent search process

The patent search process is facing a number of challenges contributing to delays in overall processing timelines and ability to secure intellectual property rights.

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- Volume of existing patents - With the increase in innovation activities, millions of patents are filed globally, examining this huge volume of data to find similar prior art can be an overwhelming task.
- Highly complex technical and legal language – Patents are written in highly complex technical and legal language which further complicates processing efforts. Vague and complicated documentation can amplify process challenges.
- Variations in the patent classification systems – Countries across the globe have adopted variety of classification system which makes it difficult for process automation. There are efforts like the International Patent Classification (IPC) system established with an objective to standardize classifications, discrepancies still exist, leading to inconsistencies and gaps in search results.
- Quality of Patent databases - Some patent databases being more comprehensive and up to date than others resulting into incomplete search and delays in the processes.
- Complexity of patent claims - Patent claims are the legal definitions of an invention's boundaries, and they can be broad or narrow, often using ambiguous or overly complex language. Interpreting these claims accurately requires a deep understanding of both the technical field and patent law, which can be challenging for inventors and businesses without specialized expertise.
- Commercial viability - The cost and time associated with conducting thorough patent searches can be expense processes for businesses.

3. Artificial Intelligence disruption

Modern technologies such as Artificial Intelligence (AI) are changing the way technology is adopted across industries. AI is bringing radical changes and advancement in the way technology is integrated into the business processes. AI's ability to process large volumes of data, recognize and relate patterns, and help make decisions with minimal human intervention is improving the pace at which new technologies are integrated into business processes. Process automation is one of the important aspects of technology adoption for improving efficiency and effectiveness. AI-led systems are able to execute complex tasks that traditionally required human intelligence at much faster pace. This not only enhances efficiency but also reduces operational costs, allowing companies to adopt advanced technologies more rapidly and at a lower cost. Various industries are leveraging AI capabilities to their advantage across process improvement, helping customers to make better decisions, sales/cost prediction, self-help capabilities and many more.

3.1. Art of possible with AI/GenAI

AI and Generative AI technologies enable the automation of complex and lengthy tasks, enabling repeatability and freeing up of human efforts. This enables deployment of human capital to more strategic and critical work. These technologies help enhance decision-making by generating real-time insights and predictive analytics. AI-driven personalization helps contextualizing experiences and products to individual needs, increasing end user satisfaction and engagement.

The following are the possible areas of contribution across domains and industries.

1. Process Effectiveness

- a. Data extraction and mining - AI technologies help enhance the effectiveness of data extraction and mining by automating and streamlining processes, which reduces the time and effort required for manual data handling. These technologies improve the accuracy and reliability of data by employing modern algorithms that minimize errors and detect inconsistencies. They enable real-time data processing and analysis, allowing businesses to make quick, data-driven decisions. AI's ability to recognize complex patterns within vast datasets uncovers valuable insights that might otherwise remain hidden. Additionally, AI-driven solutions are highly scalable, efficiently handling increasing data volumes without compromising performance.
- b. Insights and inferences - AI technologies dramatically improve the effectiveness of deriving insights and inferences from data. By leveraging advanced algorithms, these technologies can quickly identify patterns, trends, and correlations that might be overlooked by human analysis. This leads to more accurate and actionable insights. Real-time processing capabilities allow for the immediate generation of inferences, enabling businesses to respond swiftly to emerging opportunities and threats. AI also enhances predictive analytics, providing forecasts and scenarios that support strategic planning.
- c. Prediction - AI technologies enhance the effectiveness of predictions by utilizing sophisticated machine learning models that analyze historical data to forecast future trends and outcomes with high accuracy. These technologies enable real-time predictive analytics, allowing businesses to anticipate and respond to market changes swiftly. By identifying hidden patterns and relationships within vast datasets, AI can generate more reliable and detailed predictions. The scalability of AI ensures that predictive models remain effective as data volumes increase, continuously refining their accuracy. AI's ability to integrate diverse data sources leads to comprehensive and nuanced predictions, supporting better strategic decision-making.

2. Efficiency

- a. Generation - AI technologies significantly enhance efficiency by automating data generation, reducing the need for manual data collection and entry. These technologies can produce high-quality synthetic data that mirrors real-world scenarios, filling gaps in datasets and improving model training. Real-time data generation capabilities enable quick adaptation to changing business needs, ensuring timely insights and responses. AI-driven data generation supports the creation of extensive datasets for comprehensive analysis without the associated time and resource costs.

