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PATENT LANDSCAPE ANALYSIS OF HUMAN INTELLIGENCE

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Abstract: *Patent intellectual property in the field of human intelligence opens up greater opportunities to improve human life as a whole and has the potential to open enormous opportunities in various fields, such as technology, education, psychology, and health. This research was conducted to know the patent landscape and the main trends of intellectual property patents on the topic of human intelligence in all countries. Researchers applied a patent landscape analysis using data on a total of 5,470 patent intellectual property documents from the Lens database. The results of the study showed that there is a general trend of increasing the number of patents related to the field of human intelligence every year. There is an opportunity without paying royalties by using 821 patents discontinued. Intellectual property patents related to human intelligence are dominated by company ownership and inventors originating from the United States, with a total of 4,361 patents. Patents related to human intelligence are dominated by the physics (G) patent section. There are 2767 simple family patents on human intelligence in thirteen jurisdictions, and the highest is in the United States. In the future, we suggest conducting more research related to patent value analysis to evaluate patents. This study provides practical insights for various stakeholders. Businesses and entrepreneurs can leverage discontinued patents to innovate without having royalty fees, driving technological progress. Policymakers and researchers should create frameworks that protect intellectual property while also ensuring that society has access to innovation, allowing communities to get the value from patents.*

Keywords: *patent landscape analysis, human intelligence, technology.*

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INTRODUCTION

Human development and intelligence research are two distinct areas of study. Intelligence is important in the social, industrial, and educational domains, claim Dizaji et al. (2021). As technology develops, future studies on assessing human intelligence using neuroimaging data and a machine learning-based prediction framework might yield fascinating results (Teregulov, 2022). Recent studies show that people are better than machines at recognizing images (Hiremani & Senapati, 2019). Intelligent technology is now widely used, and interest in artificial intelligence research and development has constantly increased with scientific and technological advancements. This technology can improve people's living conditions and quality of life as technological innovations of human intelligence (Wang et al., 2021).

Human intelligence has changed and evolved to meet changing demands and conditions adapting to new needs and recognizing the importance of emotional and social skills. According to research findings by Kedziora and Kiviranta (2018), the value generated by RPA in the contemporary digital economy demands that the potential for automation be carefully evaluated, with an emphasis on materials that are devoid of analogue text, human judgment, or italicised in favour of strict requirements. Additionally, it is critical to concentrate on a sustainable shift towards the future "hybrid workforce," which combines digital and manual labour delivery (Kedziora, 2022).

The use of human intelligence faces several challenges. Accurate data collection and analysis are essential to achieve effective results. However, not all entrepreneurs adopt technological innovations based on human intelligence (Dana, 2020). Even if artificial intelligence has advanced significantly in recent years, there are still many obstacles to overcome before it can be used with human-like intelligence (Hassabis et al., 2017).

Advances in human intelligence have attracted the interest of researchers across various fields (Pfeifer & Scheier, 2020). Human intelligence advancements can help solve complex and multidimensional problems in a range of sectors, such as transportation, security, health, and the environment (Vialykh et al., 2020).

Many previous studies have shown that Human intelligence in education including the use of artificial intelligence to simulate human thinking processes and create a knowledge-based teaching and learning environment (Saravana & Kumar, 2019); the use of artificial intelligence in the delivery of human services (Wang et al., 2021); the application of artificial intelligence to systems that use algorithms or are related to artificial intelligence (Alter, 2022); the use of human intelligence as a means of achieving persuasive operational transformation in the majority of modern organizational settings (Dhamija & Bag, 2020); and the need for assessments based on human intelligence in higher education (Bearman & Luckin, 2020).

One of the research gaps in the study of human intelligence is the lack of data on relevant patents. Patent landscape analysis is used to explore innovation trends in patents related to human intelligence. This method supports companies and research institutions in research planning, technology transfer, and developing sustainable business innovation strategies. Additionally, governments and international organizations can use patent data to shape forward-thinking policies (Gassmann et al., 2021). Giving a global or regional overview of the patent environment for a particular technology is the aim of the patent landscape analysis approach. In patent landscape analysis, the first stage is a state-of-the-art search for pertinent technologies in a database of selected patents. According to WIPO 2021, the search results are

then analyzed and visually presented to facilitate understanding, form conclusions, and offer recommendations based on reality. "*How are the major trends in intellectual property patents on the subject of human intelligence and the global patent landscape doing?*" is the research question. Determining the global patent landscape and significant advancements in intellectual property pertaining to human intelligence is the goal of this study. Few studies, meanwhile, have looked closely at the study of human cognition from the perspective of invention across countries, legal statuses, inventors, and time to observe patterns and maps. One of the possible factors could be the absence of knowledge regarding AI patents in the business world. Thus, one of the best methods to assess and understand the level of invention and patents in human intellect is to examine the patent landscape.

METHODS

This study used a patent landscape analysis method, focusing on the topic of artificial intelligence in entrepreneurship. Researchers used 3,752 patent documents and 2,071 *simple family* intellectual property patents taken from the Lens database (https://www.lens.org/) through online searches in March 2023 (Litvinova et al., 2022). (Lens, 2023). The keyword search query for patents in Lens in the title, abstract, and claims is Patents= ("human intelligence"). Filters: Published Date (- 2022-12-31) (Lens, 2023). The analysis uses only a full year's worth of patent data, so searches on the database are limited to December 31. Data mining was limited to annual data to get full published data for twelve months each year. Thus, the patent data used is from 1979 to 2022.

This study analyzed the patent landscape by examining annual patent growth, legal status, top patent owners, leading CPC classification codes, geographic jurisdictions, and top inventors. The Lens Site's analysis tool was used to display patent landscape data on the selected topic. Researchers utilized this service to analyze and visualize patents related to human intelligence.

RESULTS

Annual Growth

Figure 1 shows an analysis of the annual number of patents related to human intelligence, categorized by published patents, granted patents, and filed patents from different countries. Patents awarded are those that the government has authorized following a thorough review and evaluation procedure. A published patent, on the other hand, shows the beginning of the evaluation process for awarding a patent. A patent filed has been submitted to a government body but has not yet been approved or made public (USPTO, 2022).

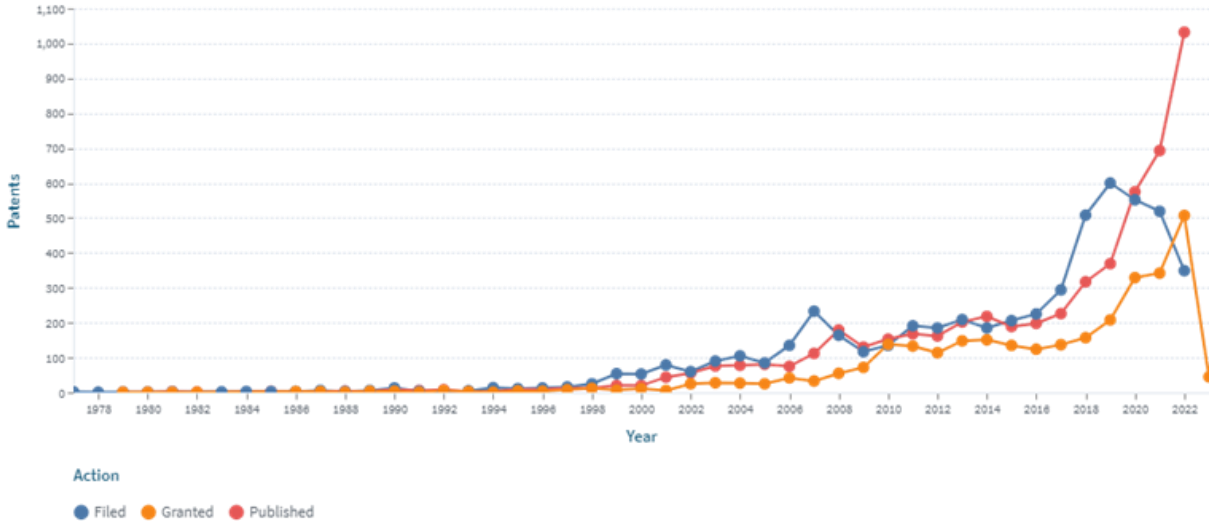

Figure 1. Annual growth of human intelligence patent documents.

