



RESEARCH

The Influence of Artificial Intelligence on Patent Legislation

A Influência da Inteligência Artificial na Legislação Patentária

La Influencia de la Inteligencia Artificial en la Legislación Patentaria

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ABSTRACT

The insurgency of smart and integrated devices is a new global trend. In this context, the objective of this article is to demonstrate the influence that Artificial Intelligence (AI) can have on the patenting world trends and legislation. For this, it was discussed the main trends of protection regarding intellectual property and AI, since the intellectual property law is controversial on the subject, regarding national protection. The article also discussed global trends in papers on AI, deepening the understanding of the technology scenario of one of the leading AI companies in Brazil and the world, UBER Technologies INC., which has radically changed the world's transportation mode.

Keywords: Artificial Intelligence, Intellectual Property, Trends, UBER Technologies INC.

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RESUMO

A insurgência de dispositivos inteligentes e integrados é uma nova tendência mundial. Neste contexto, o objetivo deste artigo é demonstrar a influência que a Inteligência Artificial (IA) pode surtir em âmbito de patentes quanto a tendências mundiais e legislações. Para isso foi discutido acerca das principais tendências de proteção quanto a propriedade intelectual e IA, uma vez que a lei de propriedade intelectual é controversa quanto ao assunto, em matéria de proteção nacional. O artigo também discutiu tendências mundiais presentes em documentos acerca de IA, aprofundando-se no entendimento do cenário tecnológico de uma das principais empresas de IA, no Brasil e no mundo, a UBER Technologies INC., que mudou radicalmente a forma de transporte pelo mundo.

Palavras-chave: Inteligência Artificial, Propriedade Intelectual, Tendências, UBER Technologies INC.

RESUMEN

La insurgencia de dispositivos inteligentes e integrados es una nueva tendencia mundial. En este contexto, el objetivo de este artículo es demostrar la influencia que la Inteligencia Artificial (IA) puede tener en las patentes sobre tendencias mundiales y legislaciones. Para esto se discutió sobre las principales tendencias de protección con respecto a la propiedad intelectual y la IA, ya que la ley de propiedad intelectual es controvertida sobre el tema, con respecto a la protección nacional. El artículo también discutió las tendencias mundiales en documentos de IA, profundizando la comprensión del panorama tecnológico de una de las compañías líderes de IA en Brasil y el mundo, UBER Technologies INC., que ha cambiado radicalmente la forma de transporte en todo el mundo.

Palabras clave: Inteligencia Artificial, Propiedad Intelectual, Tendencias, UBER Technologies INC.

INTRODUCTION

The findings of the technology economy point to multifaceted and mutually determining relationships between scientific activity, research institution productions, industrial innovation, and changes in the current business model that aggregated information technology into an important intellectual asset for the development of a new industry.

This is the fourth industrial revolution, which emerged in mid-2011, from German government strategies to focus on technology. The basic concept of the 4th industrial revolution understands that by connecting machines, systems and assets, companies can create intelligent networks throughout their entire production network and thereby control various actions independently (MARKETING DIGITAL, 2019).

Therefore, it is noteworthy that the evolution of information technology and its introduction in production processes are transforming the traditional industry, raising it to a new organizational level, where information technology is highlighted. To strengthen competitiveness in the global marketplace, a paradigm shift in manufacturing is being discussed around the world. (COLLABO, 2019).

In this context, it should be noted that the insurgency of smart and integrated devices is a new global trend. And with the emergence of new technologies, there is also a

natural discussion around the forms of commercialization of these technologies and the mechanisms of intellectual property protection that they carry.

In this regard, it is emphasized that artificial intelligence (AI) is an area of knowledge that aims to create mechanisms that can simulate human intelligence to think, make decisions and solve problems.

1. Forms of intellectual protection of computer programs

In 1998 Law 9,609 was created which protects the intellectual property of computer programs, that is, software. This law defines software as follows:

“Art. 1st Software program is the expression of an organized set of instructions in natural or coded language, contained in physical support of any kind, necessarily employed in automatic machines for the manipulation of data, devices, tools, or peripheral equipment, based on digital or analog technique, so they will operate in the way and with purposes determined.”

Thus, software protection is governed by a different law from that which deals with invention patents and utility models. This is called *sui generis* protection, which falls within the context of intellectual property. From this context arises the registration of the software, governed by Law 9,609, which although not mandatory, is advisable when there is a commercial claim of rights related to said computer program. Thus, Art. 2nd, §3^o:

Art. 2nd (...)

