Patent Protection for Artificial Intelligence in Europe

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Abstract - Many Applications should concentrate on the technical issues the innovation is tackling or specify the specific technical advances in order to increase the likelihood that artificial intelligence-related inventions will be eligible for patents at the European Patent Office. One of the most important intellectual property offices in this area is the European Patent Office, whose policies and practises for determining whether ideas relating to artificial intelligence are eligible for patents have a large global impact. European synthetic According to patent analysis, intelligence technology is the greatest in the world. Machine learning and artificial intelligence technologies are frequently unsuitable for patents since they are based on mathematical techniques, according to the European Patent Office view in the Guidelines. Except when they are a part of a technical application.

Keywords- Artificial Intelligence, Machine Learning, Patent Eligibility.

I. INTRODUCTION

As an example of successful innovation at the Office of European Patents and the National Technology Office Artificial intelligence is one of the most important inventions of the fourth industrial revolution. The primary barrier, according to Accenture's Mark Purdy, is the patentability of AI concepts. The Office of European Patents is hosting the first conference on artificial intelligence patenting. Joining the EPC has the potential to lead to two main outcomes. Firstly, persons ought to be able to acquire cheaper patent protection concurrently in their place of residence and in other EPC signatory nations. Second, acquiring patents protected in the nation is also more affordable for foreigners since they can do so by applying for an EPC patent there rather

than submitting a separate patent application at the country's representative office. This shows that, on the one hand, obtaining patent protect is concurrently in the nation and abroad is less expensive for local businesses, and, as opposed to that, obtaining patent protected in the country is less expensive for foreign businesses. EPC member. This study examines how patenting by the European Patent Office (EPO) and national offices of residents and non-residents of candidate countries evolves after joining the EPC using aggregate and applicant-level data. It also examines whether lower costs for comprehensive patent protection lead to more inventions being patented in a nation [1].

II. AIMS AND OBJECTIVE

a) Aim

The analysis yielded three key results. Firstly, there is scant evidence that local businesses filed fewer patent applications with the national office after entry. In other words, organisations in accession countries do not substitute domestic filings with submissions to the EPO. Yet, domestic entities in virtually all of the accession countries only filed a very limited number of patent applications with the national office prior to membership; accession had no effect in this situation. Furthermore, despite beginning at a very low level, notice in this article a very slight increase in domestic entity EPO submissions. In the candidate countries for membership, invention does slightly (and slowly) increase, according to research at the inventor level. Finally, foreign organisations are strongly opposed to joining the EPO. Afterwards, over 90% fewer foreign entities register with national authorities [3].

b) Objectives

Residents ought to be able to affordably obtain patent protection both in their native country and in other EPC contracting countries. Also, since foreigners can file for an EPC patent there rather than submitting a different applications for patents at the nation's representative office, it is less expensive for them to seek patent protection in the country. In contrast, it is less expensive for foreign enterprises to obtain patent preservation in the country if they already have it elsewhere than it is for local businesses to

obtain patents protection both domestically and abroad at the same time. It also examines whether lowering the cost of complete patent protection increases the number of ideas that are patented in a country [3].

III. LITERATURE SURVEY

Paper 1: The Impact of International Patent Systems

The Effects of Global Patent Systems Intellectual property rights and the training of ISS astronauts. Addressing the challenge of creating astronaut training with several goals for the ISS. In this study, the effects of membership in the Convention on Patents in Europe for the nations that joined between 2000 and 2008 are examined. According to the authors, domestic applicants are more potential to submit patent applications to the EPO. This topic is founded on the reality that various nations can define crucial elements of their intellectual property systems on an individual basis. There isn't a universal patent system; instead, there are only a few regional systems. Even if there are international accords, such as the agreement on Trade Related Aspect of Intellectual Property Rights (TRIPS), that standardize and regulate important aspects of national intellectual property rights.

As a result, patents are only legitimate in the nation in which they were awarded because they are national rights. In turn, this means that the identical innovation may be patentable in one country but not in another, regardless of how strong the legal patent protection is. As a result, in addition to the availability and strength of patent protection, the requirement that the same invention be patented in each country for which it is sought affects companies' decisions to obtain patent preservation and, consequently, business decisions such as R&D, foreign direct investment (FDI), export, etc. It may also have an impact on non-patent enterprises' business decisions, particularly in low- and middle-income nations [3].

