AN EVALUATION OF ARTIFICIAL SUPER INTELLIGENCE IN DATA MINING, HEALTH CARE AND CYBER SECURITY

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Abstract

The idea behind this paper is how Artificial Super Intelligence (ASI) can be utilized in domains like data mining, health care and cyber security etc., The author started the basic concepts of artificial intelligence (AI) in a simple manner such that, what is artificial intelligence (AI), what is the sub catagories of AI, classifications of AI, Deep Learning and Expert Systems. Artificial intelligence is a branch of computer science that aims to create intelligent machines. It has become an essential part of the technology industry. The problem of AI is to describe and build agents that receive percepts from the environment and perform actions. Each such agent is implemented by a function that maps percepts to actions, and we cover different ways to represent these functions, such as production systems, reactive agents, logical planners, neural networks, and decision-theoretic systems. The author explains the role of learning as extending the reach of the designer into unknown environments, and show how it constrains agent design, favoring explicit knowledge representation and reasoning. Super intelligence is an intellect that is just like a human mind but faster. Super intelligent system would have great power to direct the future according to its possibly flawed goals or motivation systems. In this paper, the author mainly introduced the theory behind Artificial Superintelligence.

Keywords: AI, ASI, Deep Learning, Expert System, Agents

I. INTRODUCTION

Artificial Super Intelligence (ASI) has the potential to help address some of the biggest challenges that society faces. Smart vehicles may save hundreds of thousands of lives every year worldwide, and increase mobility for the elderly and those with disabilities. Smart buildings may save energy and reduce carbon emissions. Precision medicine may extend life and increase quality of life. Smarter government may serve citizens more quickly and precisely, better protect those at risk, and save money. AI-enhanced education may help teachers give every child an education that opens doors to a secure and fulfilling life. These are just a few of the potential benefits if the technology is developed with an eye to its benefits and with careful consideration of its risks and challenges. The field of artificial intelligence, or AI, attempts to understand intelligent entities. Thus, one reason to study it is to learn more about ourselves. But unlike philosophy and psychology, which are also concerned with intelligence, AI strives to *build* intelligent entities as well as understand them. Another reason to study AI is that these constructed intelligent entities are interesting and useful in their own right. AI has produced many significant and impressive products even at this early stage in its development. Although no one can predict the future in detail, it is clear that computers with human-level intelligence (or better) would have a huge impact on our everyday lives and on the future course of civilization. An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through effectors**.** A human agent has eyes, ears, and other organs for sensors, and hands, legs, mouth, and other body parts for effectors. A robotic agent substitutes cameras and infrared range finders for the sensors and various motors for the effectors. A software agent has encoded bit strings as its percepts and actions. Fig.1 represents an how agents interact with environments through sensors and effectors.