The process of publishing patents related to human intelligence began in 1979 (n = 1). At the same time, a patent was granted (failed patent) in 1980 (n = 1). The process of filing patents from 1999 (n=54) to 2007 (n=223) experienced a significant increase. Since 2018 (n=157), the number of granted patents has increased, with the highest point in 2022 (507). Then, at the same time in 2016 (n = 198), the number of published patents continues to increase significantly until 2022 (1032).

The number of patents related to the study of human intelligence has been steadily increasing each year. This reflects the growing interest of entrepreneurs in leveraging advancements in human intelligence to establish and expand their businesses. Increased patenting activity has positive outcomes, indicating that a key factor driving the impact of human intelligence is the ability to quickly adapt to new situations and integrate technology into production processes (Damioli et al., 2021).

Legal Status

The legal status of intellectual property patents from various countries related to human intelligence can be seen in Figure 2. Active patents are those that remain valid, granting exclusive rights to the protected innovations or technologies. In contrast, discontinued patents are those that were granted but are no longer valid. A pending patent is a patent that is in the process of being assessed, but it is not yet known whether it will be granted or not. An expired patent is a patent that has been valid for a specified period (20-30 years) but is not renewed and is therefore no longer valid. Inactive patents are patents that are no longer valid but are still registered in the government body system. Patented is the process of granting a patent by a government agency (USPTO, 2022).

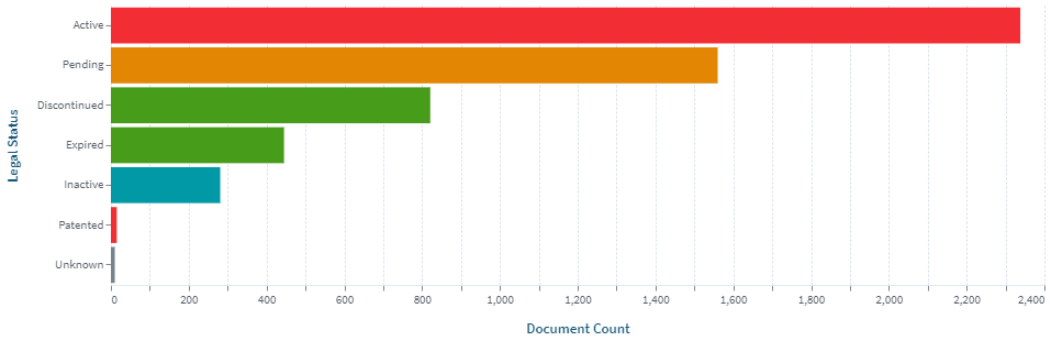

Figure 2. Human intelligence patent legal status.

Patent legal status related to human intelligence with active status is 2338 patents. In addition, 821 patents have a discontinued legal status. Patents with pending, expired, inactive, and patented legal statuses related to human intelligence number approximately 1,561, 445, 281, and 15, respectively.

There are 445 patents with the expired status and will become discontinued patents. Patent documents that have expired status will automatically appear and be available in the public domain. Entrepreneurs can study and use these patent innovations freely. This availability is an opportunity to utilize patents as a more comprehensive and thorough insight into the phenomenon of human intelligence through a multidisciplinary approach (Hunt, 2020).

Owners

Owners of intellectual property protection for artificial intelligence patents from various countries with the largest quantity can be seen in Figure 3. Tencent Technology (Shenzhen) Company Limited, China (n=248); Lg Electronics INC, South Korea (n=237); International Business Machines Corporation, United State (n=143); American Vehicular Sciences LLC, United State (n=104); Automotive Technologies International INC, United States (n=93), Beijing Baidu Netcom Science and Technology Co LTD, Hongkong (n=92); Baidu Online Network Technology (Beijing) Co LTD, Beijing (n=82); Microsoft Technology Licensing LLC, United States (n=73); Samsung Electronics Co. LTD. South Korea (n=60); and Trimble Navigation Limited, United States (n=42) and others are among the companies committed to expanding the size of the human intelligence market.

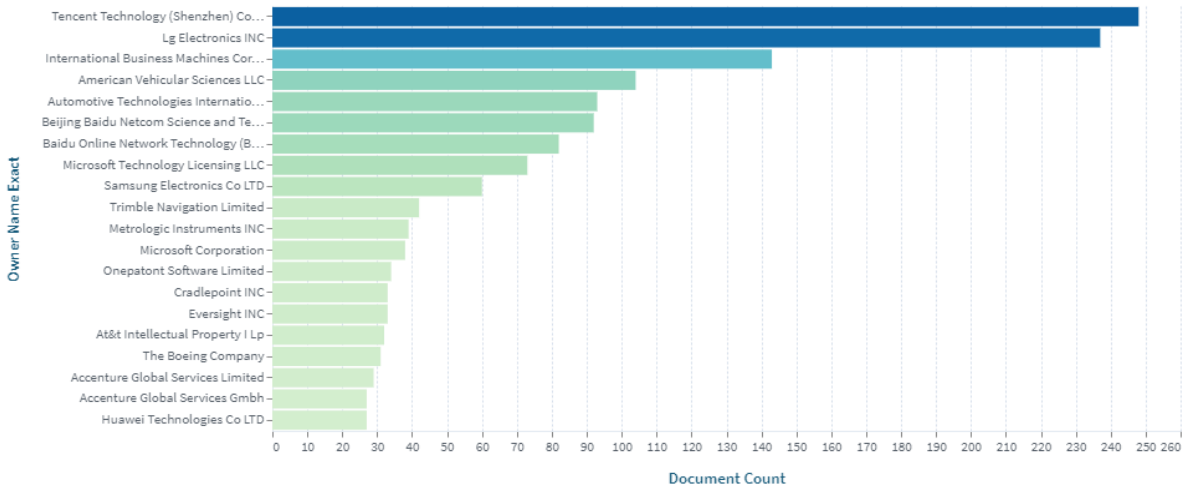

Figure 3. Owner Paten has human intelligence.

