Importance of Artificial Intelligence with their wider application and Technologies in Present Trends

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ABSTRACT

The field of artificial intelligence gives the ability to the machines to think analytically, using concepts. Tremendous contribution to the various areas has been made by the Artificial Intelligence techniques from the last 2 decades. Artificial Intelligence will continue to play an increasingly important role in the various fields. This paper is based on the concept of artificial intelligence, areas of artificial intelligence, applications of artificial intelligence and Technologies used in Artificial Intelligence.

Keywords : Artificial Intelligence, Applications, Advantages & Disadvantages and Limitations.

I. INTRODUCTION

John McCarthy who is called as a Father of Artificial Intelligence, According to him Artificial Intelligence is *"The science and engineering of making intelligent machines, especially intelligent computer programs".* Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think. AI is accomplished by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.

Artificial Intelligence is becoming a popular field in computer science as it has enhanced the human life in many areas. Artificial intelligence in the last two decades has greatly improved performance of the manufacturing and service systems. Study in the area of artificial intelligence has given rise to the rapidly growing technology known as expert system. Application areas of Artificial Intelligence is having a huge impact on various fields of life as expert system is widely used these days to solve the complex problems in various areas as science, engineering, business, medicine, weather forecasting. The areas employing the technology of Artificial Intelligence have seen an increase in the quality and efficiency.

II. METHODS AND MATERIAL

Goals of AI

- To Create Expert Systems − The systems which exhibit intelligent behavior, learn, demonstrate, explain, and advice its users.
- To Implement Human Intelligence in Machines − Creating systems that understand, think, learn, and behave like humans.

Applications of AI

AI has been dominant in various fields such as −

- Gaming − AI plays crucial role in strategic games such as chess, poker, tic-tac-toe, etc., where machine can think of large number of possible positions based on heuristic knowledge.
- Natural Language Processing − It is possible to interact with the computer that understands natural language spoken by humans.
- Expert Systems − There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice to the users.
- Vision Systems − These systems understand, interpret, and comprehend visual input on the computer. For example,
  o A spying aeroplane takes photographs, which are used to figure out spatial information or map of the areas.

- o Doctors use clinical expert system to diagnose the patient.
- o Police use computer software that can recognize the face of criminal with the stored portrait made by forensic artist.
- Speech Recognition − Some intelligent systems are capable of hearing and comprehending the language in terms of sentences and their meanings while a human talks to it. It can handle different accents, slang words, noise in the background, change in human's noise due to cold, etc.
- Handwriting Recognition − The handwriting recognition software reads the text written on paper by a pen or on screen by a stylus. It can recognize the shapes of the letters and convert it into editable text.
- Intelligent Robots − Robots are able to perform the tasks given by a human. They have sensors to detect physical data from the real world such as light, heat, temperature, movement, sound, bump, and pressure. They have efficient processors, multiple sensors and huge memory, to exhibit intelligence. In addition, they are capable of learning from their mistakes and they can adapt to the new environment.

AI is classified into Formal AI, Ordinary AI, and Expert AI.

Humans learn ordinary AI since their birth. They learn by perception, speaking, using language, and locomotives. They learn Formal AI and Expert AI later, in that order.

For humans, the Ordinary AI is easiest to learn. The same was considered true before trying to implement Ordinary AI in machines. Earlier, all work of AI was concentrated in the Ordinary AI domain.

Later, it turned out that the machine requires more knowledge, complex knowledge representation, and complicated algorithms for handling Ordinary tasks. This is the reason why AI work is more prospering in the Expert Tasks domain now, as the expert task domain needs expert knowledge without common sense, which can be easier to represent and handle.

Areas of Artificial Intelligence

Language Understanding:

The ability to "understand" and respond to the natural language. To translate from spoken language to a written form and to translate from one natural language to another natural language. Some of those are explained below.

Speech Recognition & Voice Recognition: The speech recognition aims at understanding and comprehending WHAT was spoken whereas the objective of voice recognition is to recognize WHO is speaking.