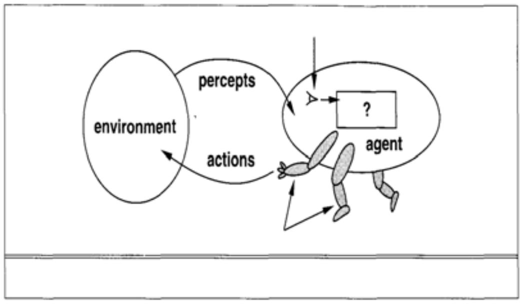

Fig.1 Agents interact with environments through sensors and effectors

II. CLASSIFICATIONS OF AI

Knowledge engineering is a core part of AI research. Machines can often act and react like humans only if they have abundant information relating to the world. Artificial intelligence must have access to objects, categories, properties and relations between all of them to implement knowledge engineering. Initiating common sense, reasoning and problem-solving power in machines is a difficult and tedious approach. **Machine learning** is another core part of AI. Learning without any kind of supervision requires an ability to identify patterns in streams of inputs, whereas learning with adequate supervision involves classification and numerical regressions. Classification determines the category an object belongs to and regression deals with obtaining a set of numerical input or output examples, thereby discovering functions enabling the generation of suitable outputs from respective inputs. Mathematical analysis of machine learning algorithms and their performance is a well-defined branch of theoretical computer science often referred to as computational learning theory. Machine perception deals with the capability to use sensory inputs to deduce the different aspects of the world, while computer vision is the power to analyze visual inputs with a few sub-problems such as facial, object and gesture recognition**.** **Robotics** is also a major field related to AI. Robots require intelligence to handle tasks such as object manipulation and navigation, along with sub-problems of localization, motion planning and mapping. **Deep Learning** In recent years, some of the most impressive advancements in machine learning have been in the subfield of deep learning, also known as deep network learning. Deep learning uses structures loosely inspired by the human brain, consisting of a set of units. Each unit combines a set of input values to produce an output value, which in turn is passed on to other neurons downstream. For example, in an image recognition application, a first layer of units might combine the raw data of the image to recognize simple patterns in the image; a second layer of units might combine the results of the first layer to recognize patterns-of-patterns; a third layer might combine the results of the second layer; and so on. Deep learning networks typically use many layers—sometimes more than 100— and often use a large number of units at each layer, to enable the recognition of extremely complex, precise patterns in data. In recent years, new theories of how to construct and train deep networks have emerged, as have larger, faster computer systems, enabling the use of much larger deep learning networks. The dramatic success of these very large networks at many machine learning tasks has come as a surprise to some experts, and is the main cause of the current wave of enthusiasm for machine learning among AI researchers and practitioners. **Natural Language Processing (NLP)** enables computers to understand human language including contractions, slang, and accents, and in turn produce human-like speech and text. Machine translation between human languages is also a form of Natural Language Processing. Among other effects, language barriers between humans may vanish within a few years, from NLP becoming a standard feature within smartphones. **Machine Vision** identifies images of visible objects as well as patterns that cannot be seen, such as time-elapsed images, infrared images, immediate magnification or telescopic sight at intelligently chosen instances, etc. This provides robots with vision, and helps search engines parse billions of photographs, images, and charts for relevant patterns of information. **Expert Systems** Expert systems are computer programs aiming to model human expertise in one or more specific knowledge areas. They usually consist of three basic components: a knowledge database with facts and rules representing human knowledge and experience; an inference engine processing consultation and determining how inferences are being made; and an input/output interface for interactions with the user. Expert systems, as a subset of AI, first emerged in the early 1950s when the Rand-Carnegie team developed the general problem solver to deal with theorems proof, geometric problems and chess playing. About the same time, LISP, the later dominant programming language in AI and expert systems, was invented by John McCarthy in MIT. During the 1960s and1970s, expert systems were increasingly used in industrial applications. Some of the famous applications during this period were DENDRAL (a chemical structure analyzer), XCON (a computer hardware configuration system), MYCIN (a medical diagnosis system), and ACE (AT&T's cable maintenance system). PROLOG, as an alternative to LISP in logic programming, was created in 1972 and designed to handle computational linguistics, especially natural language processing. At that time, because expert systems were considered revolutionary solutions capable of solving problems in any areas of human activity, AI was perceived as a direct threat to humans. It was a perception that would later bring an inevitable skeptical backlash. The success of these systems stimulated a near-magical fascination with smart applications. Expert systems were largely deemed as a competitive tool to sustain technological advantages by the industry. The usage of expert systems grew at a rate of 30% a year. Companies like DEC, TI, IBM, Xerox and HP, and universities such as MIT, Stanford, Carnegie-Mellon, Rutgers and others have all taken part in pursuing expert system technology and developing practical applications. Nowadays, expert systems has expanded into many sectors of our society and can be found in a broad spectrum of arenas such as health care, chemical analysis, credit authorization, financial management, corporate planning, oil and mineral prospecting, genetic engineering, automobile design and manufacture and air-traffic control. Expert systems are becoming increasingly more important in both decision support which provides options and issues to decision makers, and decision making where people can make decisions beyond their level of knowledge and experience. They have distinct advantages over traditional computer programs. In contrast to humans, expert systems can provide permanent storage for knowledge and expertise; offer a consistent level of consultation once they are programmed to ask for and use inputs; and serve as a depository of knowledge from potentially unlimited expert sources and thereby providing comprehensive decision support. Fig.2 represents an general model of learning agents using expert system.