§ 3^o The protection of the rights which is the objective hereof shall not be subject to registration.

Art. 3^o Computer software may, at the discretion of their title-holder, be registered with a body or entity to be indicated by an act of the Executive Branch, at the initiative of the Ministry responsible for the policy for Science and Technology

In another aspect, explain that software is also a matter of copyright, and its creation is sufficient to guarantee the right, under these terms, the same Law 9,609 points out:

Art. 2nd (...)

§ 5^o It is included among the rights ensured by this law and by the laws of copyright and related rights prevailing in the country that exclusive right to authorize or prohibit commercial rent and this right is not exhaustible through the sale, license or other form transfer of the copy of the software.

Thus, the protection that the copyright conferred on the author lies on the preservation of moral rights, including authorship and the rights of exploitation. For reference, it is worth mentioning Art. 24 and 29 of Law 9,610, which consolidates copyright legislation:

Art. 24. They are moral rights of the author:

I - to claim authorship of the work at any time;

II - to cause his name, pseudonym or conventional sign to appear or be announced as that of the author when the work is used;

III - to keep the work unpublished;

IV - to ensure the integrity of the work by objecting to any modifications or any act liable in any way to have an adverse effect on the work or to be prejudicial to his reputation or honor as author;

V - to amend the work before or after it has been used;

VI - to withdraw the work from circulation or to suspend any kind of use that has already been authorized where the circulation or the use of the work are liable to have an adverse effect on the reputation or image of the author;

VII - to have access to the sole or rare copy of the work that is lawfully in a third party's possession with a view to preserving the memory thereof by means of photographic or similar or an audiovisual process, in such a way that the least possible inconvenience is caused to its possessor who shall in any event be indemnified for any damage or prejudice suffered.

Art. 29. The express prior authorization of the author of a literary, artistic or scientific work shall be required for any kind of use, such as:

I - complete or partial reproduction;

II - publication;

III - adaptation, setting to music or any other transformation;

IV - translation into any language;

V - incorporation in a phonogram or in an audiovisual production;

VI - distribution where it is not provided for in a contract signed by the author with third parties for use or exploitation of the work;

VII - distribution for the purposes of the offering works or productions by cable, optic fiber, satellite, electromagnetic waves or any other system enabling the use to select a work or production and receive it at the time and place of his choice, provided that the access to the works or production is made through any system requiring payment on the part of the user;

VIII - the direct or indirect use of literary, artistic or scientific work by means of:

a) performance, recitation or declamation;

b) musical performance;

c) use of loudspeaker or similar systems;

d) sound or television broadcasting;

e) reception of a radio broadcast in places frequented by the public;

f) provision of background music;

g) audiovisual, cinematographic or equivalent presentation;

h) use of man-made satellites;

i) use of optical systems, telephone or other lines, cables of all kind and such comparable means of communication as may be devised in the future;

j) exhibition of works of three-dimensional and figurative art;

IX - incorporation in databases, storage in computer, microfilming and any other means of archiving of that kind;

X - any other form of the use that exists at present or might be devised in the future.

If such rights are violated, the copyright law deals with sanctions, in its Art. 102 and below, determining that:

Art. 102. The title-holder whose work is fraudulently reproduced, disclosed or used in any other way may apply for the seizure of the copies or originals made or the stoppage of the disclosure, without prejudice to whatever indemnification may be applicable.

Thus, the author is allowed to register in public or private agencies. It is, in this case, a record of the source code with the Instituto Nacional da Propriedade Industrial (INPI) [National Institute of Industrial Property]. However, this registration is not to be confused with the patent and guarantees the right of exclusivity in the production, use, and marketing of the registered software. To perform this registration, it is essential to demonstrate the authorship of the software to be registered. (Nybo et al 2016)

In particular, with regards to the computer program, the protection is guaranteed for 50 years, in the form of the paragraph 2 of Art. 2 of Law 9,609.:

"§ 2º protection of rights relating to computer software shall be ensured for a period of fifty years, as of January 1st of the year following that of their publication, or in the absence of any such date, of their creation."

Thus, in addition to copyright protection, the computer software may be registered, in accordance with Law 9,609/98. However, there is a tendency for large software companies to design diverse ways to protect their intellectual assets by protecting them through patents. This issue has been controversially faced and will be debated in the present study.

In the foreground, it is necessary to observe the Industrial Property Law 9,279/96, which prohibits the protection of computer programs through patents, namely:

Art. 10. The following are not considered to be inventions or utility methods;

(...)