Intellectual property patents related to human intelligence are dominated by the ownership of five companies in the United States. In addition, the most productive ownership of intellectual property patents related to human intelligence is owned by a US company, Tencent Technology (Shenzhen) Company Limited, with 248 patents. This happened since Tencent Technology (Shenzhen) Company Limited has patent issuance regulations that continue to increase every year. An example of such increasing regulation of patent appearances can be seen through the award it received at the Singapore Business Review's 2021 Technology Excellence Awards for the Cloud Services category in April, marking another milestone for Tencent's advancement in the cloud computing space. In recent years, Tencent Cloud has built an infrastructure committed to developing industry-leading cloud products and services in 27 regions around the world. The existence of this patent award is an important milestone in Tencent Technology (Shenzhen) Company Limited's journey to create the most valuable technological innovations in the world. In addition, this award also reflects the long-term commitment of Tencent Technology (Shenzhen) Company Limited to the development of exclusive cutting-edge technology to continue to increase technology users (Cision, 2021).

Cooperative Patent Classification

Intellectual property patents from various countries related to human intelligence can be classified based on CPC as shown in Figure 4. Cooperative Patent Classification (CPC) is a development of the International Patent Classification (IPC). It is managed jointly by the European Patent Office (EPO) and the United States Patent and Trademark Office (USPTO). The CPC is divided into nine sections, classes, sub-classes, groups, and sub-groups (EPO, 2017).

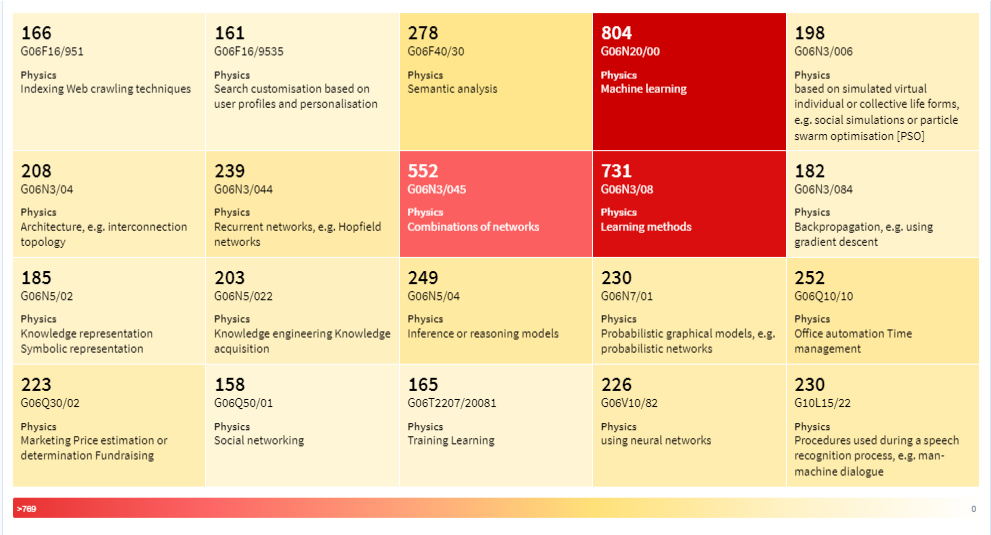

Figure 3. Patent CPC Classification in Human Intelligence

Patents related to human intelligence are dominated by the physics (G) patent section. The two most widely protected patent groups are G06N20/00 on physics, e.g., machine learning, and G06N3/08 on physics, e.g., learning methods. The physics (G) section comprises group patents G06N3/045 (n=552) on combinations of networks; G06F40/30 (n=278) on physics consisting of semantics analysis; G06Q10/10 (n=252) regarding physics, office automation time, management; G06N5/04 (n=249) regarding physics, inference or reasoning models; G06N5/044 (n=239) on physics, recurrent networks, e.g., hopfield networks; G06N7/01 (n=230) about physics, probabilistic graphical models. E.g. probabilistic networks; G10L15/22 (n=230) about physics, procedures used during a speech recognition process, e.g. manmachine dialogue; G06V10/82 (n=226) about physics, using neutral networks; G06Q30/02 (n=223) regarding physics, marketing price estimation or determining fundraising; G06N3/04 (n=208) on physics, architecture, e.g. interconnection topologies; G06N5/022 (n=203) regarding physics, knowledge engineering knowledge acquisition; G06N3/006 (n=198) regarding physics, based on simulated virtual individual or collective life forms, e.g. social simulations or particle swarm optimization; G06N5/02 (n=185) about physics, knowledge representation symbolic representation G06N3/084 (n=182) about physics, backpropagation, e.g. using gradient descent ; G06F16/951 (n=166) regarding physics, indexing web crawling techniques; G06T2207/20081 (n=165) on physics, training learning; G06F16/9535 (n=161) regarding physics, search customization based on user profiles and personalization; G06Q50/01 (n=158) about physics and social networking.

There is an effort to protect patent intellectual property related to human intelligence in the field of patent physics (G) G06N20/00. Patent protection is at the second level of the largest subgroup of CPC patents that experience longformer patent rejection models. This shows that the related patent G06N20/00 is the most widely protected patent on human intelligence innovation because the ability of assistive capabilities to manage data automatically and accurately is very important for many industries and businesses (Y. Zhang et al., 2020).

Geographical Jurisdictions

Geographical jurisdictions for patent intellectual property protection in various countries related to human intelligence can be seen in Figure 4. There are around 13 countries or regions that are listed as involved in patents on human intelligence topics. United States (n=4361), WO – WIPO (n=669), Europe (n=380), China (n=73), South Korea (n=11), Canada (n=6), Australia (n= 4), United Kingdom (n=4), Japan (n=2), Taiwan (n=2), Greece (n=1), Russia (n=1), and Ukraine (n=1) are the jurisdictions of the countries and areas related to human intelligence patents.

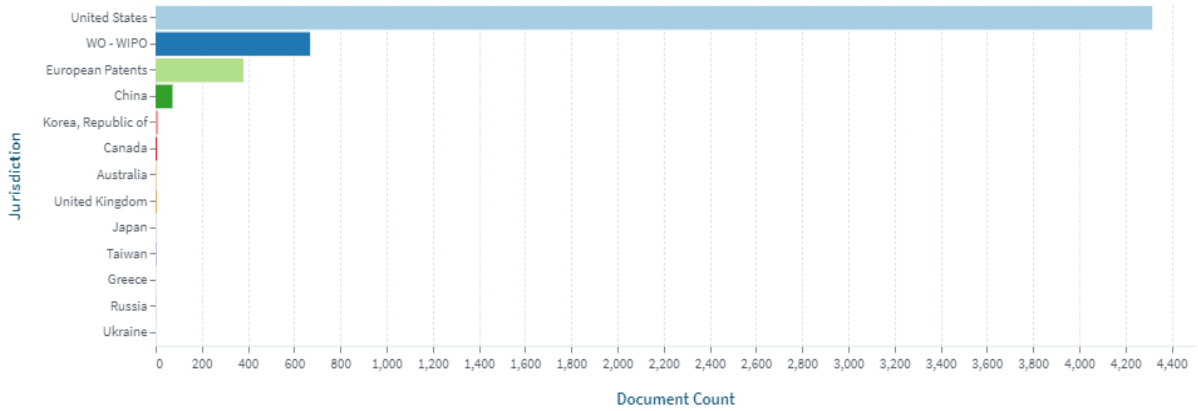

Figure 4. Human Intelligence Patent Geography Jurisdiction

The United States is the most productive and protective country regarding human intelligence patents since it has an important role in the development of artificial intelligence technology and has a significant influence on innovation in that field (Leusin et al., 2020), (F. Zhang, 2019).

