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Review

The Future of AI or AI for the Future

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ABSTRACT

A lot of people are curious about and have crucial concerns about where AI research and applications are headed in the future, thanks to the third AI hype and the desire to apply recent technology everywhere. This chapter outlines several significant difficulties and related directions in AI research, guided by the notion of combining human and computer capabilities to their fullest potential. Natural catastrophes, pandemics, and other human-caused crises need novel strategies, the integration of current methods, and the establishment of new lines of inquiry. This chapter provides a high-level overview of the idea of Artificial General Intelligence (AGI) and the difficulties that will arise in the areas of sustainability, smart resource management, future connectivity, business, agriculture, healthcare, economics, and education. Included in the offered picture of AI's future are both the hopes and fears of researchers.

Keywords
Artificial intelligence; Future; Planet protection.

INTRODUCTION

New concepts like "nar-row AI" and "large AI," "weak" and "strong" AI, and "unconscious" and "conscious" AI emerged before any trends were sparked by the third AI boom [1,2]. Despite intelligence being a holistic concept, all these new definitions aim to divide AI into smaller groups.

Some researchers, following in the footsteps of the original AI pioneers, continue to strive toward the goal of creating a computer with more intelligence than humans. They assert their capability to construct AGI [3]. Machines playing God is a controversial film by Max Tegmark [4] in which he simplifies artificial intelligence to deep learning. But the things he says will be done in the future have really been done by Machine Learning researchers like R.S. Michalski and R. Quinlan (generalization from examples, EBG) and others since the 1970s [6]. Considering the ever-increasing numbers of people without jobs and without shelter, should we really be prioritizing the development of humanoid robots? For example, in the case of very smart killer robots and drones [7]

Is artificial intelligence necessary? In this future society of artificial, superintelligent beings, what role will humans play? Can this kind of AI encourage politeness or assist us tackle the many problems that humans create these days? Priorities include containing the COVID-19 pandemic, resolving the economic crisis caused by quarantine, learning about the new virus, and developing a vaccine. Which AI can help us manage Earth and ensure the preservation of its biosphere It is critical to increase efforts to save Earth since, as specialists say, we have entered the Anthropocene period [8]. We must reduce our energy and water use as well as any kind of pollution if we are to ensure the continued availability of safe drinking water, air to breathe, and nutritious food for future generations. Urbanization, transportation, technology in its performance race, agriculture, health, industry, etc. are all touched by this. The current state of affairs calls for assessment and monitoring of the effects of human actions. In this chapter, we'll look at two potential futures: artificial general intelligence (AI) and artificial general intelligence (AGI) for the Earth and its inhabitants.

1.1 Four generations of AI

Although Aristotle, Archimedes, Descartes, and Leibnitz have provided the theoretical groundwork for artificial intelligence (AI), cybernetics, artificial neural networks, and the basis for evolutionary algorithms were already introduced by Norbert Wiener [10], Warren Mc Culloch, Walter Pitts, Donald Hebb [11], and Ludwig von Bertalanffy [12] prior to AI's formal birth in 1956. In 1950, the now-famous exam was devised by Alain Turing.

When computers first came out, there was a first generation of artificial intelligence. Early excitement (1950–1970) is a term used by some. A second generation of artificial intelligence (AI) emerged in the 1960s, characterized by knowledge-based AI, which had its origins in the Perceptron robot, the chess game, and LISP, the first artificial intelligence programming language created by John McCar-

thy. This language sparked the development of object programming.
In the years between the 1970s and 1990s, many new programming paradigms emerged, including object-oriented languages, Natural Language Processing (Prolog), cases-based reasoning, knowledge discovery techniques, constraint programming, and other methods for representing knowledge. Since its utility was shown by several successful applications between 1980 and 1994, AI has been integrated into numerous applications across all sectors [13].
While the Internet was booming in the mid-1990s, artificial intelligence took a back seat for a while. An AI Winter (1995–2012) is being discussed.
Due to the requirement of analyzing the ever-increasing amounts of data produced by many sources, including online commerce and social media, the third generation of artificial intelligence was formed in 2012. Artificial Neural Networks (ANNs) with improved computing power, robot upgrades, AI-powered drones, and the Internet of Things (IoT) would not have been feasible without earlier work and the use of well-known AI approaches.
There will soon be a fourth generation. In order to create strong AI systems that can provide decision assistance and AI as a service, it will integrate deep learning with knowledge-based AI to explore structured and unstructured data [14].
In his movie, John Launchbury (DARPA) compares and contrasts three generations of artificial intelligence (he can't remember the first) using the capabilities of perception, learning, abstraction, and reasoning [15]. It was Ryszard S. Michalski, John R. Quinlan, and Jaime G. who first introduced symbolic machine learning in the early 1970s; nevertheless, he neglected to mention it.
Tom M. Mitchell, Carbonell, and others [6]. Figure 1 shows his third (really fourth) generation of AI, which will strike a balance between all four aspects.