V - computer programs;

Under a superficial view, computer software, including applications, would be excluded from patent protection. It turns out that the law prohibits the protection of the computer program itself, which is understood as the source code, while the software assembly with the hardware can be patented, provided that the requirements of novelty, inventive activity, and industrial applicability are met. Thus, although it is a practice little used in Brazil, it is possible to apply for a software patent.

From this process, it can be appreciated that in the process of filing a software patent it is necessary to describe exactly the invention created and that invention will be detailed in all its stages and characteristics. In theory, a new version of this software would not be protected by the patent requested.

The real need for software and hardware protection arises from the fact that copyright protects against moral and property violations of its work, but does not protect the process or product arising from its application.

Thus, in Brazil, there are two forms of protection for computer programs: (i) copyright; and (ii) industrial property. They both give protection to creations, but differently and therefore cannot be confused (Nybo, et al, 2016).

2.The global context of Artificial Intelligence protection

As quoted by Russell and Norvig (2014), AI is one of the most recent fields in science and engineering and its development began shortly after World War II and has been named as such since 1956.

AI can be understood as a “tool that can transform the way we think about how growth is generated.” From this citation, it creates potential to overcome physical limitations of capital and labor, as well as opening new sources of value and growth. Something that goes beyond just being a technological wave.

There are several possibilities intrinsic to the absorption of AI by societies in various fields. And unlike other technologies, there is the possibility of creating a new workforce, which can perform activities at a greater scale and speed than people; to perform tasks that go beyond human capacity; beyond the ability to learn more than human.

The World Intellectual Property Organization (WIPO) began in 2019 to publish a series of editorials dealing with technological trends in various fields. Among them, the first editorial of the series “WIPO technology trends - Artificial Intelligence”, which used the extraction of technological information from the Elsevier’s Scopus scientific database and the Questel-Orbit patent database to study the age of AI and its trends. Thus, the aforementioned work commented on patents and scientific publications on AI that could draw the landscape of the theme over the years (WIPO, 2019).

According to the study by WIPO (2019), the idea of AI arose in 1950, and since then approximately 340,000 inventions (invention patents) and more than 1.6 million scientific publications (academic articles) have been published. These data demonstrate the importance of the theme for the development of world industry, which values immaterial, intangible, and intellectual goods, making the fourth industrial revolution a world reality.

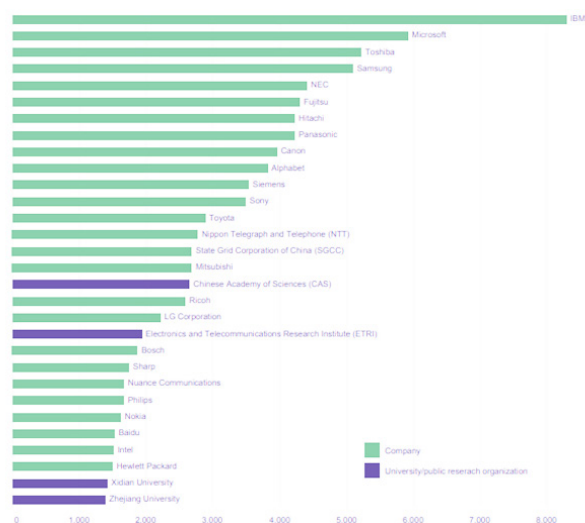
Machine Learning is the dominant AI technique and is included in more than one-third of all inventions identified (134,777 patent documents). While Deep Learning got a lot of attention, which can be seen from the patent numbers that from 2013 to 2016 grew by 175%. As well as “Neural Networking”, which grew by 46% over the same period.

Technologies involving AI developments, image recognition is defined as the most popular, being present in 49% of all related patents (167,038 patent documents). On the other hand, the same analysis showed that several sectors and industries are also commercially exploiting AI.

Thus, 20 AI fields of application were identified, namely: telecommunications (15%), transportation (15%), health and medical sciences (12%), personal devices (11%) and other sectors: banking, entertainment, insurance, industry, agriculture and networking (Social Networks, Smart Cities and The Internet of Things) (WIPO, 2019).

And in order to illustrate these data, it is worth bringing to this study the main depositors in the most relevant international offices, namely the TRIADICS (Japan, United States of America and China). Thus, according to Figure 1, of the 30 most relevant depositors, 26 are companies and only 4 are universities or public research institutions. In the top 20 companies: 12 are Japanese, 3 American and 2 Chinese.

Figure 1 - Top 30 Patent Filers by Number of Patent Families



Source: WIPO, 2019.