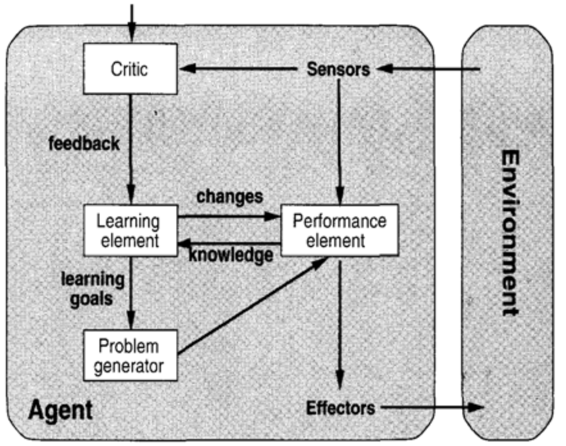

Fig.2 A general model of learning agents

So far we have talked about agents by describing their *behavior*—the action that is performed after any given sequence of percepts. Now, we will have to bite the bullet and talk about how AGENTPROGRAM the insides work. The job of AI is to design the **agent program:** a function that implements the agent mapping from percepts to actions. We assume this program will run on some sort of

ARCHITECTURE computing device, which we will call the **architecture.** Obviously, the program we choose has to be one that the architecture will accept and run. The architecture might be a plain computer, or it might include special-purpose hardware for certain tasks, such as processing camera images or filtering audio input. It might also include software that provides a degree of insulation between the raw computer and the agent program, so that we can program at a higher level. In general, the architecture makes the percepts from the sensors available to the program, runs the program, and feeds the program's action choices to the effectors as they are generated. The relationship among agents, architectures, and programs can be summed up as follows: agent = architecture + program

III. ARTIFICIAL SUPER INTELLIGENCE

General intelligence measures an agent’s ability to achieve goals in a wide range of environments. This kind of intelligence can pose a risk if the goals of the agent do not align with our own. If a general intelligence reaches a superhuman level, it becomes a superintelligence; that is, an algorithm superior to human intelligence in every way, including scientific creativity, “common sense”, and social competence. Note that this definition leaves open the question of whether or not a superintelligence would have consciousness. **Artificial General Intelligence (AGI)** is achieved when the AI can perform functions associated with average human intelligence. This leads to enterprise-class AI software that can replace humans within the corporate workforce. This also is the lightning rod for negative portrayals of AI by politicians and the media. **Artificial Superintelligence** Artificial SuperIntelligence is the extreme of artificial intelligence. It is the best form of artificial intelligence and easily surpasses human intelligence. Apparently, this has not been achieved yet. Many scientists and prominent figures have raised concerns about Artificial SuperIntelligence, even saying that developing it can lead to human extinction. artificial intelligence is widely used in solving social problems. ASI describes AI that performs at levels that greatly exceed the abilities of any living human being. This enables a user to achieve tasks that were previously entirely beyond reach, potentially creating business models that were previously impossible.