Paper 2: The EPO as Patent Law Maker in Europe

Conflicts exist between the actions taken by the European Patents Process in its patent litigation. This articles study the role played by the European Patent Organization (EPO) in the European patents system. It demonstrates how the EPO's independent technocracy is evolving European patent law. The patent awarding procedure hollows out economic and political issues. [4].

Paper 3: The Governance of European Intellectual Property Rights

European Intellectual Property Rights Governance The flexible approach to community IP protection could promote development and innovation while raising the bar for patents in scientific patent communities by reducing the chance of deadlocks. Distinguishable framework regulations should enable national patent systems to set more stringent requirements. It propose establishing epistemic patent communities to prevent a deadlock [5].

Paper 4: Intellectual Property Rights Software One Accessibility to Venture Capitalist

Technology-related consequences of copyright and patent protection on venture capital investment Intellectual Property Rights Software One Accessible to Venture Capitalists. The effect of copyright and patent protection on securing venture funding funding for software technologies is examined in a study. Smaller enterprises can receive VC funding more quickly by registering their copyrights and applying for software patents. Therefore, possessing dual intellectual property rights is bad for VC investment [6].

Paper 5: The Impact of Artificial Intelligence on Innovations

Artificial Intelligence's Effect on Innovation Redefining innovation in R&D: a new strategy Academics believe that artificial intelligence can alter the structure of R&D and the process of innovation. They assert that developments in "deep learning" might signify a fresh, universal mode of creativity. They assert that it might lead to the shift from labor-intensive to application-oriented learning research [7].

IV. EXISTING SYSTEM

The current mechanism, the European procedure, has not replaced national aid procedures. A uniform method for granting patents is provided by the Office of European Patents, but there is no such process in place for enforcing patents. As a result, rather than being European Union or even pan-European patents, the issued patents are a collection of state patents. When requesting patent infringement defence in one or more EPC agreements States, the patent applicant may opt to follow the national approach in each nation for which they are seeking protection or they may opt to take the European route, which provides protection in a single procedure in all Contracting States. [5].

V. COMPARATIVE STUDY

Sr. No	Paper Name	Author/ Publication	Technology	Advantage	Disadvantage
1.	The Impact of International Patent Systems .	Bronw H. Halla,Christian Helmers 2000 and 2008	A.I	The European Patent Convention allows for small modifications and extensions.	It does not specify Which laws are exempt from patentablity
2	The EPO as Patent Law-Maker in Europe.	Aurora Plomer IEEE,2019	A.I	Only one language may be used to prosecute a single European patent application.	In order to obtain a European patent, applicants would have to pay higher and more expensive attorney costs.
3.	The Governance of European Intellectual Property Rights. .	Evisa Kica, Nico Groenendijk 2015-2020	A.I	Intellectual property helps the business increase money through the sale or licencing of the invention.	Sometimes it becomes tough to stop someone from replicating the inventory job, even after obtaining IP protection.
4.	Intellectual Property Rights Software One Accessibility to Venture Capitalists.	Onishi K, Yamauchi I 2018	A.I	Getting Intellectual rights helps reduce the cost of patents.	To spend extra money on fees and legal expenses in order to get IPR protection..
5.	The Impact of Artificial Intelligence on Innovation.	Iain M. Cockburn, Rebecca Henderson & Scott Stern 2009-2018	A.I	The application of A.I. technology allows for far more effective data analysis, as well as the creation of predictive models and processing algorithms.	It is an impressive achievement when a machine can mimic human intelligence.

Table 5.1. Comparative Analysis of Existing System

VI. PROBLEM STATEMENT

Commercial organisations, those that develop standards, academic communities, etc. have all given the issue of how patents relate to standards a lot of attention. Globally effective efforts to build standards based on private technologies are increasing. Despite the fact that both standards and patents can foster innovation and market acceptability, many people think that is the only thing they have in common. Despite these opposing viewpoints, the problem of patents in standardised technology must be addressed during the creation of standards.