Nineteen of the top 20 depositing companies in this area mention primarily the Computer Vision function. In IBM’s case, the main focus is on natural processing language, such as IBM Watson. And Machine Learning is the technique that is at the top of all these patent portfolios.

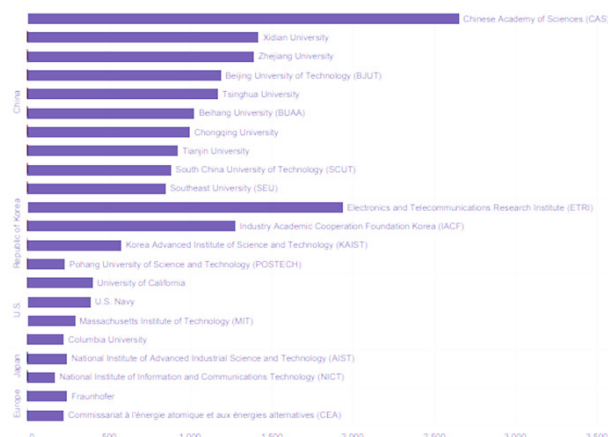
Table 1, as shown below, shows the number of patents found during WIPO searches of the 5 companies with the most patents in the area.

Table 1 - Featured Companies and Number of Patents

| Companies | Number of patents |
|-----------|-------------------|
| IBM | 8,290 |
| Microsoft | 5,930 |
| Toshiba | 5,223 |
| Samsung | 5,102 |
| NEC | 4,406 |

Also, to investigate possible research groups in the area and determine the maturity of the AI issue, the same study, published by WIPO, listed the main universities and public research centers, to ascertain the rate of exploitation of the subject in question. According to Figure 2, Chinese universities lead the rankings of AI patents, followed by Korean institutions.

Figure 2 - Top Patent Filers among Universities and Public Research Organizations in Selected Locations



Source: WIPO, 2019.

3. The philosophical context of the technological cycle in the world.

The technology cycle causes a broad spectrum of hopes and fears. On one side are the “techno-optimists” who emphasize the benefits to the economy and society, promoting theories such as the “uniqueness” of technology, or even posthumanism and transhumanism (BARBOSA, 2017; OLIVEIRA, 2017).

Optimists preach that the rapid growth of computing and AI brings several improvements through the economy. While on the other hand, there are the “techno-pessimists” who worry about the negative consequences for society, especially when it comes to AI (BUGHIN *et al.*, 2019).

In today’s knowledge age, industry 4.0 preaches technology boundaries such as the Internet of Things, accounting technologies, smart robots, automation, and AI that drive productivity growth, increase prosperity, and replace mundane or dangerous tasks (BUGHIN *et al.*, 2019).

Thus, with the advance of AI, there is the emergence of new jobs and the extinction of others, whose replacement by the machine will be inevitable. Besides, new technologies carry new risks, such as data breach and cyber fraud, that require mitigation in the form of new approaches, regulations and cultural norms (BUGHIN *et al.*, 2019).

In this context, other forms of hiring and obligation emerge and as AI progresses, they become lucrative and important for regional and global economies. An emblematic case is UBER Technologies INC., Which despite being the world’s largest form of individual transportation, does not have its vehicles.

4. Case Study of Uber Technologies INC.

The company came up with the possibility of new forms of hiring (individual contracts with users through

applications) and payment for transportation “mobile payment”. Thus, a new form of hiring is created, that of driver-partner, which become emblematic cases related to the service delivery and the hiring of service providers.

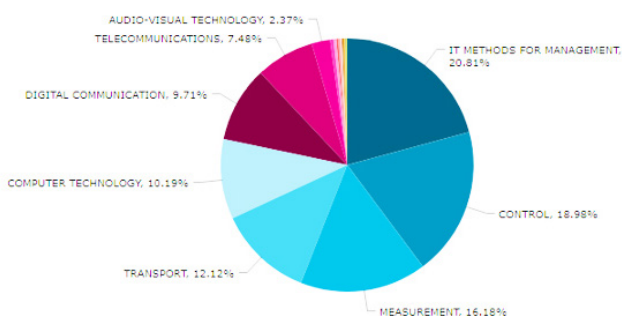
This context shows that new business forms have emerged in the face of technological advances and that AI has been the focus of companies that want to remain competitive. As such, UBER Technologies has demonstrated its interest in investing in AI development, as noted by the creation of Uber AI Labs, which is “at the heart of UBER’s AI technology innovations and technologies.”