IV. AI TO MACHINE SUPER INTELLIGENCE

It seems unlikely that humans are near the ceiling of possible intelligences, rather than simply being the first such intelligence that happened to evolve. Computers far outperform humans in many narrow niches (e.g. arithmetic, chess, memory size), and there is reason to believe that similar large improvements over human performance are possible for general reasoning, technology design, and other tasks of interest. If artificial intelligences can be created at all, there is little reason to believe that initial successes could not lead swiftly to the construction of artificial superintelligences able to explore significant mathematical, scientific, or engineering alternatives at a rate far exceeding human ability, or to generate plans and take action on them with equally overwhelming speed. Since man’s near monopoly of all higher forms of intelligence has been one of the most basic facts of human existence throughout the past history of this planet, such developments would clearly create a new economics, a new sociology, and a new history. A system that is superintelligent in the sense of being smarter than the best human brains in practically every field" could have an enormous impact upon humanity. Just as human intelligence has allowed us to develop tools and strategies for controlling our environment, a superintelligent system would likely be capable of developing its own tools and strategies for exerting control. In light of this potential, it is essential to use caution when developing AI systems that can exceed human levels of general intelligence, or that can facilitate the creation of such systems. In order to ensure that the development of smarter-than-human intelligence has a positive impact on the world, we must meet three formidable challenges: How can we create an agent that will reliably pursue the goals it is given? How can we formally specify beneficial goals? And how can we ensure that this agent will assist and cooperate with its programmers as they improve its design, given that mistakes in early AI systems are inevitable? This agenda discusses technical research that is tractable today, which the authors think will make it easier to confront these three challenges in the future. Of the three challenges, the one giving rise to the largest number of currently tractable research questions is the challenge of finding an agent architecture that will reliably and autonomously pursue a set of objectives| that is, an architecture that can at least be aligned with some end goal. This requires theoretical knowledge of how to design agents which reason well and behave as intended even in situations never envisioned by the programmers. The challenge of developing agent designs which are tolerant of human error also gives rise to a number of tractable problems. We expect that smarter-than human systems would by default have incentives to manipulate and deceive human operators, and that special care must be taken to develop agent architectures which avert these incentives and are otherwise tolerant of programmer error. Reliable and error-tolerant agent designs are only beneficial if the resulting agent actually pursues desirable outcomes. The difficulty of concretely specifying what is meant by beneficial behavior implies a need for some way to construct agents that reliably learn what to value. A solution to this value learning problem is vital. In short, the authors believe that there are theoretical prerequisites for designing aligned smarter than- human systems over and above what is required to design misaligned systems. We believe that research can be done today that will make it easier to address alignment concerns in the future. Intelligence implies the ability to achieve goals, we should expect super intelligent systems to be significantly better at achieving their goals than humans. This produces a risky power differential. The appearance of super intelligence appears to pose an existential risk: a possibility that humanity is annihilated or has its potential drastically curtailed indefinitely.

V. HEALTH CARE WITH SUPER INTELLIGENCE

Artificial intelligence is breaking into the healthcare industry by assisting doctors

According to Bloomberg Technology, Microsoft has developed AI to help doctors find the right treatments for cancer. There is a great amount of research and drugs developed relating to cancer. In detail, there are more than 800 medicines and vaccines to treat cancer. This negatively affects the doctors, because there are way too many options to choose from, making it more difficult to choose the right drugs for the patients. Microsoft is working on a project to develop a machine called "Hanover". Its goal is to memorize all the papers necessary to cancer and help predict which combinations of drugs will be most effective for each patient. One project that is being worked on at the moment is fighting myeloid leukemia, a fatal cancer where the treatment has not improved in decades. Another study was reported to have found that artificial intelligence was as good as trained doctors in identifying skin cancers. Another study is using artificial intelligence to try and monitor multiple high-risk patients, and this is done by asking each patient numerous questions based on data acquired from live doctor to patient interactions.

VI. DATA MINING WITH SUPER INTELLIGENCE

The interaction and integration between agents and data mining are comprehensive, multiple dimensional, and inter disciplinary. As an emerging scientific field, agent mining studies the methodologies, principles, techniques and applications of the integration and interaction between agents and data mining, as well as the community that focuses on the study of agent mining. On the basis of complementation between agents and data mining, agent mining fosters a synergy between them from different dimensions, for instance, resource, infrastructure, learning, knowledge, interaction, interface, social, application and performance. As shown in Fig. 3, we briefly discuss these dimensions.