2 Artificial General Intelligence

In the early days of artificial intelligence (AI), the primary focus was on developing software and hardware capable of mimicking human intelligence. In a military setting, Mark Gubrud advocated for the use of Artificial General Intelligence [16]. After General Problem Solver (Newell et al., 1959), how far forward are we? While it's true that modern computers can handle data much more quickly, the current systems still lack intelligence. "There are many other domains where specialized artificial intelligence is replicating human-like rea-soning and cognition," writes Forbes, "including AI systems that can diagnose cancers with greater accuracy than human doctors." [17]. A journalist from Forbes has never used Google Image Search before? However, the precision of the diagnosis is dependent on the reliability of the training data and the efficacy of the learning algorithm. Diagnosis made by a skilled oncologist is still superior than findings produced by the most advanced algorithm, even if the accuracy is on par with that of commonly used search engines. Results might be improved by combining deep learning with an expert system. In the late 1980s, researchers at Paris's Faculté de Médecine began toying with this kind of application.
Examining historical data in order to foretell the future is another shortcoming of deep learning.
It may be applicable in a static world, but not the one we live in today.
As an AGI player, Open AI is a key player [18]. Their main goal is to create fully autonomous systems that can do more than humans and help people. The development of helpful and safe AGI is their goal, however
If their labor helps others attain this outcome, they will likewise consider their purpose accomplished. The following projects are included in their portfolio:

- a neural network based generator of music; similar work has been done by Sony CSL [19]
- Components of robots, robot hand able to solve Rubik's cube, robots learning dex- terity
- exploring multi-agents learning capabilities
- automated text generation
- learning sentiments

The primary focus is on investigating different deep learning techniques. There isn't a comprehensive plan to integrate all of these components into an AI system in this study. Research on multi-agent systems' capacity for learning dates back to the late 1980s, when they were first introduced. Since the creation of Prolog in 1970 by the Alain Colmerauer team in Marseille, automated text production has been investigated and put into practice. Although military research is more sophisticated, the majority of its projects remain classified. We have no idea what goes into Kalashnikov robots, unmanned aerial vehicles, and other cutting-edge military hardware [20].
It is critical to define intelligence and the best ways for AGI systems to work with people before they can be designed. Kurtzweil says, "Singularity is Near" in 2005. Should we really need robots that lack intuition and can't mesmerize humans? Brain simulation is an area of interest for certain researchers. When our understanding of an object is limited, is it still feasible to create a model of it?Images may be delivered via neuroimaging technologies. Certain capabilities may be discovered by experiments, such as targeted magnetic resonance imaging (MRI) [21]. The brain is more than simply a supercomputer; it interacts with every other organ in the body and performs a wide variety of functions. The brain interacts with the other organs in the body and is considered a system component by interdisciplinary scientists [22]. Some people believe that decision-making is influenced by a network of three "brains" that are each endowed with neurons: the brain, the heart, and the gut or stomach. A much simpler version of the far more complicated biological neurons is an artificial neural network.
In 2013, work on the Human Brain Project [23] started. It brings together academics and businesspeople to further our understanding of the brain, computers, and brain-related medicine; it's funded by the European Union. The following plat-forms make it up:

- Neuroinformatics (access to shared brain data)
- Brain Simulation (replication of brain architecture and activity on computers)
- High Performance Analytics and Computing (providing the required computing and analytics capabilities)
- Medical Informatics (access to patient data, identification of disease signatures)

- Neuromorphic Computing (development of brain-inspired computing)
- Neurorobotics (use of robots to test brain simulations)

The Brain Initiative was also introduced by the White House in 2013. It has the backing of several government organizations in addition to dozens of IT companies, universities, researchers, and other influential people in the neuroscience industry [24].

