ARTIFICIAL INTELLIGENCE

ITS APPLICATION IN VARIOUS FIELDS

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I. ABSTRACT

It is claimed that artificial intelligence is playing an increasing role in research areas. At present many intelligent machines are replaced or enhanced human capabilities in many areas. Artificial Intelligence is the exhibited by machines or software. It has the advantages over the natural intelligence as it is more permanent, consistent, less expensive, has the ease of duplication and dissemination, can be documented and can perform certain tasks much faster and better than the human. Its scientific goal is to understand intelligence by building computer programs that exhibit intelligent behaviour.

This paper presents some back ground and potential of artificial intelligence and its implementation in various fields. We discuss issues that have not been studied in detail with in the expert systems setting, yet are crucial for developing theoretical methods and computational architectures for automated reasons. The tools that are required to construct expert systems are discussed in detail.

KEY WORDS: Artificial Intelligence, Algorithms, Cognitive computing, Clustering, Decision tree, Fluent, Machine intelligence, CNN, Logic programming.

1. INTRODUCTION

Artificial Intelligence (AI) is a science and a set of computational technologies that are inspired by—but typically operate quite differently from—the ways people use their nervous systems and bodies to sense, learn, reason, and take action. While concepts already date back more than fifty years, only recently have technological advances enabled successful implementation at industrial scale.

Earlier in nientin50 artificial intelligence success were limited to the scientific field but in the last years, established IT giants like Google, IBM and Nvidia – fuelled by the abundance of data, algorithmic advances, and the usages of high performance hardware for parallel processing have been bridging the gap between science and business applications.

The research is designed to address three intended audiences. For the general public, it aims to provide an accessible, scientifically and technologically accurate portrayal of the current state of AI and its potential. For industry, the report describes relevant technologies and legal and ethical challenges, and may help guide resource allocation. The report is also directed to local, national, and international governments to help them better plan for AI in governance.

2. WHAT IS ARTIFICIAL INTELLIGENCE?

DEFINITION

Curiously, the lack of a precise, universally accepted definition of AI probably has helped the field to grow, blossom, and advance at an ever-accelerating pace. Practitioners, researchers, and developers of AI are instead guided by a rough sense of direction and an imperative to "get on with it." Still, a definition remains important and Nils J. Nilsson has provided a useful one:

"Artificial intelligence is that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment." From this perspective, characterizing AI depends on the credit one is willing to give synthesized software and hardware for functioning "appropriately" and with "foresight." A simple electronic calculator performs calculations much faster than the human brain, and almost never makes a mistake.

3. APPLICATION OF ARTIFICIAL INTELLIGENCE IN VARIOUS FIELDS

1. TRANSPORTATION

Transportation is likely to be one of the first domains in which the general public will be asked to trust the reliability and safety of an AI system for a critical task. Autonomous transportation will soon be commonplace and, as most people's first experience with physically embodied AI systems, will strongly influence the public's perception of AI. Once the physical hardware is made sufficiently safe and robust, its introduction to daily life may happen so suddenly as to surprise the public, which will require time to adjust. As cars will become better drivers than people, city-dwellers will own fewer cars, live further from work, and spend time differently, leading to an entirely new urban organization. Further, in the typical North American city in twenty thirties, changes won't be limited to cars and trucks, but are likely to include flying vehicles and personal robots, and will raise social, ethical and policy issues. A few key technologies have already catalysed the widespread adoption of AI in transportation. Compared to 2 thousands, the scale and diversity of data about personal and population-level transportation available today—enabled by the adoption of smartphones and decreased costs and improved accuracies for variety of sensors—is astounding. Without the availability of this data and connectivity, applications such as real-time sensing and prediction of traffic, route calculations, peer-to-peer ridesharing and self-driving cars would not be possible.

FOR EXAMPLE: smart cars, self-driving vehicles, on demand transportation, etc.

4. HOME/SERVICE ROBOTS

Robots have entered people's homes in the past fifteen years. Disappointingly slow growth in the diversity of applications has occurred simultaneously with increasingly sophisticated AI deployed on existing applications. AI advances are often inspired by mechanical innovations, which in turn prompt new AI techniques to be introduced. Over the next fifteen years, coincident advances in mechanical and AI technologies

promise to increase the safe and reliable use and utility of home robots in a typical North American city. Special purpose robots will deliver packages, clean offices, and enhance security, but technical constraints and the high costs of reliable mechanical devices will continue to limit commercial opportunities to narrowly defined applications for the foreseeable future. As with self-driving cars and other new transportation machines, the difficulty of creating reliable, market-ready hardware is not to be underestimated.