VII. PROPOSED SYSTEM

As a pure mathematical method, the suggested method is ineligible for patent protection under EPC Art. 52 (2). (a). Patent preservation is not available for advancements in artificial intelligence that solely contain an abstract mathematical method. If the focus of an AI-related innovation is on a tool or a technique that uses technical means (like a computer), it is not prohibited from patentability under Art. 52(2) and has a generally technical character. Declaring the technical nature of the data or the parameters of the mathematical approach would not be sufficient because the resulting technique might still fall under the methods' excluded subject-matter. [1].

VIII. ALGORITHM

The Algorithm to check similarity with textual data:

Step.1: Start

Step.2:

X = str(data1.content)

Y = str(data2.content)

X_list = word_tokenize(X)

Y_list = word_tokenize(Y)

The set of strings containing keyword is provided and stored in tokenized form.

Step.3:

 sw = stopwords.words('english')

Stopword (sw) is keyword to ignored both when indexing records for search and when searching for them as a outcome of search query.

Step.4:

rvector = X_set.union(Y_set)

It simulate the vector data type (rvector)

Step.5:

for i in range(len(rvector)):

cosine_values.append(cosine)

The difference between two vectors, such as a collision at a glance.

Step.6: Stop

IX. MATHEMATICAL MODEL

In the interest of evaluating the similarity between the vectorized texts and the original text document, cosine similarity is also employed in textual data. angle formed between these vectors is used to evaluate it (which is also the same as their inner product).That was a lot of technical knowledge, which the student might find unfamiliar or challenging. Here, It will analyse into its component parts and provide extensive illustrations and examples [2].

Consider these three vectors:

$$\overrightarrow{A} = [\,1\ 4\,]$$

$$\overrightarrow{B} = [\,2\ 4\,]$$

$$\overrightarrow{C} = [\,3\ 2\,]$$

The Euclidean dot product can be used to obtain the cosine of two non-zero vectors:

$$A.B\ \|A\|\ \text{x}\ \|B\|\ \text{x}\ \cos(\theta)$$

which break for:

$$Similarity(A,\ B) = \cos(\theta) = \frac{A.B}{\|A\|\ \text{x}\ \|B\|}$$

Searching for components

Let's examine the given formula.

Step 1: Starting with the proposer:

$$A.B = \sum_{i=1}^{n} Ai\ \text{x}\ Bi(A_1\text{x}\ B_1)\ +$$
$$(A_2\ \text{x}\ B_2) + \ldots + (A_n\ \text{x}\ B_n)$$

where Ai and Bi are the ith elements of vectors A and B.

$$A.B\ (\,1\ \text{x}\ 2\,) + (\,4 \times 4\,) = 2 + 16 = 18$$

Step 2: The next step is to deal with the denominator:

$$\|A\|\ \text{x}\ \|B\|$$

the length of vector A multiplied by the length of vector B. The length of a vector can be calculated as:

$$\sum_{i=1}^{n} Ai^2 = \sqrt{A_1^2 + A_2^2 + \cdots + A_n^2}.$$

$$\|A\| = \sqrt{1^2 + 4^2} = \sqrt{1+16} = \sqrt{17} \approx 4.12$$

$$\|B\| = \sqrt{2^2 + 4^2} = \sqrt{4+16} = \sqrt{20} \approx 4.47$$

Step 3: Here we have all the components of the original formula. Let's plug them in and see what we get:

$$Similarity\ (A,\ B) = \cos(\theta) = \sqrt{17} \times \sqrt{20} \approx 0.976$$