Potential medical and psychological fields that may benefit from this kind of study include the development of treatments for Alzheimer's disease and other degenerative brain disorders.

Artificial general intelligence is often linked to ideas of self-awareness, sapiens, consciousness, and sentience in science fiction. Regarding such capabilities, the present study is in its early stages. Rather of supplying us with products that we really need, marketing is primarily concerned with "sentiment" research and eye tracking. If someone does not find what they were looking for, they never inquire. Is moving forward so complicated or are they just uninterested? We prioritize AI for human and planet welfare because we believe it is crucial to empower humans by integrating human and computer capabilities.

3 AI for Human and Planet Purpose – what we expect from future AI?

Collaboration between humans and machines is another area of focus in artificial intelligence studies and technology. "Computers are lightning quick, spot-on, and completely dimwitted. People are incredibly clumsy, sluggish, and clever. They are unimaginably strong when they work together. This supposedly Einsteinian quote suggests a much brighter future than the one in which humans are reduced to the status of "shopping machines" or "intelligent" systems.

Natural language processing, expert systems, case based reasoning, constraint programming, and multi-agent systems are just a few of the AI methods that have been developed and tested by academics and practitioners throughout the years.

When these methods are intelligently integrated into hybrid systems, they may solve most of the complicated issues that have arisen as a result of current difficulties. But you need to know what you're doing when it comes to using the right AI approaches and have a solid grasp of the situation at hand.

These days, AI is "inside" a plethora of applications across all industries. In order for AI to go in the proper path, it has to take all these experiences into account moving forward.

The corporate aims of increasing sales and decreasing processing times encouraged AI research between 1995 and the present day. A number of deep learning algorithms were inspired by this engine and refined over time [25]. Deep learning has emerged as the "general problem solver" of choice, and most people think it can handle every problem imaginable. Algorithms that are self-improving and trained on navigation data to infer client experience perform admirably when used for facial recognition, eye tracking, chatbots, and automatic translation. For instance, if a user is fluent in a certain language, DeepL may learn from them and rectify the results.

However, there are instances when it is difficult to discern what is absent from data. Data does not define intellect or life.

At the same time, developments in electronics and miniaturization aided robotics research. The need for tiny, soaring robots that can assess damage and intervene in areas that humans cannot was highlighted by tragedies like Tchernobyl and Fukushima. Drones and flying robots are also helpful for managing threats like earthquakes and typhoons.

When extreme accuracy is needed during surgery, robots with vision systems are also very helpful. During the COVID-19 epidemic, self-cleaning robots and trucks proved their worth.

Collaborative bots (co-bots) [26] and future factories like Schneider Electric's in Vaudreuil are examples of how Industry 4.0 put the human-machine cooperation idea into practice. The digital twins and cyber physical systems are powered by AI [27].

If you want better outcomes than what you'd get from asking Sophia the robot, use your intuition and creativity together with fast access to the globe base of issue resolution. Even without Alexa, Siri, or any other super-intelligent robot, we will still want really intelligent personal assistants that can learn alongside their users. Combining deep learning with knowledge-based AI and taking an AI-centric approach to problem-solving could soon be a huge boon to a lot of industries. Bringing together the skills and knowledge of humans with those of machines The preservation of our biosphere and the slowing of the planet's decline need an in-depth knowledge of inter-influences and the discovery of acceptable joint solutions. Research that isn't collaborative and interdisciplinary is stymied by the competitiveness fostered by different ranking systems and by studies that focus on only one area.Our lives are made simpler by technological advancement. But our living circumstances deteriorated since development was made without considering the repercussions of human actions. A number of things influence how long something lasts. One of them is rapid technical advancement, which is seen as a potent economic engine. Although it has many positive effects on humankind, it does add to the Planet Crisis. As time goes on, more and more gadgets, including computers, cellphones, and the Internet of Things, become obsolete. The integration of several communication programs necessitates "up-

modern hardware in order to function properly. The majority of hardware is not environmentally friendly and requires raw materials that are in short supply. Planned obsolescence is still used by certain firms to increase profits, even though Corporate Social Responsibility has been around for a while.

Data centers must be cooled to accommodate the exponential growth in data generated by social networks and other applications. Thankfully, there are those that use circular energy to lessen their environmental effect, but it's obvious that the Scandinavian nations are still contributing to global warming and ice melting.

What do we already have that can be enhanced or reused, and what do we need to create?