FOR EXAMPLE: Vacuum cleaners, home robots twenty thirthy, etc.

5. HEALTHCARE

For AI technologies, healthcare has long been viewed as a promising domain. AI-based applications could improve health outcomes and quality of life for millions of people in the coming years—but only if they gain the trust of doctors, nurses, and patients, and if policy, regulatory, and commercial obstacles are removed. Prime applications include clinical decision support, patient monitoring and coaching, automated devices to assist in surgery or patient care, and management of healthcare systems. Recent successes, such as mining social media to infer possible health risks, machine learning to predict patients at risk, and robotics to support surgery, have expanded a sense of possibility for AI in healthcare. Improvements in methods for interacting with medical professionals and patients will be a critical challenge. As in other domains, data is a key enabler. There has been an immense forward leap in collecting useful data from personal monitoring devices and mobile apps, from electronic health records (EHR) in clinical settings and, to a lesser extent, from robots designed to assist with medical procedures and hospital operations. But using this data to enable more finely-grained diagnostics and treatments for both individual patients and patient populations has proved difficult. Research and deployment have been slowed by outdated regulations and incentive structures. Poor human-computer interaction methods and the inherent difficulties and risks of implementing technologies in such a large and complex system have slowed realization of AI's promise in healthcare The reduction or removal of these obstacles, combined with innovations still on the horizon, have the potential to significantly improve health outcomes and quality of life for millions of people in the coming years.

FOR EXAMPLE: The clinical setting, healthcare analytics, healthcare robotics, mobile health, elder care, etc.

6. EDUCATION

The past fifteen years have seen considerable AI advances in education. Applications are in wide use by educators and learners today, with some variation between K-twelve and university settings. Though quality education will always require active engagement by human teachers, AI promises to enhance education at all levels, especially by providing personalization at scale. Similar to healthcare, resolving how to best integrate human interaction and face-to-face learning with promising AI technologies remains a key challenge. Robots have long been popular educational devices, starting with the early Lego Mind storms kits developed with the MIT Media Lab in the nineteen eighties. Intelligent Tutoring Systems (ITS) for science, math, language, and other disciplines match students with interactive machine tutors. Natural Language Processing, especially when combined with machine learning and crowdsourcing, has boosted online learning and enabled teachers to multiply the size of their classrooms while simultaneously addressing individual students' learning needs and styles. The data sets from large online learning systems have fuelled rapid growth in learning analytics. Still, schools and universities have been slow in adopting AI technologies primarily due to lack of funds and lack of solid evidence that they help students achieve learning objectives. Over the next fifteen years in a typical North American city, the use of intelligent tutors and other AI technologies to assist teachers in the classroom and in the home is likely to expand significantly, as will learning based on virtual reality applications. But computer-based learning systems are not likely to fully replace human teaching in schools.

7. PUBLIC SAFETY AND SECURITY

Cities already have begun to deploy AI technologies for public safety and security. By two thousand and thirthy, the typical North American city will rely heavily upon them. These include cameras for surveillance that can detect anomalies pointing to a possible crime, drones, and predictive policing applications. As with most issues,

there are benefits and risks. Gaining public trust is crucial. While there are legitimate concerns that policing that incorporates AI may become overbearing or pervasive in some contexts, the opposite is also possible. AI may enable policing to become more targeted and used only when needed. And assuming careful deployment, AI may also help remove some of the bias inherent in human decision-making. One of the more successful uses of AI analytics is in detecting white collar crime, such as credit card fraud. Cyber security (including spam) is a widely shared concern, and machine learning is making an impact. AI tools may also prove useful in helping police manage crime scenes or search and rescue events by helping commanders prioritize tasks and allocate resources, though these tools are not yet ready for automating such activities. Improvements in machine learning in general, and transfer learning in particular—for speeding up learning in new scenarios based on similarities with past scenarios—may facilitate such systems. The cameras deployed almost everywhere in the world today tend to be more useful for helping solve crimes than preventing them This is due to the low quality of event identification from videos and the lack of manpower to look at massive video streams. As AI for this domain improves, it will better assist crime prevention and prosecution through greater accuracy of event classification and efficient automatic processing of video to detect anomalies—including, potentially, evidence of police malpractice. These improvements could lead to even more widespread surveillance. Some cities have already added drones for surveillance purposes, and police use of drones to maintain security of ports, airports, coastal areas, waterways, and industrial facilities is likely to increase, raising concerns about privacy, safety, and other issues.