Inventor

The most productive individual inventors for intellectual property patents from various countries related to human intelligence can be seen in Figure 6. Breed, David. S (Colombia, n=117); Duvall, Wilbur. E (United States, n=69); Zhu, Xiaoxun (China, n=27); Johnson, Wendell. C (United States, n=59); Allen Christopher (United States of America, n=39); Kotlarsky Anatoly (New York, n=39); Mandal, Sudhin (India, n=39); and Au, Ka, Man. (China, n=38) are the most prolific individual inventors of human intelligence patents.

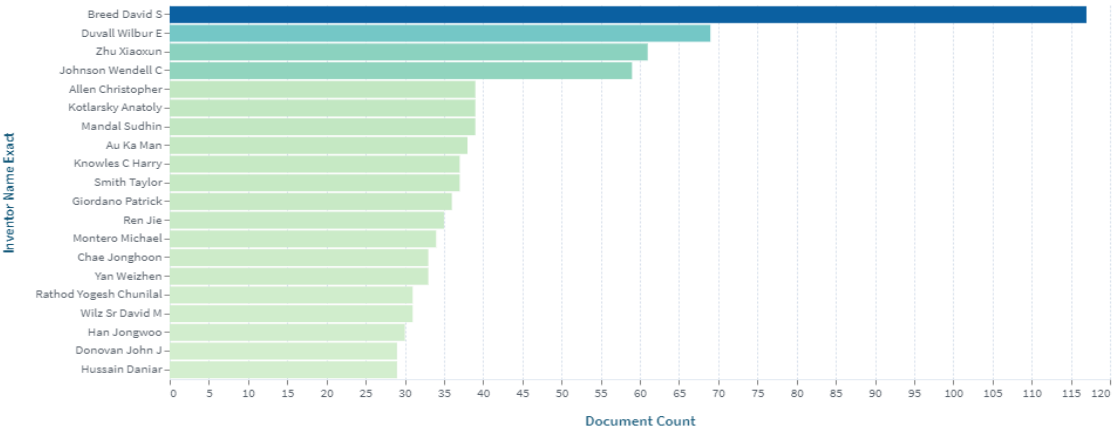

Figure 5. Inventor of Human Intelligence Patents

Intellectual property patents related to human intelligence are dominated by inventions by inventors from affiliated countries in the United States (n=2) and China (n=2). The relationship between human intelligence and patent analysis in the US lies in the ability of human intelligence to understand and interpret the information contained in patents (Sadiku et al., 2020). The role of artificial intelligence, which is starting to replace many sectors, is what has encouraged the United States to continue to develop its research in the field of rationalizing human intelligence, solving problems, and learning. The concept of cultural intelligence is relevant in the modern world of globalization (Regens, 2019).

Human Intelligence Categorization

Table 1. Categories Patent of Human Intelligence.

No.	Category patent	Patent Number
1.	Education	CN 201220404301 U (Enyi, 2012), US 201916657131 A (Shady, Chahid, and Fakhri 2018), KR 20010062819 A (Ram, 2001)
2.	Smartphone	US 201615053751 A (Calvin and Caleb, 2016) CN 201721508049 U (Huayun 2018)
3.	Personal assistance	IB 2020061556 W (Vahid and Azadeh 2021), US 2011/0023492 W (Dean 2011)
4.	AI	US 201715420028 A (Erik and Peter 2018), CN 202110435444 A (Mou et al. 2021)
5.	Home	IB 2019057280 W (BidHan 2020), CN 201720993736 U (Changshan and Changsong 2018), CN 201010513421 A (Zhao 2012) US 30741706 A (Hongyue 2007)
6.	Business Management	KR 0100922 W (Jin, 2001), US 96010507 A (Alexander et al., 2012), US 201313934608 A (John & Jonathan, 2013), US 95025110 A (M, Gregory, and Eric, 2011), US 2014/0012411 W (Gabriela, Gavin, and Natasa, 2015)
7.	Healthcare	KR 20010044701 A (Hyun 2001), CN 202210693972 A (Zhiwen, Yixuan, et al. 2022), CN 98123932 A (Anyu 1999), US 202217706267 A (Ryanghee 2022), CN 90207944 U (Lei 1991)
8.	Journalism	CA 2235030 A (Steve, 1999), GB 0810737 A (Timothy, 2009), US 201916460319 A (Daming & Hao, 2021)
9.	Translation system	US 201715603938 A (Hagen, 2019), CN 202211077086 A (Zhiwen, Xin, et al. 2022), US 201816044926 A (Qiang and Sheng, 2020).
10.	Assessment	RU 2001115157 A (N 2003), CN 01204586 U (Ying and Jianru 2002), US 14359802 A (L 2003)
11.	Internet	US 98019507 A (Ole-Petter et al. 2008a), US 91522401 A (K, H, and S 2002), US 201616306434 A (Dai et al. 2020)

12.	Supply Chain	US 65448307 A (Ole-Petter et al. 2008b), US 98019307 A (Ole-Petter et al. 2010), US 201113300087 A (Jason et al. 2017)
13.	Simulating	US 201314097377 A (Changbin and Li, 2018), IN 2020050560 W (Bosubabu 2021)
14.	Psychology	US 201917291003 A (Yehuda, Sholomo, and Liora 2022), IL 2019051222 W (Yehuda, Ernesto, and Liora 2020)
15.	Human Intelligence Task	US 201929711049 F (Joseph, Riccardo, and Alessandra 2021), US 201414203513 A (R et al. 2015), US 201314025880 A (Huai-Hsin et al. 2017)

DISCUSSION

Education

Human intelligence becomes the foundation for education-based learning and knowledge acquisition. Human intellect and education are closely interconnected, significantly influencing each other. Education helps individuals to enhance their cognitive abilities and overcome challenges, helping them reach their full potential. The utility model of patent CN 201220404301 U, according to the inventor (Chen Enyi), pertains to teaching aids, particularly educational goods or toys that serve to enhance human intelligence. Human intelligence affects educational outcomes: Success in school is significantly influenced by human intelligence. The integration of artificial intelligence and education has become an unavoidable development trend with the development of big data intelligence, deep learning, brain-like intelligence, autonomous control, and other new generations of artificial intelligence technologies (Qian & Feng 2020). This trend can foster the development of students' creativity more than traditional teaching (Qian & Feng 2020).

Inventors of US patent 201916657131 A (Shehata Shady, Ouali Chahid, Karray Fakhri) stated that Human intelligence and automatic interactive learning systems/methods are closely related in the context of learning and developing human abilities. Automatic interactive learning systems and methods are technologies designed to help humans learn various topics more effectively and efficiently. The relationship between human intelligence and automatic interactive learning systems/methods is a mutually beneficial symbiotic relationship in an effort to improve human abilities and achieve the desired learning goals, especially by educational institutions (Chen et al., 2020).