Semantic Information Processing (Computational Linguistics): One of the major research areas that is now appearing in the IT industry is called "semantic information processing", or the building and using of semantic information repositories. A semantic information repository is a data collection that links concepts and names together. We have probably all seen the need for this when performing Internet searches. Suppose that we search for "chip": this could mean a search for semiconductor chip, potato chip, or a person named Chip. From the context, we can determine the meaning. For instance, if I wrote the search: "tell me about the nutrition value in chips", I am probably talking about potato chips, since they are the only kind of chip that is food. If I wrote the search "collect sales of the Intel T7200 processor chip", the words "Intel" and "processor" would mean that I am talking about a computer chip or a semiconductor chip. The intent is to enhance the usability and usefulness of the Web and its interconnected resources.

Question Answering: QA is a computer science discipline within the fields of information retrieval and natural language processing (NLP), which is concerned with building systems that automatically answer questions posed by humans in a natural language.

Information Retrieval: Information Retrieval, a way to separate relevant data from irrelevant, An intelligent Information Retrieval system can simulate the human thinking process on information processing and intelligence activities to achieve information and knowledge storage, retrieval and reasoning, and to provide intelligence support.

Learning and adaptive systems: The ability to adapt behavior baged on previous experience, and to develop

general rules concerning the world based on such experience.

Cybernetics: Norbert Wiener defined cybernetics in 1948 as "the scientific study of control and communication in the animal and the machine. the essential goal of the broad field of cybernetics is to understand and define the functions and processes of systems that have goals and that participate in circular, causal chains that move from action to sensing to comparison with desired goal, and again to action. Its focus is how anything (digital, mechanical or biological) processes information, reacts to information and changes or can be changed to better accomplish the first two tasks. Cybernetics includes the study of feedback, black boxes and derived concepts such as communication and control in living organisms, machines and organizations including self-organization.

Concept Formation : The generalized descriptions of sets of objects or events that stand behind the words of our language, provides your vocabulary for speaking about the world, our working hypothesis is that they are one of the most important representational tools available to humans and computers and that forming new concepts is a central part of the representation adjustment problem.

Problem solving: Ability to formulate a problem in a suitable representation, to plan for its solution and to know when new information is needed and how to obtain it. Some of these are Inference (Resolution-Based Theorem Proving, Plausible Inference and Inductive Inference), Interactive Problem Solving, Automatic Program Writing, Heuristic Search.

Perception (visual): The ability to analyze a sensed scene by relating it to an internal model which represents the perceiving organism's "knowledge of the world." The result of this analysis is a structured set of relationships between entities in the scene. Some of the areas are Pattern Recognition, Scene Analysis.

Modeling: The ability to develop an internal representation and set of transformation rules which can be used to predict the behavior and relationship between some set of real-world objects or entities. Some of the models are the Representation Problem for Problem Solving Systems, Modeling Natural Systems (Economic, Sociological, Ecological, and Biological etc.), Hobot World Modeling (Perceptual and Functional Representations).

Robots: A combination of most or all of the above abilities with the ability to move over terrain and manipulate objects. Most of the area which need the collaborative intelligence which might need Exploration, Transportation/Navigation, Industrial Automation (e.g., Process Control, Assembly Tasks, Executive Tasks), Security, Other (Agriculture, Fishing, Mining, Sanitation, Construction, etc.), Military, Household.

Games: The ability to accept a formal set of rules for games such as Chess, Go, Kalah, Checkers, etc., and to translate these rules into a representation or structure which allows problem-solving and learning abilities to be used in reaching an adequate level of performance like Particular Games (Chess, Go, Bridge, etc.).

Some of the Artificial intelligence that are used in your daily life

Virtual Personal Assistants:

Siri, Google Now, and Cortana are all intelligent digital personal assistants on various platforms (iOS, Android, and Windows Mobile). In short, they help find useful information when you ask for it using your voice; you can say "Where's the nearest Chinese restaurant?", "What's on my schedule today?", "Remind me to call Jerry at eight o'clock," and the assistant will respond by finding information, relaying information from your phone, or sending commands to other apps. AI is important in these apps, as they collect information on your requests and use that information to better recognize your speech and serve you results that are tailored to your preferences. Microsoft says that Cortana "continually learns about its user" and that it will eventually develop the ability to anticipate users' needs. Virtual personal assistants process a huge amount of data from a variety of sources to learn about users and be more effective in helping them organize and track their information.

Video Games:

One of the instances of AI that most people are probably familiar with, video game AI has been used

for a very long time—since the very first video games, in fact. But the complexity and effectiveness of that AI has increased exponentially over the past several decades, resulting in video game characters that learn your behaviors, respond to stimuli, and react in unpredictable ways. 2014's *Middle Earth: Shadow of Mordor* is especially notable for the individual personalities given to each non-player character, their memories of past interaction, and their variable objectives.