- b. Classification and grouping - AI technologies greatly improve efficiency in classification and grouping by automating the categorization of large datasets with high accuracy. Advanced algorithms can identify and label data points, reducing manual sorting efforts. Real-time classification capabilities enable instant organization of incoming data, enhancing responsiveness and decision-making. AI can uncover subtle patterns and relationships, leading to more meaningful groupings and better insights.
- c. Translation - AI technologies enhance efficiency in multilingual translation by automating the translation process with high accuracy across numerous languages. These technologies quickly convert text, reducing the need for manual translation and accelerating communication. Real-time translation capabilities enable instant comprehension and response in diverse linguistic contexts. AI can handle nuanced language differences and idiomatic expressions, improving the quality and relevance of translations.

4. Opportunities for adopting AI/GenAI in overall IP domain

The introduction of Artificial Intelligence (AI) and Generative AI (GenAI) into the intellectual property (IP) space offers a broad range of advantages in terms of process efficiency, accuracy and strategic decision-making opportunities. These advanced technologies serve to modernize all manners of IP management, right down from performing patent searches and legal analyses to optimizing portfolios.

- Automating the patent search process: By automating the search process, artificial intelligence (AI) algorithms can analyze much larger volume of data more quickly and accurately than traditional methods. This in turn saves inventors and businesses time as they seek to work within the extensive network of existing patents. GenAI, which can be used to draft patent applications, also generate detailed and accurate descriptions and claims Drawings aid for streamlining the application process.
- Patent Examination: AI can help examine whether an invention is novel and non-obvious with the examiner doing a validity check. Comparison of new patent to existing patents — In general, machine learning models can be used for comparison between the newly applied patent and other publications, showing related previous art in an efficient way. This can lead to a better quality of patent exams and in turn reduce the likelihood that patents are granted on already disclosed inventions.
- The manual process of patent search: As we have already lightly mentioned, doing a DIY/unprofessional job on your research would increase the possibilities of processing errors. It also adds to more rework and waiting for the release. Being able to scan through this content and quickly identify any instances of unauthorized use for example can provide an invaluable assist in the management of trademark & copyright. They can embrace a proactive strategy that enables IP holders to enforce their rights better and take swift legal action against infringers.
- IP portfolio management with the help of AI and GenAI: Based on the market trend, competitor actions and technology move AI tools can give strategic inputs to optimize IP Portfolio. This gives companies the ability to better understand what patents they have left, and which deserve investment (further litigation, licensing campaign) or should be disposed of.
- AI's role in IP litigation: In legal contexts, AI can support IP litigation by analyzing case law, predicting case outcomes, and assisting in the preparation of legal documents. This can significantly enhance the efficiency and effectiveness of legal teams handling

4.1. Current state of AI/GenAI adoption in Patent search softwares

Patent management software are tools and platforms designed to help various personas across patent life-cycle. Patent search software in particular designed to help individuals and organizations in search, retrieve, and analyze information related to patents. These software solutions are valuable for researchers, inventors, intellectual property professionals, and businesses looking to understand the patent landscape, assess the novelty of inventions, and monitor developments in specific technology areas. Patent search software contributes to informed decision-making, strategic planning, and effective management of intellectual property. It plays a crucial role in enhancing innovation, minimizing legal risks, and staying competitive in rapidly evolving industries.

The history of patent search software has evolved in tandem with technological advancements and the increasing volume of patent data. The evolution journey ranged from manual processing during early days to introduction of online data bases to development of comprehensive search platform to softwares with sophisticated visualization and reporting solutions. Modern patent search softwares are well integrated, developed on modern cloud platform and are far more collaborated.

Overall, the history and advancement of patent search software reflect a continual effort to make patent information more accessible, efficient, and insightful for researchers, innovators, legal professionals, and businesses. The integration of AI, advanced analytics, and collaborative features continues to shape the landscape of patent search tools.

Patent management softwares are undergoing transformation particularly in areas of data base access, relevance assessment, efficient filtering, and other advanced features.

Some of the leading private/semi-private software companies in the field includes - Google Patents, Clarivate, Thomson Innovation, PatBase, Questel Orbit, PatSnap, IP.com, WIPO's PATENTSCOPE, EPO's Espacenet, FreePatentsOnline (FPO) (Not a comprehensive list).

These software companies have started embracing next generating technologies and have been continuously modernizing their products. While the adoption is varying level of maturity across these companies, there is definite effort to

continuously improve the offering with AI/GenAI. Following are some of the use cases these software companies are working on –

1. Understand and interpret the context of the search in plain language and simplify communication
2. Categorize patents and enable faceted search
3. Discover related patents and relevant prior art
4. Analyze large datasets of patent information to identify trends and patterns
5. Seamless linkage of patent, literature, legal and featured data like valuation estimates, name standardizations, translation
6. Technical solutions using GPT AI search

5. Prioritizing opportunities & recommendations

Whereas AI/GenAI indeed can make a difference in the entire life cycle, it is crucial to define where adoption should start and what areas of your processes would be most affected by things like efficiency or quality improvements.