Preschool education assembly learning tools are supplied, according to patent KR 20010062819 A inventor Jung A Ram, to effectively foster the development of different human intelligences. Children's educational assembly resources can enhance general intelligence or general assembly intelligence. By letting kids freely explore and imagine, this tool can also aid in fostering their creativity and ingenuity. In this way, assembly education tools are a valuable resource that promotes the growth of excellence in school-age pupils and can aid in the development of critical and creative thinking abilities as well as the capacity to recognize and solve difficulties (Paz-Baruch, 2020).

Education greatly influences human intelligence. It can enhance social and emotional abilities like empathy, teamwork, communication, and emotion control, raising a person's EQ, or emotional intelligence score.

Smartphone

Human intelligence refers to the brain's capacity for information processing, problem-solving, learning, and environmental adaptation. Smartphones and human intelligence are related in that they can either impede or support a person's cognitive ability. According to the inventor of US patent 201615053751 A (Wiese Calvin and Wiese Caleb), one of the devices that can impair a person's cognitive capacities is a smartphone. Smartphone use can also contribute to greater access to knowledge and technology. A smartphone can facilitate communication and connections with others on both a social and professional level. When used wisely and responsibly, smartphone technology can support the growth of human intelligence, have an impact on individual attention and performance, and enable quick and efficient decision-making in the business world (Schwaiger & Tahir 2022).

Inventor of CN patent 201721508049 U (Wu Huayun) states that the utility model relates to human intelligence control systems such as lap wall, telephone devices, and high-definition digital cameras. Therefore, it can be claimed that human intelligence's utility models and control systems can relate to the use of telephone devices in a variety of ways. Users can choose the telephone equipment that will benefit them the most using a utility model. However, they also need to use a human intelligence control system to engage with and control the gadget (Chen et al., 2020).

Smartphones have had several positive impacts on human intelligence, including social connectedness. Thus, they make it possible for users to stay in touch with others around them and stay up to date on social trends. This may enhance one's capacity for social interaction.

Personal Assistance

Personal assistance is an individual or technology that assists a person in managing and completing daily tasks, as well as increasing a person's efficiency and productivity in carrying out daily life. They are a component of the human intelligence system that aids in daily task optimization, enhances decision-making abilities, and frees up time for more difficult and crucial tasks. Artificial intelligence technologies (Artificial Intelligence, Natural Language Processing, Deep Learning, Machine Learning, Social Networks, Cloud, SaaS, Multi-Platform (Web & Apps), Chat Bot, Question/Answer, Text Generation, Recommendation System, Online Learning) are disclosed in inventor of IB patent 2020061556 W (Salehi Vahid, Najafi Dejdeh Monfared Azadeh). They are created collaboratively with knowledgeable consultants, discussions with users, and step-by-step analysis. Humans can benefit from personal assistance that is integrated with artificial intelligence technology in analyzing massive or complex data, identifying trends or patterns, and improving decisions. According to numerous research, humans are more likely to choose personal help when perceived intelligence and anthropomorphism are considered to be significant elements. While anthropomorphism refers to personal assistance skills in mimicking human behavior, perceived intelligence includes personal assistance skills in offering practical answers or suggestions (Moussawi et al., 2021).

Inventor of US patent 2011/0023492 W (Stark Dean) states that Human intelligence personal assistance systems and methods enable users to interact with audio and video images when requested. Human intelligent personal assistance systems, such as virtual assistant technology or productivity apps, can assist humans in managing daily tasks and schedules.

With the help of this system, humans can improve their multitasking abilities, time management, and efficiency in completing tasks. In an organizational context, modern assistance functions such as virtual assistant technologies can assist humans in semi-automated invoice processing and intelligent calendar management (Morana et al., 2020).

Personal assistance can increase productivity, efficiency, and mental performance, all of which have a good effect on human intellect. It can also improve multitasking effectiveness, everyday task management, and information processing speed and accuracy in people. By doing this, people can enhance their cognitive skills and use their brains to the fullest extent possible to make better decisions.

Artificial Intelligence

Artificial intelligence (AI) aims to simulate human behaviour and carry out operations that call for human intelligence. In a technological setting, where AI development tries to imitate human cognitive capacities and improve human intelligence's capacity for problem-solving and decision-making, AI and human intelligence are related. A system that enables human intelligence and artificial intelligence to collaborate on problem solving in real time, as disclosed by the inventors of US patent 201715420028 A (Viirre Erik, Tagg James Peter), allows people to characterize complex data sets of interactions in order to identify systemic failure points and make improvements. Artificial intelligence techniques that are human-centered are more likely to result in systems that are dependable, secure, and trustworthy (Shneiderman, 2020).

One application of AI using multiple unmanned aerial vehicles based on intelligence-enhanced hybrids enhances planning effectiveness and job completion, according to the inventors of CN patent 202110435444 A (Chen Mou, Han Zengliang, Zhu Ronggang, Zhou Tongle, Wu Qingxian, Nie Zhiqiang, and He Jianliang). The connection between human intelligence and artificial intelligence (AI) is fascinating that signifies the capacity of automated machines to imitate or exceed human intellect in certain jobs or activities including a new generation of technology that can interact with the environment and replicate human intelligence (Glikson & Woolley 2020).

AI has the potential to have a substantial impact on human intelligence and how we perceive the world, such as augmenting human problem-solving abilities, expanding human constraints, and increasing productivity and efficiency.

Home

Home is a place where someone lives and feels comfortable and safe. In terms of human intelligence, the idea of home security can be factors related to the physical and psychological security of the people who live there. This can involve making sure the home is physically secure, such as by installing alarms, cameras, and locks, as well as making sure the environment inside is hygienic and safe. According to inventor of IB patent 2019057280 W (Podder Bidhan), home automation systems and techniques are offered. Multiple sensors built within the system can perceive a variety of devices' operational statuses. Since the system can track daily home activities in real-time and send alerts when anything suspicious happens, the

application of AI in home automation systems can also improve the safety and tranquility of the home's occupants. AI can make homes safer and more theft-resistant (Pala & Özkan 2020).

According to the use model disclosed in inventor of CN patent 201720993736 U (Bai Changshan & Bu Changsong), garden lights can be controlled by human intelligence to open and close, thereby realizing forced air cooling and heat dissipation. Based on an innovative and potentially ground-breaking method of designing lamp holders, the new garden lights are intended to offer a more customised and human-centred lighting experience in outdoor settings. These lights are fitted with sensors or other technology that enables them to recognize human presence, movement, or other behavior and react to it, for example by changing their brightness or color temperature. A favorable user experience can be provided by intelligent lamp designs that are low-cost, high-efficiency, and energy-saving (Lin et al., 2022).

According to the inventor of CN patent 201010513421 A (Sulong Zhao), as containerized housing gains popularity, more inventive solutions are likely to materialize, propelled by the creativity of architects and contractors. Buildings or residences constructed from shipping containers are referred to as container housing. Because they are frequently built of steel, these containers are strong and resistant to adverse weather. Increasingly more people are choosing containerized homes because of its affordability, sustainability, and adaptability. One can investigate how to create smart structures that attain the subtleties of sustainability, cost-effectiveness, and flexibility that are the hallmarks of this new building technology by examining patents pertaining to container dwelling (Marson & McAllister 2021)

By using real-life simulation, real-life simulation reactive, active, and intelligent response, the inventor of US Patent 30741706 A (Luo Hongyue) discloses intelligent home security methods that can significantly lower the likelihood of intruders breaking in or even prevent the occurrence of break-in. Additionally, distributed security is classified for the different operating and communication states of the connected apps (Alkatheiri et al., 2021).