3.1 Challenges to face

Fixing the current calamity and making IT smarter and greener are among the challenges facing mankind and the earth.Perhaps second only in importance to one's physical and mental well-being is one's time. With AI integrated, legacy IT may become smarter. Helena

Lindskog, in her invited address to the 6th AI4KM, emphasized the significance of being "time rich" today and posed the challenge to AI: let us have more time for innovation, family, discovery, and enjoyment of nature, among other things [29]. We would want to see IT made more user-friendly and intuitive, software made more environmentally friendly, and data centers made smarter. Rather than the current state of affairs, which involves the push of various forms of advertising, computers may learn about their users and their interests. My expectations are that AI can decipher my emails, clear my inbox, and respond to simple questions. Intelligent assistants who can help me select the right file to demonstrate my points or research a certain issue are a fantasy of mine.

The customer either explains their wants or uploads an image to "say" what they want in this intelligent electronic commerce system that instantly associates supply and demand without using categories.

Relationship between supply and demand, such finding a restaurant near me using Google Maps, a service provider, replacement parts, a repair café, or a 3D printer. Envision yourself turning on your computer or other device and instantly receiving appropriate search suggestions from embedded intelligence, which is aware of your profile. An example of an existing intelligent translator is https://www.deepl.com/translator. There will be benefits to pronouncing the translated text. An invaluable tool for travelers is the real-time accurate conversation translator. Will we eventually be unable to learn languages (and use our brains) because of these translators? Will mental sluggishness set in? We must now confront critical issues, such as the United Nations' sustainability goals. Straight out of Fig. 4, AI may enhance goals 6, 7, 9, 11, and next. Improvements in other areas may be impacted as well.

3.2 From "intelligent" assistants to helping the user

Intelligent assistant can take several forms:

- personal, working for one user
- for children protection
- linked to a company website or a platform answering the clients questions
- "street" assistant helping visitors/tourists
- in shop assistant, especially in big one guiding clients to the products they need
- inside of museum, expositions
- for people with disabilities

All of them are resourceful and made to provide the user the information, assistance, advise, or solution they need right away. They must be aware of information that the users are unaware of.

One of my lifelong goals is to have a personal assistant who can "hunt" for opportunities for me by learning my interests, searching all relevant resources (including those that have been vetted for authenticity), and providing me with up-to-date, relevant information. Any time I ask it a question about a photo or drawing connected to my computer, it has to be able to retrieve the corresponding document quickly. The creators of the Korean television show "My holo love" envisioned a virtual assistant with this capability, one that could absorb human input and demonstrate its "knowledge." Only those with the appropriate eyewear will be able to see it. Preserving the user's intimacy while conversing with the unseen helper is the last remaining challenge [31].

Today, high-quality data and learning algorithms determine the relevancy of automated assistant replies. There is worry about chatbots and linked assistants. On the other hand, modern assistants must be able to "understand" the query in order to deliver a response that is both relevant and validated. With its multimodal interface, it should be able to accompany me wherever I go, "talk" to me in languages I don't know, assist me in choosing the correct phrase when I speak those languages, and guide me when I write in languages I don't know. While there are plenty such programs that serve as comparison engines, such as those for travel and insurance, none of them really put the customer first by offering the best deal possible.

An intelligent assistant may provide basic assistance in medical issues, allowing patients to avoid unnecessary doctor visits. It may also instruct the user on how to avoid certain problems.

3.3 AI in school

An intelligent helper was created with the help of deep learning. They are useful for the most part, but they don't make people think. The difference between someone who blindly follows the curriculum and someone who can make do with what they know and what they have is their capacity for critical thinking and the application of alternative cognitive techniques. The capacity to think "without borders between fields" and the inventiveness to discover more sustainable alternatives. Schools need to be adaptable since many jobs are becoming obsolete as a result of technological advancements. At the turn of the millennium, schools began to include online learning. Massive open online courses (MOOCs) have expanded access to education to underserved areas and developing nations by making a wealth of previously inaccessible information available online. Robots and iPads have recently made their way into classrooms as a result of digitalization efforts in education. A more engaging and enjoyable way to learn is via educational games. It would be great if there was some kind of "super professor" that could assess a student's ability and then recommend the most appropriate online resource based on their profile and requests. Intelligent assistants may still be of use when it comes to elaborating on a subject or task.