AI/GenAI integration is achieving better results, superior user experience with patent search software and multiple advanced layers in the analysis of your patent landscapes. Now this is expected to open a lot of opportunity areas as the technology included will get evolved but its cost-benefit analysis is going to help you prioritize these opportunities. Opportunities and recommendations for prioritization are as follows.

Likewise, it is essential to develop interactive search tools that offer cognitive support directly to the user requiring minimal effort from them. And these tools simultaneously need to be created with users, taking into account how they work and what their expectations are.

1. **Automation - Prior Art Searches:** Automation related to prior art searches can save a lot of time & costs and thus, increase the ability for identifying correct patents. The search accuracy and speed can be improved by developing AI-powered Search tools that take advantage of Natural Language processing (NLP) & Machine learning. Something like be automated further with a little bit of NLP, and if it is expanded upon to integrate across multiple patent data bases — then this could help reduce the time taken for searches while retaining or even surpassing coverage.
2. **Insights & Data Analysis:** Deep learning-based analysis of the different set of data across phases can help form meaningful insights into technology trends, competitor landscapes. Patent offices, patent management software providers, service firms and research agencies can use AI assisted tools to create an in-depth analysis of a specific field for strategic purposes or gain competitive advantage.
3. **Patent Drafting Assistance:** AI/GenAI may also be deployed to help in patent drafting thus reducing pressure on the Patent professionals and providing more quality application by using prebuilt templates or translation tools or with a self-help/knowledge mining BOTs. This process can be extended to developing claims and then writing the supporting documents as well. These tools can also be matched with the drafting workflow of existing workflows for producing further performance enhancement without disturbing established procedures
4. **Detection and Monitoring of Infringements:** AI/GenAI can serve as a vigilant guardian to remain alert 24×7, detecting on its own (or with some human intervention) if any patent has been infringed upon. Patenting Offices, governmental bodies and regulators can then use monitoring AI tools that check if the patents are being used correctly with access to large part of their all data. In such solutions, can be also have a good set of mitigation process/systems to control if anything bubbles up as anomaly. These monitoring solutions are also extended across multiple digital platforms.
5. **Predictive Analytics:** AI/GenAI can be of help in predicting the confidence level of patent grants and potential legal challenges, thus informing strategies. The viability analysis, the existing gaps within a focused domain or impact analysis are the classic use-cases where this technology finds natural suitability to contribute to the process.
6. **Cross-Language Capabilities:** AI/GenAI can be of help in predicting the confidence level of patent grants and potential legal challenges, thus informing strategies. The viability analysis, the existing gaps within a focused domain or impact analysis are the classic use-cases where this technology finds natural suitability to contribute to the process.
7. **Generic recommendations:**
 - **Integration:** Existing IP management systems can be enhanced and can find increased adoption, effectiveness with enablement of AI/GenAI tools.
 - **Training and Enablement:** Invest in training for IP professionals to effectively use these advanced tools, maximizing their potential benefits.
 - **Continuous Evaluation:** Regularly assess the performance of AI and GenAI tools and update them as necessary to keep pace with technological advancements and changing needs.
 - **By prioritizing these opportunities and following these recommendations,** organizations can harness the full potential of AI and GenAI to transform their patent management processes, drive innovation, and maintain a competitive edge.

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7. Bibliography

Table 1: Bibliography

Terminology	Definition
AI (Artificial Intelligence)	The simulation of human intelligence processes by machines, especially computer systems.
Automation	The use of technology to perform tasks with reduced human intervention.
Classification Systems	Systems used to organize patents based on their technical features and fields.
Data Extraction and Mining	The process of retrieving relevant data from various sources and identifying patterns within large datasets.
Digital Age	The current era characterized by the widespread use of digital technology and the internet.
Efficiency	The ability to accomplish a task with the least waste of time and effort.
GenAI (Generative Artificial Intelligence)	AI that can generate new content, such as text, images, and music, based on the data it has been trained on.
Intellectual Property (IP)	Legal rights that result from intellectual activity in the industrial, scientific, literary, and artistic fields.
IP Portfolio	A collection of intellectual property rights owned by a single entity.
IP Search	The process of searching for existing intellectual property to identify prior art, assess novelty, and determine patentability or infringement potential.
Multilingual Translation	The process of translating text or speech from one language to another, across multiple languages.
Patent	A government authority or license conferring a right or title for a set period, especially the sole right to exclude others from making, using, or selling an invention.
Predictive Analytics	The use of data, statistical algorithms, and machine learning techniques to identify the likelihood of future outcomes based on historical data.
Scalability	The capability of a system to handle a growing amount of work or its potential to accommodate growth.
Trademark	A symbol, word, or words legally registered or established by use as representing a company or product.
WIPO (World Intellectual Property Organization)	A global forum for intellectual property services, policy, information, and cooperation.