8. EMPLOYMENT AND WORKPLACE

While AI technologies are likely to have a profound future impact on employment and workplace trends in a typical North American city, it is difficult to accurately assess current impacts, positive or negative. In the past fifteen years, employment has shifted due to a major recession and increasing globalization, particularly with China’s introduction to the world economy, as well as enormous changes in non-AI digital technology. Since the nineteen nineties, the US has experienced continued growth in productivity and GDP, but median income has stagnated and the

employment to population ratio has fallen. There are clear examples of industries in which digital technologies have had profound impacts, good and bad, and other sectors in which automation will likely make major changes in the near future. Many of these changes have been driven strongly by "routine" digital technologies, including enterprise resource planning, networking, information processing, and search. Understanding these changes should provide insights into how AI will affect future labour demand, including the shift in skill demands. To date, digital technologies have been affecting workers more in the skilled middle, such as travel agents, rather than the very lowest-skilled or highest skilled work. On the other hand, the spectrum of tasks that digital systems can do is evolving as AI systems improve, which is likely to gradually increase the scope of what is considered routine. AI is also creeping into high end of the spectrum, including professional services not historically performed by machines. To be successful, AI innovations will need to overcome understandable human fears of being marginalized. AI will likely replace tasks rather than jobs in the near term, and will also create new kinds of jobs. But the new jobs that will emerge are harder to imagine in advance than the existing jobs that will likely be lost. Changes in employment usually happen gradually, often without a sharp transition, a trend likely to continue as AI slowly moves into the workplace. A spectrum of effects will emerge, ranging from small amounts of replacement or augmentation to complete replacement. For example, although most of a lawyer's job is not yet automated, AI applied to legal information extraction and topic modelling has automated parts of first-year lawyers' jobs. In the not too distant future, a diverse array of job-holders, from radiologists to truck drivers to gardeners, may be affected. AI may also influence the size and location of the workforce. Many organizations and institutions are large because they perform functions that can be scaled only by adding human labour, either "horizontally" across geographical areas or "vertically" in management hierarchies. As AI takes over many functions, scalability no longer implies large organizations. Many have noted the small number of employees of some high profile internet companies, but not of others. There may be a natural scale of human enterprise, perhaps where the CEO can know everyone in the company. Through the creation of efficiently outsourced labour markets enabled by AI, enterprises may tend towards that natural size. AI will also create jobs, especially in some sectors, by making certain tasks more important, and create new categories of employment by making new modes of interaction possible.

9. ENTERTAINMENT

With the explosive growth of the internet over the past fifteen years, few can imagine their daily lives without it. Powered by AI, the internet has established user-generated content as a viable source of information and entertainment. Social networks such as Facebook are now pervasive, and they function as personalized channels of social interaction and entertainment—sometimes to the detriment of interpersonal interaction. Apps such as WhatsApp and Snap chat enable smart-phone users to remain constantly "in touch" with peers and share sources of entertainment and information. In on-line communities such as Second Life and role-playing games such as World of War craft, people imagine an alternative existence in a virtual world. Specialized devices, such as Amazon's Kindle have also redefined the essentials of long-cherished pastimes. Books can now be browsed and procured with a few swipes of the finger, stored by the thousands in a pocket-sized device, and read in much the same way as a handheld paperback. Trusted platforms now exist for sharing and browsing blogs, videos, photos, and topical discussions, in addition to a variety of other user-generated information. To operate at the scale of the internet, these platforms must rely on techniques that are being actively developed in natural language processing, information retrieval, image processing, crowdsourcing, and machine learning. Algorithms such as collaborative filtering have been developed, for example, to recommend relevant movies, songs, or articles based on the user's demographic details and browsing history. Traditional sources of entertainment have also embraced AI to keep pace with the times. As exemplified in the book and movie Money ball, professional sport is now subjected to intensive quantitative analysis. Beyond aggregate performance statistics, on-field signals can be monitored using sophisticated sensors and cameras. Software has been created for composing music and recognizing soundtracks. Techniques from computer vision and NLP have been used in creating stage performances. Even the lay user can exercise his or her creativity on platforms such as Words Eye, which automatically generates 3D scenes from natural language text. AI has also come to the aid of historical research in the arts, and is used extensively in stylometry and, more recently, in the analysis of paintings. The enthusiasm with which humans have responded to AI-driven entertainment has been surprising and led to concerns that it reduces interpersonal

interaction among human beings. Few predicted that people would spend hours on end interacting with a display. Children often appear to be genuinely happier playing at home on their devices rather than outside with their friends. AI will increasingly enable entertainment that is more interactive, personalized, and engaging. Research should be directed toward understanding how to leverage these attributes for individuals' and society's benefit.