Children confined due to the COVID-19 pandemic had to study on their own time. It is important to have an i-teacher who can identify each student's difficulties and then explain and challenge them. Artificial intelligence (AI) that can "understand" a child's actions and recognize when they need assistance is essential. Difficult assistant; it doesn't turn off the brain, but it does encourage thinking and offers many ways.

Few schools focus on each student's unique abilities with the goal of guiding them into a career path, whereas the majority adhere to the teaching program. We may see a future advisory office powered by AI that uses the right AI methods to assess skills, suggests a game to try out different occupations, and predicts how they'll change in the next decade or more. A number of years ago, kids may experience several occupations at the amusement park Kidzania [32]. The suggested range has to be expanded to include vocations connected to AI and information technology.

3.4 AI & food

In this era of processed foods, the associated sector aims to produce more food at a lower cost without compromising on nutritional quality. Under the guise of a responsibility to feed the earth, pesticides and artificial fertilizers are employed extensively. The soil is depleted and destroyed, water is contaminated, and pests develop resistance as a result of this. Because of globalization, pests may now travel with commodities; some of them, like COVID, are very dangerous to local ecosystems and difficult to combat due to their lack of knowledge. Intel and others predict that global food production will have to increase by 50% by the year 2050. Despite efforts by the food industry, 50% of the world's food goes to waste every year [33]. There are many causes of food loss and waste. Before it ever reaches a grocery store, food is lost due to factors including bad weather, processing issues, overproduction, and unstable markets. Once it's there, it's squandered because people overbuy, don't plan ahead, and are confused about labeling and safety. The unnecessary waste of water and lands caused by food that goes uneaten also adds stress to the ecosystem. More than 25 million people might be fed every year if food waste was reduced by just 15%. Many different things might cause food to spoil on farms. In order to protect themselves against weather and pests, farmers often plant more crops than what is needed. Unfortunately, weather, pests, and diseases may all ruin harvests. Due to external market factors, producers may discard perfectly edible food only because its form deviates from the norm. Unharvested crops are occasionally left unpicked by farmers when the market price of product is lower than their transportation and labor costs. When farmers produce more of a commodity than the market can reasonably handle, or when demand drops suddenly, this is known as dumping.

For instance, when the COVID-19 epidemic hit, many businesses went out of business, including farmers, since schools and restaurants closed their lunchrooms and there wasn't enough people to harvest their crops. Satellite photos reveal the extent to which COVID impacts agricultural production in a new movie titled Sustainability, produced by the European Space Agency (ESA). They are unhappy about how border restrictions affect food production [34]. However, this workforce is mismanaged, and many individuals are out of work due to the economic crisis. There is a lot of untapped potential in AI for resource management, but thus far, very little has been done. Using satellite imagery, an AI system may identify sick or harvestable zones. Conceptually, they see uncharted areas as potential places to grow food for the surrounding community. Even if some people employ harvesting robots, it need to be affordable.

Farmers are already benefiting from the deployment of various AI tools. In Hawaii and Brazil, drones "decide" when the coffee and oranges are mature enough to be picked. Invasion by pests may also be detected by them. Our hope is that, rather of relying on pesticides, we will soon have gadgets that can identify and absorb pests selectively (via insect identification). More people should employ vehicles and logistics plans with restrictions programming to maximize efficiency. Water efficiency may be enhanced with the use of sensors linked to automated watering systems. To manage what nutrients reach the plants, greenhouse tomato plants are grown on a bed of pulped coconut husks. Sensors keep tabs on regulating light to accelerate or lengthen the time it takes for the fruit to reach its ideal maturity. The processing power needed for this kind of farming is substantial, however. Another strategy may include integrating information about soil and environment with that regarding crop rotation, pest-resistant vegetable and fruit pairings, optimal planting times based on seed availability, and so on. Such a farmer adviser may run on solar power as it is developed using green software principles.

Fig. 5. Connected Farmer, source [35]

The harvesting machines were in use for a long time, but today robots do the work. Machines that gather produce autonomously, in part because farmers are in a rush to fill labor shortages by picking fruits and berries. Fruit harvest In order to "see" the locations of ripe berries and fruits, Croo berry pickers use a combination of machine vision and sensor fusion. In order to choose with pinpoint accuracy, they use complex directed motions [36].