Smart houses, home security systems, and street lighting are just a few examples of the advanced technologies that can be developed to improve comfort, safety, and efficiency in varied surroundings. The result is that human intelligence can also help to develop smarter, more energy-efficient street light systems, smarter, and more energy-efficient home security technologies, as well as smart homes that can increase occupant comfort and safety, reduce energy use, and optimize temperature and light settings as necessary.

Business Management

Using human intellect in strategy, decision-making, innovation, and problem-solving optimizes human resources and facilitates effective corporate management. Patent KR 0100922 W describes a communication-oriented human clock that consists of a control program, an integrated time function, and a data memory for storing voice information (Park Kyu Jin). The ability of these technologies to mimic human speech and thought processes, as well as their applications, is what links human intelligence to human-like clocks capable of carrying out bilateral conversations via telecommunications, data providing systems for them, and internet business methods for them. To make it more effective and human-like, artificial intelligence and machine learning are used (Kikerpill, 2021).

According to the inventors of US patent 96010507 (Alexander Gounares, David M. Chickering, Eric J. Horvitz, Michael Connolly, Lili Cheng, and Kamal Jain), the term "mass

auditing" describes the process of examining huge amounts of data or information to find patterns, trends, and potential issues. Human intelligence and mass auditing work together to enhance each other. While large-scale audits can aid in spotting possible issues, human intelligence is necessary for comprehending context, analyzing data, and coming to wise judgments. Human intelligence, however, can offer value by interpreting data, making judgments, and assessing the outcomes of these mass audits (Brody et al., 2020). As a result, human intelligence and emotional intelligence are interconnected, and they can both have a big impact on an auditor's performance and audit findings.

Taxonomy-based targeted search advertising can use human intelligence to maximize the success of advertising campaigns, according to inventors of US patent 201313934608 A (Zimmerman Jr Stephen John & Warden Jonathan). In order to gain greater knowledge and insight into how well these advertising efforts performed, human intelligence can also be used to evaluate and analyze the outcomes of these campaigns. In order to increase the success of future advertising campaigns and deliver better quality advertising results and experiences, this can help in making improvements or adjustments to advertising strategies (Chintalapati & Pandey 2022).

By fostering a work environment that supports learning, creativity, cooperation, and problem solving, business management can have a beneficial impact on human intelligence and help employees become smarter and more productive. By giving a company a defined framework for managing its resources, procedures, and employees, business management can have a positive impact on human intelligence.

Healthcare

Healthcare is an effort or activity that is performed to promote, maintain, and restore a person's or society's health and well-being. The management of illnesses and medical problems, as well as the prevention and control of diseases, are all included in healthcare. Cho Jae Hyun's invention is described in patent KR 20010044701 A, which relates to the tactile feeling care bottle. From conception to execution, nurses must be actively involved (Ronquillo et al., 2021).

Inventors of patent CN 202210693972 A (Yu Zhiwen, Chen Yixuan, Liu Jiaqi, Wang Liang, Guo Bin, Wang Yanfei, Zhang Xin) stated about methods and systems of medical diagnosis based on human-machine cooperation. When robots take the position of human doctors to conduct symptom investigations, machine intelligence and human intelligence are effectively merged, significantly decreasing the workload of human doctors. By effectively grouping individuals to grasp certain scenarios and enhance decision-making, a multipurpose machine learning platform for clinical data extraction, aggregation, management, and analysis can assist physicians (Ahmed et al., 2020).

The inventors of CN patent 98123932 A (Ren Anyu) described a nutritionally complete and balanced breakfast that integrates oral liquid medications for health care with foods like instant rice, noodles, vermicelli, and bean jelly based on the requirements of life, health, ecological beauty, and long life. To promote human intelligence and cognitive function throughout life, a diet rich in nutrients is crucial. Although diet alone cannot predict intelligence, it is crucial for preserving the health and best functioning of the brain. A better knowledge of the role that nutrition plays in promoting human intellect and cognitive function

could lead to the creation of more focused nutrition treatments, which would ultimately enhance the general standard of living for all people (Tardy et al., 2020).

Human intelligence is significantly enhanced by healthcare. One of the benefits is guaranteeing people's physical and mental health and wellbeing, which can enhance their intelligence and cognitive skills. They are more likely to have access to good food, a clean environment free of contaminants, and enough health services in a healthy environment. All of these can aid in enhancing cognitive abilities in people, allowing them to think more clearly, creatively, and with greater concentration while performing daily chores.

Journalism

Journalism is the process of disseminating information and news about real-world occurrences and facts with the intention of educating readers or the public at large. By providing society with pertinent and worthwhile news and information, journalism can significantly contribute to the growth and advancement of human intelligence., The inventors of patent CA 2235030 A (Mann Steve), describes systems for photojournalists, video documentarians, and electronic news gathering. Journalists can easily join a network of human intelligence and access the knowledge and expertise of a vast community in photography. The application of automated artificial intelligence processes to different areas of news production has transformed journalistic practice, especially on a huge economic scale (Jamil, 2021).

A video data source configured on a central coordination server to be an HIT (Human Intelligence Task) set consisting of a collection of frames collected from the video source is described in inventor patent GB 0810737 A (Cross Geoffrey Mark Timothy). Because the development of cognitive skills carried out by HIT can contribute to enhancing total human intelligence, there is a favorable association between HIT and HI. To boost user click-through rates for videos, a hybrid human-artificial intelligence system was created (Wu et al., 2021).

It is described in US Patent 201916460319 A (Lu Daming & Tian Hao) how to specify (raw) video content for news stories using various tools and methods. According to (Túñez-López et al., 2021), methods and tools for determining (raw) video material for news are techniques or approaches that use human intelligence to choose, determine, and edit video material to be used in news production. This will enable automated text news current to audio and video on demand.

When it comes to influencing knowledge, attitudes, and behaviour, news and journalism can make a significant beneficial difference in the field of human intelligence. People's understanding of social, economic, and political concerns that have an impact on their lives can be increased via news and media. People can make wiser and more knowledgeable decisions if they are more knowledgeable about these subjects.

When it comes to influencing knowledge, attitudes, and behavior, news and journalism can make a significant beneficial difference in the field of human intelligence. People's awareness of social, economic, and political concerns that have an impact on their lives can also be increased by news and journalism. People can make wiser and more knowledgeable decisions if they are more knowledgeable about these subjects.

Translation system

A software program or application that automatically translates text or speech from one language into another is referred to as a translation system. A mechanism for assessing the effectiveness of a machine translation system is shown in patent US 201715603938 A (Fuerstenau Hagen). The translation system attempts to mimic the human translation process, but it still has limits in comparison to the adaptability and nuance of human intellect. This shows how closely the two are related. The constructed translation model is highly clever and capable of addressing the required translations (Song, 2021).