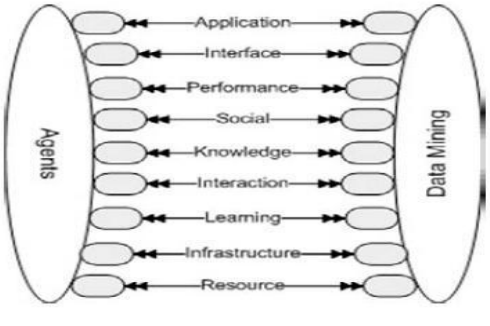

Figure 3: Multidimensional Agent Mining

Resource layer – interaction and integration may happen on data and information levels;
Infrastructure layer – interaction and integration may be on infrastructure, architecture and process sides
Knowledge layer – interaction and integration may be based on knowledge, including domain knowledge, human expert knowledge, meta-knowledge, and knowledge retrieved, extracted or discovered in resources
Learning layer – interaction and integration may be on learning methods, learning capabilities and performance perspectives
Interaction layer – interaction and integration may be on coordination, cooperation, negotiation, communication perspectives
Interface layer – interaction and integration may be on human-system interface, user modeling and interface design;
Social layer – interaction and integration may be on social and organizational factors, for instance, human roles;
Application layer – interaction and integration may be on applications and domain problems;
Performance layer – interaction and integration may be on the performance enhancement of one side of the technologies or the coupling system.
From these dimensions, many fundamental research issues/problems in agent mining emerge. Correspondingly, we can generate a high-level research map of agent mining as a disciplinary area.

VII. CYBER SECURITY WITH SUPER INTELLIGENCE

Today's Narrow AI has important applications in cyber security, and is expected to play an increasing role for both defensive (reactive) measures and offensive (proactive) measures. Currently, designing and operating secure systems requires a large investment of time and attention from experts. Automating this expert work, partially or entirely, may enable strong security across a much broader range of systems and applications at dramatically lower cost, and may increase the agility of cyber defenses. Using AI may help maintain the rapid response required to detect and react to the landscape of ever evolving cyber threats. There are many opportunities for AI and specifically machine learning systems to help cope with the sheer complexity of cyberspace and support effective human decision making in response to cyber attacks. Future AI systems could perform predictive analytics to anticipate cyber attacks by generating dynamic threat models from available data sources that are voluminous, ever-changing, and often incomplete. These data include the topology and state of network nodes, links, equipment, architecture, protocols, and networks. AI may be the most effective approach to interpreting these data, proactively identifying vulnerabilities, and taking action to prevent or mitigate future attacks. AI systems also have their own cyber security needs. AI-driven applications should implement sound cyber security controls to ensure integrity of data and functionality, protect privacy and confidentiality, and maintain availability. Advances in cyber security will be critical in making AI solutions secure and resilient against malicious cyber activities, particularly as the volume and type of tasks conducted by governments and private sector businesses using Narrow AI increases. Finally, AI could support planning, coordinating, integrating, synchronizing, and directing activities to operate and defend government networks and systems effectively, provide assistance in support of secure operation of private-sector networks and systems, and enable action in accordance with all applicable laws, regulations and treaties.

VIII. DESIGN OF NEW ASI

The author proposes a general idea of building a new ASI system:

- Start with the existing design of any system,
- and incrementally modify the design through a series of successive stages,
- Each stage independently viable,
- and then carry out this series of transformations on an actual systems.
- Upgrade biological brains in-place (for example, by adding new neurons which will
- be usefully wired in);
- or usefully interface computers to biological human brains;
- or usefully interface human brains with each other;
- or construct Artificial Intelligence.
- Creative enough to build their own recursively self-improving AI?