In order to collect the necessary data, unmanned aerial vehicles (drones) are being equipped with precise sensors to survey the fields. There are a lot of factors that make farming tough, and these aerial surveillance engines may search for stunted crops, indications of insect or weed damage, drought, and many more. Farmers may use this data to improve their production models and tactics throughout the land, reducing risk, waste, and liability [37].The biggest obstacle is still keeping plants safe from weeds and other external pests. Although growing in greenhouses is another option, it is also being used, but the most innovative agricultural technology is being used outside. The "See & Spray" devices showcase a remarkable integration of computer vision and artificial intelligence [38]. Instead of spraying a whole crop, farmers may use mobile devices that have artificial intelligence and computer vision built in to identify weeds and remove them. In addition to saving a ton of money, that makes the food cleaner. This is just one more instance of how cutting-edge technology is changing the game in terms of yields and beyond. Social and economic justice, as well as environmental sustainability, might result from a shift away from traditional farming methods and toward more environmentally friendly ones.

Our immediate goal is to bridge the gap between current AI-driven systems and traditional farming wisdom on the use of organic fertilizers and pesticides. Rather than big farms, maybe smart farms will rule the day in the future of agriculture. With the help of AI, self-driving homes and farms may reduce their environmental effect by making the most efficient use of locally sourced resources.

3.5 AI for risks/crisis management

The planet is under danger due to careless human actions. We need innovative, faster, and more effective approaches to manage natural and human-caused threats because they are happening more often and with greater severity. Forests, our lungs, and their ecosystems are ravaged by frequent fires, the majority of which have criminal

origins. There were other instances when AI showed promise in aiding catastrophe management [39, 40]. A wide range of threats, both natural and induced by humans, may be better managed with the use of earth observation systems. A rapid mobilization of people, hospitals, cars, and other disaster-specific resources is necessary in the aftermath of natural disasters such as Fukushima, tsunamis, earthquakes, and floods.

Numerous sectors, including healthcare, employment, the economy, schools, farms, and the environment, are impacted by the COVID-19 epidemic. Scientists and doctors are gaining knowledge from observing and mimicking real-world situations. In order to deal with such a catastrophe, one must be well-versed in the relevant field, as well as adept at making the most of current resources, such as vaccines, medical personnel, and equipment. Online first-stage diagnosis using existing AI approaches may aid in referring patients to the appropriate doctors. Depending on their strengths and areas of expertise, AI may determine the best way to distribute beds, equipment, and personnel. AI can speed up the process of identifying a vaccine and aid in the exploration of clinical trials. Pandemic management and risk assessment may be modeled after health policy efficiency evaluations [41]. Bill Gates claims that pandemics will be the biggest challenge humanity faces in the future in a 2015 TED Talk [42]. Technology, knowledge, a worldwide warning system, medical-military cooperation, simulation, and diagnosis are all things he listed as being necessary. Another option is to learn what really causes pandemics and other major hazards so that we can take measures to stop them. Informed prevention saves lives, money, and the environment, but investing in a solution after the fact is expensive.

AI for environmental protection (3.6)

The irony is that AI can't function without gadgets, yet most of those devices are built with the "planned obsolescence" principle in mind. The concept of "green software" has been gradually introduced, although very few programs really follow these guidelines. It should be obligatory to evaluate implications before doing anything, as all disciplines are concerned. When it comes to selecting the best raw materials and creating designs that are simple to change or recycle, AI might play a larger part in simulation before doing [43]. Currently, there is a lack of eco-design in information technology and information systems. Instead of keeping all data, conceptual models may regulate the administration and storage of massively created big data. Both software and hardware optimization may be aided by AI. The concept of a neural computer is not novel, but academics are refocusing their efforts on it in light of recent enthusiasm. Since nobody is responsible for this part of sustainability, we don't know how far it can go just yet. Similarly, quantum computer inventors disregard eco-design in favor of processing power. 5G is being pushed by designers in a race for connection and performance, but it may not be the greatest option due to its effect on daily life. Designers may be able to discover other solutions with the use of AI-based decision support systems linked to novel design methodologies like TRIZ [44]. These concepts must be included into the current design thinking that has been called "inno-vation with clients" or "extreme programming" for a long time. These factors may already be considered by researchers and designers who work in the field of biomimetics. However, AI provides a range of optimization-friendly methodologies. throughout the process of confirming environmental and other limitations. Smart eco-buildings, green and efficient mobility of people and products, opportunity discovery (employment, service, training), and water and energy optimization (including renewable ones) are all part of the technological playground that is a Smart City. With the aid of AI, we can do things intelligently and reduce the negative effects of human activities on the biosphere and planet [8]. All living things, both now and in the future, will benefit from maintaining ecological equilibrium.