The inventors of CN patent 202211077086 A (Yu Zhiwen, Zhang Xin, Liu Jiaqi, Wang Hui, Wang Liang, Guo Bin, Chen Yixuan, Wang Yanfei) claimed that when human intelligence and machine intelligence are successfully combined, the accuracy of the final program translation results improves and the workload of software engineers is decreased. Programs for human-machine collaboration are now translated more quickly and effectively. As a result, machine translation is becoming more and more significant in the field of language services (Yu, 2021).

The US patent 201816044926 A (Cheng Qiang & Qian Sheng) reveal techniques and tools for turning spoken English into writing. The approach is capable of accepting user-provided English voice data. The quality and simplicity of the transcription process, as well as the accessibility and effectiveness of gathering and processing information, can all be improved with techniques and tools for turning spoken English into text with human intelligence. According to (Yang & Yue 2020), deep learning can give learners quick, accurate, and objective feedback on their pronunciation.

Employing a translation system powered by human intelligence has various benefits, including expanding access to information, boosting output, promoting language development, fostering global cooperation, and raising translation quality.

Assessment

Assessment is a process used to measure an individual’s abilities in areas such as language, math, verbal, and visual-spatial skills. A person's level of intelligence, as well as their strengths and weaknesses in terms of their cognitive, emotional, and social skills, are commonly determined through assessment in the context of human intelligence. A technique for determining the level of information processing by the human brain is revealed in patent RU 2001115157 A (Anan Ev I N). Assessment must concentrate on human intelligence, particularly on skills that are difficult for robots to replicate (Bearman and Luckin 2020).

The inventors of CN Patent 01204586 U (Hu Ying & Zhou Jianru) describe a utility model for a meter that may graphically represent the mental and emotional intelligence and physical prowess of the human body. With the help of this utility model, it is believed that a more comprehensive grasp of human intelligence as a whole will be gained, as well as a better understanding of human potential and talents in a wide range of contexts, not only academic or intellectual ones. The development of knowledge-based intelligent systems has expanded as a result of technological advancements that emulate key features of human intelligence (Vigo, Zeigler, and Wimsatt, 2022).(Vigo et al., 2022).

The inventor of US patent 14359802 A (Klingler Gregory L) shows a technique used in management or marketing to anticipate or estimate market demand for a good or service. However, when discussing human intelligence, the procedures or techniques used to gauge someone's aptitude or intelligence can also be discussed. IQ testing, as an illustration. According to the predictive capacity of their demand, market factors are rated in importance (Nguyen et al., 2020).

From the preceding statement, it can be inferred that evaluation can assist in identifying a person's potential and areas for improvement in a variety of areas of intelligence, including cognitive, emotional, and social abilities.

Internet

Millions of computers and other devices are connected by a global network called the Internet. The Internet, on the other hand, can be regarded as a resource that is crucial for human ability to rapidly and efficiently receive, retain, and exchange knowledge if it is related to human intelligence. In the US patent 98019507 A, the inventors (Skaaksrud Ole-Petter, Dryden Cameron Dee, Smith Jeffrey Robert, Rhodes Robert Russell, Gordon Wayne Luke, and Zhu Xiaoxun) reveal that Internet-based transmission, tracking, and delivery networks comprise data collection and processing facilities that are operationally coupled to the Internet infrastructure. Humans and technology have co-evolved to create the Internet (Halpin, 2022).

The inventors of US Patent 91522401 A (Dar Vinod K, Abrew Frederick H, Rissman Michael S) show methods for retrieving information via the Internet. The strategies and tools used in online information search are essential for enhancing the effectiveness and efficiency of human information gathering. The process of finding information on the internet encompasses a number of techniques, including text, image, video, and voice searches, as well as a number of tools, including search engines, online databases, search applications, and specialized websites. ICT proficiency enables people to find relevant information quickly and accurately (Mahendran & Velmurugan 2020).

The inventors of US patent 201616306434 A (Tan Dai, Xu Qian, Li Jialin, Gao Lei, Li Zheng, Liao Dachun, Pan Xiaolei, Zhang Lun) disclose the use of artificial intelligence-based internet of things systems and techniques. Human intellect may be significantly impacted by the use of Internet of Things (IoT) technologies and techniques powered by artificial intelligence. IoT and AI can increase technology's effectiveness, productivity, and usability in many facets of daily life. The material well-being and happiness of people can be increased by the greater optimization of artificial intelligence Internet of Things technology and the logical application of technical methods (Zhang & Cheng 2022).

The internet has made access to information easier and more widespread, allowing people to learn new things quickly. By entering specific terms into a search engine, users can instantly find the information they need. In this way, greater access to information supports the growth of human understanding and knowledge.

Supply Chain

The term "supply chain" refers to a group of processes that include the coordination, planning, control, and execution of tasks linked to the production, acquisition, storage, distribution, and

delivery of goods or services from suppliers to ultimate customers. The US patent 65448307 A (Skaaksrud Ole-Petter, Dryden Cameron Dee, Smith Jeffrey Robert, Rhodes Robert Russell, Gordon Wayne Luke, and Zhu Xiaoxun) reveal that a system component for document image capture and transmitting, tracking, and delivery over the Internet. Its processing for transmission and recognition begins at the site of collection. It ends as the shipment is being delivered to the first scanning point on the network, accelerating information transfer through the network and cutting down on transmission time. AI can contribute to setting up supply chains to reduce the risk of disruption (Modgil et al., 2022).

The inventors of US patent 98019307 A (Skaaksrud Ole-Petter, Dryden Cameron Dee, Smith Jeffrey Robert, Rhodes Jr. Robert Russell, Gordon Wayne Luke, Zhu Xiaoxun) show that methods and apparatus for sending, tracking, and sending packages using document capture shipping and recognition processing starts at the point of collection and finishes. At the same time, the shipment is being transported to the first scanning point, to facilitate the start of billing processing for shipments. The proposed package delivery system can perform tasks quickly and efficiently (Feng et al., 2020).

Systems and techniques for labelling data from numerous sources are disclosed by the inventors of US patent 201113300087 A (Williams Jason, Alonso Tirso, Hollister Barbara B, and Melamed Ilya Dan). Systems and techniques can use human intelligence for data labeling from a variety of sources. Data labelling is the process of assigning labels or tags to data, such as images or text, to help computers recognise and comprehend the information. To improve data annotations for the same data set and to develop labels for new data sets, the most reliable and consistent label relationships are used (Cui et al., 2020).

Human intelligence can benefit from supply chain, which can enhance staff competencies. Employees who are involved in supply chain activities might receive training and development from a strong supply chain. In addition to helping them advance their professions and boosting their skills and abilities, this can help employees' skills and abilities. Employees that are involved in supply chain activities might receive training and development from a strong supply chain. Employees' skills and abilities may be enhanced, and it may also help with professional advancement.

Simulating

Simulating refers to the process of developing a computer program or system that can mimic or emulate human thought, behaviour, and interaction. A technique for virtualizing a computing system that resembles the human brain is described in US patent 201314097377 A (Tang Changbin & Xiong Li). attempts to develop computing systems that can simulate or model how the human brain processes information and performs intelligence-related activities. In a number of industries, social interactions and production are most affected by artificial intelligence and virtualization (Santos et al., 2021).