For Example, in medical field using expert systems so many intelligent systems available. With Superintelligence and Data mining we can diagonise and find some solutions in medical field.

IX. ADVANTAGES OF ASI

Below we list a few ASI advantages that may allow ASIs to become not only vastly more intelligent than any human, but also more intelligent than all of biological humanity. Many of these are unique to *machine* intelligence, and that is why we focus on intelligence explosion from AI rather than from biological cognitive enhancement.

Increased computational resources: The human brain uses 85–100 billion neurons. This limit is imposed by evolution-produced constraints on brain volume and metabolism. In contrast, a machine intelligence could use scalable computational resources. While algorithms would need to be changed in order to be usefully scaled up, one can perhaps get a rough feel for the potential impact here by noting that humans have about 3.5 times the brain size of chimps, and that brain size and IQ correlate positively in humans, with a correlation coefficient of about 0.35.

Communication speed : Axons carry spike signals at 75 meters per second or less. That speed is a fixed consequence of our physiology. In contrast, software minds could be ported to faster hardware, and could therefore process information more rapidly.

Increased serial depth: Due to neurons' slow firing speed, the human brain relies on massive parallelization and is incapable of rapidly performing any computation that requires more than about 100 sequential operations. Perhaps there are cognitive tasks that could be performed more efficiently and precisely if the brain's ability to support parallelizable pattern-matching algorithms were supplemented by support for longer sequential processes. In fact, there are many known algorithms for which the best parallel version uses far more computational resources than the best serial algorithm, due to the overhead of parallelization.

X. Conclusion and Future Enhancement

The author believes that 100 % Artificial Super Intelligence is not possible but some extent we can try. Artificial Super Intelligence can be a major driver of economic growth and social progress, if industry, civil society, government, and the public work together to support development of the technology, with thoughtful attention to its potential and to managing its risks. Artificial Super Intelligence is a subject with broad intellectual challenges of its own. It is not limited to specific applications or certain biological structures. It requires combined basic research in cognition, statistics, algorithms, linguistics, neurosciences and much more. The complexity of human intelligence had been underestimated before, especially in the expert systems field. Technological limitations and managerial challenges still remain in the development of expert systems. However, with the success of neural networks, CASE technology and other state-of-art technologies, the future for expert systems seems bright despite the earlier setbacks. Moreover, careful consideration must be given to legal and ethical issues that will certainly arise during the course of advancing expert system technology. Should autonomous "thinking" machines ever become reality, our lives as we know it would be forever changed. Government has several roles to play. It should convene conversations about important issues and help to set the agenda for public debate. It should monitor the safety and fairness of applications as they develop, and adapt regulatory frameworks to encourage innovation while protecting the public. It should support basic research and the application of AI to public goods, as well as the development of a skilled, diverse workforce. And government should use AI itself, to serve the public faster, more effectively, and at lower cost. Many areas of public policy, from education and the economic safety net, to defense, environmental preservation, and criminal justice, will see new opportunities and new challenges driven by the continued progress of AI. Government must continue to build its capacity to understand and adapt to these changes. As the technology of AI continues to develop, practitioners must ensure that AI-enabled systems are governable; that they are open, transparent, and understandable; that they can work effectively with people; and that their operation will remain consistent with human values and aspirations. Researchers and practitioners have increased their attention to these challenges, and should continue to focus on them. Intelligent systems are expected to work, and work well, in many different environments. Their property of intelligence allows them to maximize the probability of success even if full knowledge of the situation is not available. Functioning of intelligent systems cannot be considered separately from the environment and the concrete situation including the goal. Developing and studying machine intelligence can help us better understand and appreciate our human intelligence. Used thoughtfully, AI can augment our intelligence, helping us chart a better and wiser path forward. Author concludes that no single AI technique which gives consistent results for all types of health care, data mining and cyber security. Intelligent data analysis will play even a more important role, due to the huge amount of information produced and stored by modern technology.

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