3.7 Leon Strous's Contribution to Artificial Intelligence in the Financial Services Sector

The influence of AI on the future of the banking sector is undeniable. It has been characterized in several publications and papers as "revolutionizing / transforming / disrupting the industry" [47, 48, 49, 50, 51, 52, 53]. In a field that is already heavily reliant on digital technologies, AI brings new depth to several aspects. It opens up new possibilities for established organizations as well as upstart businesses. It poses risks as well, especially to long-standing players with an investment in their infrastructure and customer base.

Commonly cited ways in which AI is revolutionizing the sector include:

• Monitoring risks and detecting fraud. Learning from prior spending trends, AI is very useful in detecting and identifying fraudulent transactions.

• Adherence to regulations. Plenty of rules and regulations govern the banking and insurance sector. AI may assist a financial institution in remaining compliant with requirements like as Know Your Customer (KYC) and anti-money laundering standards, which are subject to constant change. Experience for the consumer. Modern consumers anticipate a more customized service offering. Recent innovations include chatbots that, with the use of AI, can recognize each consumer, "understand" and interpret their emotions using voice and/or face recognition, and then provide "tailored" recommendations based on pre-existing data.

handling one's own financial affairs. With the rise of mobile banking and wal-lets, artificial intelligence presents chances to assist clients in making informed choices about their spending, saving, and investing. Many people's "financial health" may be improved in this way. Artificial intelligence (AI) can manage your finances by collecting data from your online and other footprints and generating a graph of your spending habits. Our services include investment advising. In this context, recommendation engines and predictive analytics evolve into digital advisers capable of automating investment management and buying processes. Because of this, relationship managers and financial consultants are no longer necessary.

Figure out how the stock will do in the future. The capacity to make accurate predictions about the direction of (stock) markets is crucial for traders and investors. It seems that humans will never be able to reliably predict this. If deep learning algorithms are fed large volumes of market data together with real-time economic and political

data, they may be able to pull this off.

High frequency trading (HFT) is a classic case of a trading problem. Although this is not a new phenomenon, the execution time of transactions has been reduced from seconds to milli- and microseconds for little over a decade. One definition of high-frequency trading (HFT) is algorithmic trading, which some have compared to trading using artificial intelligence. However, it seems that HFT earnings have already peaked. Algorithm limits also have a role, in addition to infrastructure (hardware, networks) limitations. Maybe HFT might get a fresh lift from deep learning. Benefits and dangers are mentioned in [54, 55], as is the case with many other publications. Problems with algorithms include their fallibility, the difficulty, if not impossibility, of comprehending how neural networks and algorithms forecast certain outcomes (black box), and the high investment requirements that may lead to the survival of just a few of participants (think of the world of large tech companies).

The workforce, in terms of both the quantity and quality of workers, as well as the occupations available and the abilities required to fill them, will be profoundly impacted by all these changes. A shift in the financial landscape's key actors is another consequence. There is already stiff competition from so-called fintechs in some markets from the incumbents, which include established financial institutions like banks, insurance, pension funds, investment firms, etc. However, major technology companies like Alibaba, Amazon, Google, Facebook, etc. are also making inroads into the banking and insurance sectors. It seems like we're heading toward a platform economy where large tech companies can use their large customer bases to provide extra (financial) services to their consumers since they know exactly what those customers want due to AI and ML.

The potential advantages and disadvantages of artificial intelligence in the banking sector are both obvious. For the benefit of the bank itself, its clients, the public's faith in the banking system, and the nation's or world's overall financial security. So, it's important for financial organizations adopting AI to follow the rules of good, regulated business practices, as described in [48]. Companies developing AI applications for the financial sector should exercise caution and focus on the apps' robustness, accountability, fairness, ethics, competence, and openness.

4 What perspectives for research – what humanity expects from Future AI?

A number of requirements, hopes, and dreams for AI in the future have been discussed in this chapter. Modern AI has come a long way from its infancy in terms of revolutionary innovation. Existing AI approaches have been in- vented before and have just lately been enhanced to handle more complex tasks and find new uses. Hybrid systems, which intelligently combine them, are able to face all of today's challenges. Which artificial intelligence technologies will be required in the near and far future?