According to inventors of IN patent 2020050560 W (Sambana Bosubabu), artificial intelligence is used for telepathic data exchange with virtual reality holographic projections in virtual brain cloning. A technique known as *"virtual brain cloning"* permits the construction of a computer simulation model that represents the human brain's structure, connections, and neuronal activity. Through the regenerative development of professional skills, a cognitive

ensemble of intelligent cellular diverse agents with powerful artificial intelligence can be developed (Bryndin, 2020).

In the context of human intelligence, simulating and virtualizing have important advantages, such as raising productivity and efficiency. With the use of simulation and virtualization, humans can handle data and information more rapidly and effectively, which can boost productivity and effectiveness when carrying out specific jobs.

Psychology

The science that examines human behaviour and mental processes, including intellectual capacities or human intelligence, is known as psychology in the context of human intelligence. The Inventor of US patent 201917291003 A (Kahane Yehuda, Korenman Ernesto Sholomo, Weinbach Liora) describe computerized systems and methods for assessing psychological states based on sound analysis. A professional psychology evaluation system for students can, among other things, use scientific professional psychological assessments to assist students in better understanding their own interests, personalities, and professional skill inclinations (Ren, 2020).

The inventors of IL patent 2019051222 W (Kahane Yehuda, Korenman Ernesto, Weinbach Liora) disclose a computerized system and method for assessing psychological states through sound analysis. Technologies that use computers to analyze and interpret human speech data to evaluate a person's psychological condition, such as emotions, stress levels, and anxiety, are known as computerized systems and methods for evaluating psychological states based on sound analysis. The voice control method used in this paper is precise and effective for controlling intelligent systems involving human-computer interaction (Liu et al., 2020).

The positive impact of psychology on human intelligence is very important in understanding and improving the quality of human life, such as improving mental health. By examining the elements that affect mental health, such as stress, anxiety, and depression, psychology aids in the improvement of mental health and well-being. Psychology can assist people in overcoming mental health issues and enhancing their quality of life by comprehending these aspects.

Human Intelligence task

Human Intelligence Task (HIT) is a task or work that humans must do as part of the process of collecting or processing data for a specific purpose. Even while these activities are frequently straightforward, they call for a level of cognition or knowledge that current artificial intelligence algorithms or machines are unable to accomplish. HIT examples include data validation, data annotation, voice transcription, and picture or text recognition. The inventors of US patent 201929711049 F (Rhyu Joseph, Carlet Riccardo, Villaamil Alessandra) presents a Display panel with a graphical user interface of the primary news. The blue colour indicates keywords under high introduced cognitive burden, and the italic font and red colour of the keyword text provide the cognitive strain that the reader feels while reading news texts under low introduced cognitive load (Zhou et al., 2022).

The inventors of US patent 201414203513 A (Jorge R. Ramos, Rajesh Patel, Steven Shelford, and Yunling Wang) claim that the invention and efficient application of human

intelligence's reference jobs. The development of knowledge-based intelligent systems has expanded as a result of technological advancements that try to emulate key features of human intelligence (Vigo, Zeigler, and Wimsatt 2022).

Using task performance as a guide, the inventors of US patent 201314025880 A (Chi Ed Huai-Hsin, Dai Peng, Paritosh Praveen, and Rzeszotarski Jeff) explain how to manage the workflow of human intelligence jobs. The methods presented here are adaptable to the kinds of tasks offered throughout a process. This preparation may entail offering various jobs or activity breaks as workflow interruptions. In terms of effectiveness, security, and customer satisfaction, the suggested planner performs better (Paz-Baruch, 2020).

The Human Intelligence task improves cognitive abilities. These abilities, including concentration, problem-solving, analysis, and comprehension, are needed to complete HIT assignments. HIT activities can assist in expanding cognitive capacity and improving cognitive abilities through consistent practice.

One of the most striking examples from the study is the potential use of the 821 discontinued patents related to human intelligence, which are now accessible without royalty fees. This aspect highlights the immense opportunity for leveraging previously protected intellectual property to drive innovation across fields such as education, healthcare, and artificial intelligence. A key motivation behind this discussion is the urgency to advocate for more patents to be released from their protective status, thus enabling society to benefit from the documented intellectual value. To inspire readers, this review emphasizes the transformative impact of these patents, such as advancing cognitive tools and human-machine interfaces, which have significantly enhanced human intelligence capabilities. A more systematic and critical discussion is essential to examine how the patent mechanism itself influences society's ability to access and utilize these innovations. This exploration invites readers to reflect on the balance between intellectual property protection and the public's right to benefit from knowledge, urging actionable steps to maximize societal gains while ensuring sustainable innovation ecosystems.

The findings of this research have significant practical implications for various stakeholders. Businesses and entrepreneurs can leverage discontinued patents to innovate without incurring royalty fees, enabling cost-efficient advancements in human intelligence technologies. Policymakers may utilize these insights to craft strategies that promote sustainable innovation and facilitate the commercialization of such technologies. Researchers and academics are provided with a clearer understanding of emerging trends and gaps, offering direction for future interdisciplinary studies. For technology developers, the study reveals opportunities to design solutions in fields like artificial intelligence, healthcare, and education that align with global patent trends and societal demands. Additionally, educational institutions could integrate human intelligence advancements into teaching methods, enhancing learning outcomes. Finally, the geographical patent data supports international collaboration, fostering partnerships to drive innovation and technological progress. By applying these insights, stakeholders can effectively contribute to technological development and societal well-being.

CONCLUSIONS

To create innovations and discoveries in the subject of human intelligence, knowledge of patents that are pertinent to that sector is crucial. The number of patents pertaining to the study of human intelligence is generally on the rise each year. It is possible to start a business without paying royalties by utilizing 821 revoked patents that deal with human intelligence. Ownership of businesses and American inventors dominate patent intellectual property relating to human intelligence. The physics (G) patent section predominates in human intelligence-related patents. In 13 nations or areas, there are 2,767 simple family human intelligence patents, with the United States having the most. With 117 patents, Colombian citizen David S. Breeds is the most prolific inventor in the field of human intelligence.

The main restriction of this study is that it only uses Lens patent data. The benefits for different parts of life, including technological advancement, boosting efficiency, developing human resources, and improving quality of life, will expand with further development of scientific and practical methods, including the use of human intelligence. By developing human intelligence studies utilizing a patent landscape analysis approach, this research adds to the body of knowledge. Future predictions indicate that most businesses will adopt human intelligence as a standard. Text here with the first line of the paragraph flush left.

IMPLICATIONS FOR RESEARCH, APPLICATION, OR POLICY

This study highlights the significant potential of using discontinued patents related to human intelligence to drive innovation and societal advancement. Beyond the quantitative analysis, a more critical and systematic examination reveals the profound impact of these patents on enhancing cognitive tools, education, healthcare, and artificial intelligence. The findings highlight the urgent need to reconsider the current mechanisms of patent protection, advocating for more equitable access to intellectual property that can unlock transformative benefits for society. By releasing patents from their protective status, communities worldwide can harness their intellectual value to address pressing challenges and foster inclusive technological progress. This review encourages stakeholders to re-evaluate intellectual property frameworks to align innovation with broader societal benefits. By inspiring readers to reflect and act on these issues, the study aims to stimulate meaningful contributions toward a more inclusive and impactful landscape of human intelligence innovations.

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