Uber AI Labs has been focusing its efforts on Machine Learning research, understanding that Machine Learning is critical to their business. In addition to dedicating to the development of technology in Computer Vision seeking solutions for computational vision and machine learning of the latest generation (UBER, 2019)

Uber has also applied the use of neural networks developing technologies in Sensing & Perception to understand the movement of people and things in cities. In addition to trying to enable faster response in customer service, bringing models of natural language and reducing the waiting time of passengers (UBER, 2019).

Aiming to bring a worldwide context, from a search for the patent family filed by UBER Technologies INC. in the Questel-Orbit commercial database, 1,246 patents were obtained. **Figure 4** shows the main technological domains of the patents found.

Figure 4 - Patents x Technological Domain



Analyzing **Figure 4**, we can see from the technological domain of patents a significant investment directed to technologies such as: Computer Technologies (10.19%), Digital Communication (9.71%), Telecommunications (7.48%) and Audiovisual Technologies (2.37%).

And to analyze the impact of these technologies in the Brazilian patent context, a patent search was performed on behalf of Uber Technologies INC. in INPI database. **Table 2** lists the company’s main patent applications in Brazil.

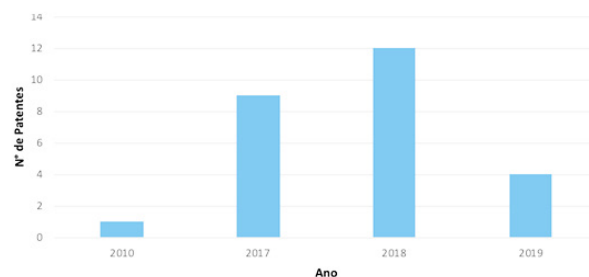
Table 2: Uber Technologies INC. patent applications in Brazil.

| PATENT | DEPOSIT | NATIONAL PHASE ENTRY | TITLE |
|------------------------|------------|----------------------|--|
| BR 11 2019 005975 0 A2 | 09/26/2017 | 03/26/2019 | CUSTOM CONTENT GENERATION FOR A USER INTERFACE FOR A NETWORK SERVICE |
| BR 11 2019 005968 7 A2 | 09/26/2017 | 03/26/2019 | NETWORK SYSTEM FOR DETERMINING ACCELERATORS FOR SELECTION OF A SERVICE |
| BR 11 2019 005982 2 A2 | 09/26/2017 | 03/26/2019 | NETWORK SERVICE OVER LIMITED NETWORK CONNECTIVITY |
| BR 11 2019 003772 1 A2 | 08/29/2017 | 02/25/2019 | DRIVER LOCATION PREDICTION FOR A TRANSPORT SERVICE |
| BR 11 2018 077539 8 A2 | 07/01/2017 | 12/31/2018 | AUTONOMOUS VEHICLE CONTROL USING SUBMAPS |
| BR 11 2018 076026 9 A2 | 06/14/2017 | 12/13/2018 | IDETERMINATION OF TRAVEL COMPLETION FOR TRANSPORT ON DEMAND |
| BR 11 2018 075358 0 A2 | 06/07/2017 | 12/07/2018 | HIRARCHICAL SELECTION PROCESS |
| BR 11 2018 074757 2 A2 | 05/10/2017 | 11/29/2018 | USER-SPECIFIC REFERENCE POINTS FOR NAVIGATION SYSTEMS |
| BR 11 2018 069224 7 A2 | 05/21/2017 | 09/20/2018 | NETWORK COMPUTER SYSTEM TO ADDRESS CONTACT SERVICE PROVIDERS |
| BR 11 2018 069225 5 A2 | 05/21/2017 | 09/20/2018 | TARGET ADDRESSING SYSTEM |
| BR 11 2018 016488 7 A2 | 02/14/2017 | 08/13/2018 | NETWORK COMPUTER SYSTEM FOR ANALYSIS OF DRIVING ACTIONS OF DRIVERS IN ROAD SEGMENTS OF A GEOGRAPHIC REGION |
| BR 11 2018 015201 3 A2 | 12/31/2016 | 07/25/2018 | SIMPLIFYING GPS DATA FOR MAP CONSTRUCTION AND DISTANCE CALCULATION |
| BR 11 2018 016076 8 A2 | 12/31/2016 | 08/07/2018 | SELECTION OF A ZONE-BASED DESTINATION ROUTE |
| BR 11 2018 011694 7 A2 | 12/09/2016 | 06/08/2018 | SUGGESTED SHIPMENT LOCATION FOR TRANSPORT SERVICES |
| BR 11 2018 009779 9 A2 | 11/16/2016 | 05/14/2018 | METHOD AND SYSTEM FOR SHARED TRANSPORT |
| BR 11 2018 007365 2 A2 | 10/13/2016 | 04/12/2018 | APPLICATION SERVICE CONFIGURATION SYSTEM |
| BR 11 2017 026670 9 A2 | 06/10/2016 | 12/11/2017 | SYSTEM AND METHOD FOR PROVIDING CONTEXTUAL INFORMATION FOR A LOCATION |
| BR 11 2017 024473 0 A2 | 05/13/2016 | 11/14/2017 | METHODS FOR MITIGATING COMMUNICATION DELAYS BETWEEN SYSTEMS CONNECTED WITH A TRANSPORT SERVICE |
| BR 11 2017 022131 4 A2 | 04/15/2016 | 10/13/2017 | PROVIDING PROGRAMMATIC INFORMATION IN CONNECTION WITH LOCATION-BASED SERVICES TO SERVICE PROVIDERS |
| BR 11 2017 021597 7 A2 | 04/13/2016 | 10/09/2017 | TARIFF DETERMINATION SYSTEM FOR TRANSPORT AGREEMENT SERVICE ON DEMAND |
| BR 11 2017 016820 0 A2 | 02/05/2016 | 08/04/2017 | PROGRAMMATICAL DETERMINATION OF LOCAL INFORMATION IN CONNECTION WITH A TRANSPORT SERVICE |
| BR 11 2017 008139 8 A2 | 10/21/2015 | 04/19/2017 | ARRANGEMENT SERVICES UNDER DEMAND ON ONE OR MORE PRESET RULES |
| BR 11 2017 003938 3 A2 | 09/04/2015 | 02/24/2017 | PROVIDING ROUTE INFORMATION FOR DEVICES DURING A SHARED TRANSPORT SERVICE |
| BR 11 2017 002174 9 A2 | 08/04/2015 | 02/02/2017 | DETERMINATION AND SUPPLY OF PREDICTED LOCATION DATA POINTS TO SERVICE PROVIDERS |
| BR 11 2017 001776 8 A2 | 07/30/2015 | 01/27/2017 | TRANSPORT SERVICE PROVISION FOR MULTIPLE USERS |
| PI 0913210-4 A2 | 05/20/2009 | 11/25/2010 | STREET LEVEL IMAGE IN 3D CONSTRUCTION MODELS |