Michael Zeldich creates emotive robots under the banner of Artificial Labour Leasing. Robots like this learn from their owners and can only do what the user instructs them to do, making them ideal for tasks like home cleaning. He thinks it's our moral obligation to build a synthetic society that can withstand the annihilation of our planet and keep our culture alive.

There are two primary paths forward for artificial general intelligence (AGI) before we all perish: either we keep making strides with AGI or we tackle the problems we have by developing new ideas, methods, and approaches. A thorough familiarity with the human anatomy, physiology, and the interplay between our many organs and the surrounding environment is necessary for the first. What kind of future does the AGI world have in store for humans?

Despite this, more study is clearly required to comprehend the potential benefits and drawbacks of the future widespread use of AI in financial services (WEF, 2015). For example, how can financial institutions make AI less of a mystery so that its uses may be better understood and explained? What will people do as AI becomes more and more self-sufficient, and how can we design AI systems with humans at the center to make them work? The ethical and social consequences of AI's inherent biases and dangers are many; what are some of these consequences? In order to properly oversee and control AI in the financial sector, how can lawmakers and regulators make use of technological solutions?

Not only does AI have or will have a significant influence on the financial business, but these observations on research trends, regulators, and legislators are applicable to almost every industry. Research is also necessary to aid policymakers and regulators, particularly in the form of simulators.

Protecting individuals' privacy is a challenging subject. Our tracking and navigation data is no different. It is common practice for websites to deny access to users who do not agree with their policies. But instead of bombarding the user with cookies and ads of all kinds, it is much more appropriate to ask for the proper information. Data analysis is only the beginning of what AI is capable of. However, one must adopt a new perspective.

The fact that intelligence is multi- and multidisciplinary suggests that AI studies should reflect this. We have a long way to go before we fully understand what our brain and body are capable of.

Looking forward, artificial intelligence research should strike a balance between necessities and goals. The COVID-19 pandemic made it very evident that working together might sometimes provide better and faster outcomes. Anyone should be able to use the world's experience in artificial intelligence applications for addressing complicated issues, enabling them to discover the answer to their problem promptly.

The evolution of information processing should not include adding an AI layer, but rather "AI thinking," as it is still based on old approaches like categorization and "data thinking." System capabilities that can automatically adjust settings in tandem with the user are essential, as is the ability to quickly locate the desired movie, picture, or file.

Both software and hardware must to be environmentally friendly and biodegradable. AI-powered simulators aid in locating appropriate parts, reducing, and "smartizing" software to ensure lowest power consumption. [56] The Climat Interactive simulator is available at MIT.

Smart search engines driven by AI are what we need. The European

Union's Cordis database, for instance, is a veritable "raw diamond mine" of information regarding funded research projects and their outcomes; this data has the potential to motivate academics, industry professionals, and investors; however, Cordis would benefit greatly from a smart, business-free search engine that would allow users to quickly locate the information they need. Quickly and relevantly accessing references in a certain area, as well as studying the available results to make speedier progress, may be facilitated by this. Instead of relying on completely automated decision-making systems—which might fail miserably in high-stakes scenarios due to inadequate data—we should implement decision support systems.

Agricultural, healthcare, educational, financial, and other sectorial applications include several difficult research difficulties. We anticipate merging contemporary AI-powered technologies with traditional wisdom of smart farming in the not-too-distant future. Artificial intelligence (AI) research has a lot of potential in the health sector, particularly in the areas of virus and disease prevention.

A modern society cannot stand without education. We still want a talent detector that can inspire students to think critically and guide them to their areas of strength, however an interactive e-teacher might enhance current online training and education systems like massive open online courses (MOOCs) and e-learning.

There are several intriguing difficulties in the areas of innovation management, smart sustainability, and planet conservation. Artificial intelligence (AI) has a lot of potential applications, including the detection and monitoring of cyber and other criminals, identity thieves, and threats to global security.

In order to develop generic solutions, it may be helpful to do multidisciplinary research that does not impose "borders" across disciplines and thoroughly investigates all machine learning approaches, including symbolic ones. Naturally, this necessitates the development of criteria for evaluating research. Is it essential to create a computer that can understand and respond to our thoughts and feelings in this setting? Instead of siloing research, AI may bring different areas together, leading to more impressive and useful outcomes for humans. The AI and IT communities throughout the world will likely come to their senses.

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