10. FINANCE AND ECONOMICS

Financial institutions have long used artificial neural network systems to detect charges or claims outside of the norm, flagging these for human investigation. The use of AI in banking can be traced back to early nineties when Security Pacific National Bank in US set-up a Fraud Prevention Task force to counter the unauthorised use of debit cards. Programs like Kasisto and Money stream are using AI in financial services.

Banks use artificial intelligence systems today to organize operations, maintain book-keeping, invest in stocks, and manage properties. AI can react to changes overnight or when business is not taking place. In August twenty-first century, robots beat humans in a simulated financial trading competition. AI has also reduced fraud and financial crimes by monitoring behavioural patterns of users for any abnormal changes or anomalies.

The use of AI machines in the market in applications such as online trading and decision making has changed major economic theories. For example, AI based buying and selling platforms have changed the law of supply and demand in that it is now possible to easily estimate individualized demand and supply curves and thus individualized pricing. Furthermore, AI machines reduce information asymmetry in the market and thus making markets more efficient while reducing the volume of trades. Furthermore, AI in the markets limits the consequences of behaviour in the markets again making markets more efficient. Other theories where AI has had impact include in rational choice, rational expectations, game theory, Lewis turning point, portfolio optimization and counterfactual thinking.

11. VIDEO GAMES

In video games, artificial intelligence is routinely used to generate dynamic purposeful behaviour in non-player characters (NPCs). In addition, well-understood AI techniques are routinely used for path finding. Some researchers consider NPC AI in games to be a "solved problem" for most production tasks. Games with more atypical AI include the AI director of Left 4 Dead and the neuro-evolutionary training of platoons in games.

12. AFTERMATH

13. BENEFITS OF ARTIFICIAL INTELLIGENCE

Companies new to the space can learn a great deal from early adopters who have invested billions into AI and are now beginning to reap a range of benefits.

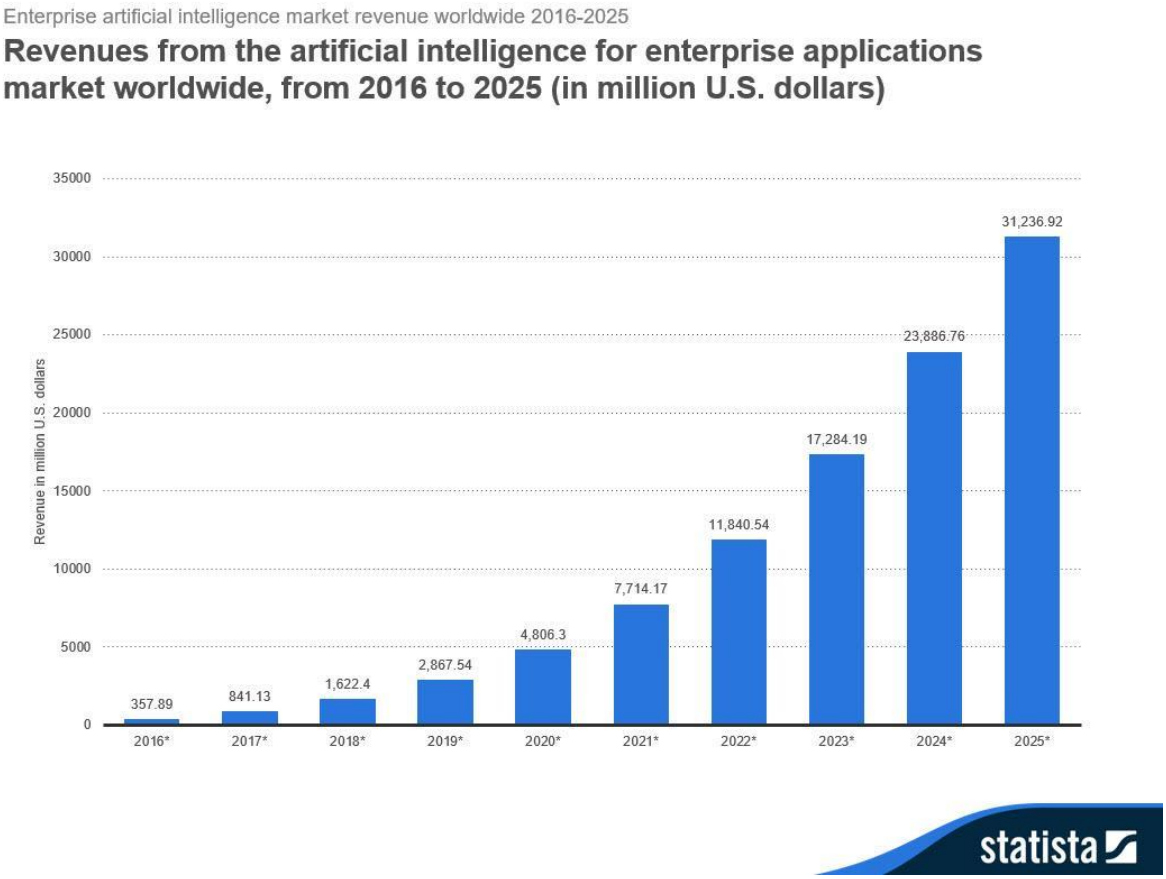
After decades of extravagant promises and frustrating disappointments, artificial intelligence (AI) is finally starting to deliver real-life benefits to early-adopting companies. Retailers on the digital frontier rely on AI-powered robots to run their warehouses—and even to automatically order stock when inventory runs low. Utilities use AI to forecast electricity demand. Automakers harness the technology in self-driving cars.