Source: The authors.

Then, **Figure 03**, addresses the company’s temporal path in Brazil, including patent filing. Showing how AI-based businesses and software can find opportunities to develop their intellectual property portfolio by investing in patents. From **Figure 3** it is also possible to observe that the strongest movement of the company seeking protection in Brazilian territory started in 2017, having a patent filed in 2010.

Figure 03: The temporal evolution of Uber Technologies INC. patent applications in Brazil.



Source: The authors.

This fact reveals that UBER Technologies INC. has not maintained the protection of its applications by merely

registering its source code. As a company with exclusively intellectual assets, UBER Technologies INC. invested in software and hardware protection, and their rights are guaranteed in the form of a patent claim.

For this reason, UBER Technologies INC. expects of the right to exploit the product arising from the application of the software, rather than merely protecting it against moral and property violations of its source code.

CONCLUSIONS

From what was exposed in this paper, it could be established that the move towards industry 4.0 is a reality. And within this context, there are new needs when it comes to intellectual property protection, especially concerning AI.

Given this, the software has become more important, and thus need a protection that gives it greater support than protection by copyright. That is, the fact that software can only be protected by patent law as embedded software can be detrimental to new technological trends in Brazil. In these cases, those interested in protecting their functions and processes have found artifices in patent drafting that enable them to seek such protection.

It is also worth mentioning that, as stated in this work, the technological evolution from AI brings with it several opportunities, from the creation of new sources of income, new businesses in the digital environment, to future possibilities of changes in the human body. And it is in this context that companies with a technological profile such as UBER Technologies INC. are born.

And from the surveys carried out, it was observed that a company like UBER Technologies INC. finds in AI, in addition to the opportunity to create a new business model, an opening for the generation of patents that may be linked directly or not to AI. It could also be seen from the case study that the company has sought to remain competitive by developing according to the global trends highlighted in the document prepared by WIPO.

Thus, despite some pessimistic views, it is possible to see the market conforming to new technologies, new jobs being created, as well as more fluid employee-employer relationships brought through technological and AI advances.

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