X. SYSTEM ARCHITECTURE

Machine Learning and Deep Learning Techniques for Sentiment Analysis
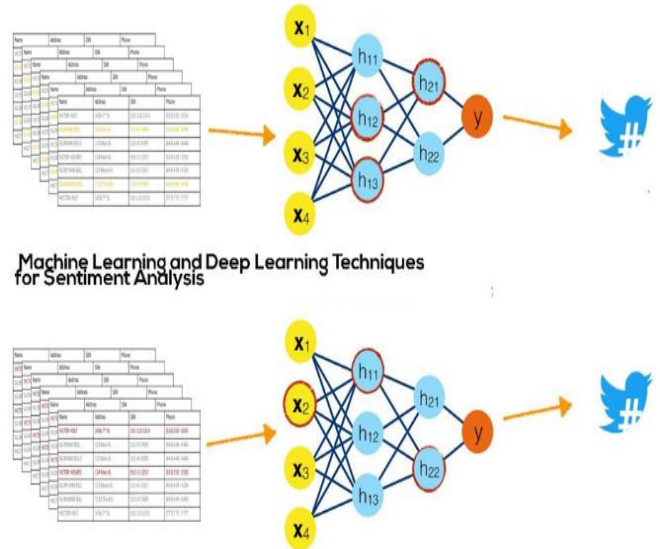

Fig.10.1: System Architecture for patent application.

The ideal way to visualise an artificial neural network is as a weighted directed graph, where the nodes are the artificial neurons. The directed edges with weights illustrate the relationship between the neuron inputs and outputs. The input signal for the neural network comes from an external source as a pattern and an text as a vector. Then, for each n-th input, these inputs are mathematically assigned using the notation x(n). An analytical technique for determining the emotional content of communications is sentiment analysis. It integrates data, natural language processing, and machine learning. Analysis produces meaningful data when we include deep learning into the model. Deep learning has at least three hidden levels. Depending on the function these neurons serve, deep learning neurons are divided into input, hidden, and output layers.

XI. ADVANTAGES

- If your invention qualifies for patent protection, you have the legal right to prevent unauthorised production, distribution, importation, or replication. Consider how intellectual property rights are protected.
- You receive protection for a predetermined amount of time, enabling you to keep your rivals at bay.
- After that, you can independently apply your update. By giving out licences to third parties, you can also sell or utilise your patent. This might be a sizable source of income for your business. Some companies, perhaps in conjunction with registered designs and trademarks, operate solely to receive royalties from patents they have leased.
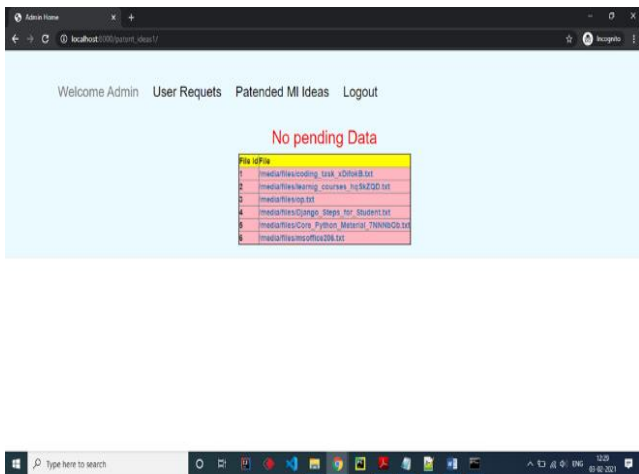
XII. DESIGN DETAILS

Fig 12.1: Result

Calculating the similarities of the two contents that are projected in a multidimenssional space is a mathematical topic known as cosine similarity. The two vectors being discussed here are arrays that contain the word counts of two separate publications. The cosine similarity represents the orientation (the angle) rather than the size of the documents when plotted on a multidimensional space where each dimension corresponds to a word in the text. Get the magnitude by doing the Euclidean distance computation. Because of their size, the two comparable papers may be separated by a significant Euclidean distance, but there may still be a small angle between them, the cosine similarity is advantageous. As the angle shrinks, the similarity grows.

XIII. CONCLUSION

Thus, we have tried to implement the paper 'Patent Protection for Artificial Intelligence in Europe', Wang Lin, Hu Shuijing, IEEE, 2020 & the conclusion is as follows to the EPO, AI and ML technologies are often ineligible for patent protection unless they are tied to a technical application because they are based on mathematical concepts. The amended EPGL did not materially alter the "technical" requirements of the patent eligible topic; rather, it clarified and refined them. Whether the new EPGL will make it simpler to patent AI inventions in the EPO is now impossible to predict. At least one window has been opened.

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