A confluence of developments is driving this new wave of AI development. Computer power is growing, algorithms and AI models are becoming more sophisticated, and, perhaps most important of all, the world is generating once-unimaginable volumes of the fuel that powers AI—data. Billions of gigabytes every day, collected by networked devices ranging from web browsers to turbine sensors.

The entrepreneurial activity unleashed by these developments drew three times as much investment in twenty sixteen—between $twenty billion and $forty billion—as it did three years earlier. Most of the investment in AI consists of internal R&D spending by large, cash-rich digital-native companies like Amazon, Baidu, and Google.

However, early evidence suggests that there is a business case to be made, and that AI can deliver real value to companies willing to use it across operations and within their core functions.

- A company program with artificial intelligence can answer the generic question it is meant to solve.
- Artificial intelligence can absorb new modifications by putting highly independent pieces of even a minute piece of information of programme without affecting its structure.
- Quick and easy modification of programmes.



The statistic shows the growth of the artificial intelligence market worldwide, the global AI market is expected to grow approximately one hundred and seventy five% from prior levels, reaching an forecast size of two point four billion U.S. dollars. Artificial intelligence is a term used to describe a variety of technologies. These include machine learning, computer vision, natural language processing (NLP), and

machine reasoning, among others. Artificial intelligence is expected to have implications for and a use in every industry vertical, and is likely to be one of the next great technological shifts, like the advent of the computer age or the smartphone revolution.

14. HOW CAN AI BE DANGEROUS?

Most researchers agree that a super intelligent AI is unlikely to exhibit human emotions like love or hate, and that there is no reason to expect AI to become intentionally benevolent or malevolent. Instead, when considering how AI might become a risk, experts think two scenarios most likely:

- **The AI is programmed to do something devastating:** Autonomous weapons are artificial intelligence systems that are programmed to kill. In the hands of the wrong person, these weapons could easily cause mass casualties. Moreover, an AI arms race could inadvertently lead to an AI war that also results in mass casualties. To avoid being thwarted by the enemy, these weapons would be designed to be extremely difficult to simply "turn off," so humans could plausibly lose control of such a situation. This risk is one that's present even with narrow AI, but grows as levels of AI intelligence and autonomy increase.
- **The AI is programmed to do something beneficial, but it develops a destructive method for achieving its goal:** This can happen whenever we fail to fully align the AI's goals with ours, which is strikingly difficult. If you ask an obedient intelligent car to take you to the airport as fast as possible, it might get you there chased by helicopters and covered in vomit, doing not what you wanted but literally what you asked for. If a super intelligent system is tasked with a ambitious geo-engineering project, it might wreak havoc with our ecosystem as a side effect, and view human attempts to stop it as a threat to be met.

As these examples illustrate, the concern about advanced AI isn't malevolence but competence. A super-intelligent AI will be extremely good at accomplishing its goals, and if those goals aren't aligned with ours, we have a problem. You're probably not

an evil ant-hater who steps on ants out of malice, but if you're in charge of a hydroelectric green energy project and there's an anthill in the region to be flooded, too bad for the ants. A key goal of AI safety research is to never place humanity in the position of those ants.

15. CONCLUSION

Artificial intelligence exhibited by machines, with machines mimicking function typically associated with human cognition. Artificial intelligence functions include all aspects of perception, learning, knowledge representation, reasoning, planning and decision making. The ability of these function to adapt to new context i.e., situations that an artificial intelligence system was not previously trained to deal with, is one aspect that differentiates strong artificial intelligence from weak artificial intelligence.