First-person shooters like *Far Cry* and *Call of Duty* also make significant use of AI, with enemies that can analyze their environments to find objects or actions that might be beneficial to their survival; they'll take cover, investigate sounds, use flanking maneuvers, and communicate with other AIs to increase their chances of victory. As far as AI goes, video games are somewhat simplistic, but because of the industry's huge market, a great deal of effort and money are invested every year in perfecting this type of AI.

Smart Cars:

You probably haven't seen someone reading the newspaper while driving to work yet, but self-driving cars are moving closer and closer to reality; Google's self-driving car project and Tesla's "autopilot" feature are two examples that have been in the news lately. Earlier this year, the *Washington Post* reported on an algorithm developed by Google that could potentially let self-driving cars learn to drive in the same way that humans do: through experience. The AI detailed in this article learned to play simple video games, and Google will be testing that same intelligence in driving games before moving onto the road. The idea is that, eventually, the car will be able to "look" at the road ahead of it and make decisions based on what it sees, helping it learn in the process. While Tesla's autopilot feature isn't quite this advanced, it's already being used on the road, indicating that these technologies are certainly on their way in.

Purchase Prediction:

Large retailers like Target and Amazon stand to make a lot of money if they can anticipate your needs. Amazon's anticipatory shipping project hopes to send you items *before* you need them, completely obviating the need for a last-minute trip to the online store. While

that technology isn't yet in place, brick-and-mortar retailers are using the same ideas with coupons; when you go to the store, you're often given a number of coupons that have been selected by a predictive analytics algorithm. This can be used in a wide variety of ways, whether it's sending you coupons, offering you discounts, targeting advertisements, or stocking warehouses that are close to your home with products that you're likely to buy. As you can imagine, this is a rather controversial use of AI, and it makes many people nervous about potential privacy violations from the use of predictive analytics.

Fraud Detection:

Have you ever gotten an email or a letter asking you if you made a specific purchase on your credit card? Many banks send these types of communications if they think there's a chance that fraud may have been committed on your account, and want to make sure that you approve the purchase before sending money over to another company. Artificial intelligence is often the technology deployed to monitor for this type of fraud.

In many cases, computers are given a very large sample of fraudulent and non-fraudulent purchases and asked to learn to look for signs that a transaction falls into one category or another. After enough training, the system will be able to spot a fraudulent transaction based on the signs and indications that it learned through the training exercise.

Online Customer Support:

Many websites now offer customers the opportunity to chat with a customer support representative while they're browsing—but not every site actually has a live person on the other end of the line. In many cases, you're talking to a rudimentary AI. Many of these chat support bots amount to little more than automated responders, but some of them are actually able to extract knowledge from the website and present it to customers when they ask for it.

Perhaps most interestingly, these chat bots need to be adept at understanding natural language, which is a rather difficult proposition; the way in which customers talk and the way in which computers talk is very different, and teaching a machine to translate between the two isn't easy. But with rapid advances in natural

language processing (NLP), these bots are getting better all the time.

News Generation:

Did you know that artificial intelligence programs can write news stories? According to *Wired*, the AP, Fox, and Yahoo! all use AI to write simple stories like financial summaries, sports recaps, and fantasy sports reports. AI isn't writing in-depth investigative articles, but it has no problem with very simple articles that don't require a lot of synthesis. Automated Insights, the company behind the Wordsmith software, says that e-commerce, financial services, real estate, and other "data-driven" industries are already benefitting from the app. Of course, Wordsmith still needs quite a bit of help from an actual author to get setup and give it the matrix article that data is placed into. However, the concept has been proven, and it's likely that we'll see more and more reports generated by these means. Moving beyond data-driven fields will require major leaps in technology, but the groundwork has been laid, and it seems like it's only a matter of time until fully automated reporters become a reality.

Security Surveillance:

A single person monitoring a number of video cameras isn't a very secure system; people get bored easily, and keeping track of multiple monitors can be difficult even in the best of circumstances. Which is why training computers to monitor those cameras makes a great deal of sense. With supervised training exercises, security algorithms can take input from security cameras and determine whether there may be a threat—if it "sees" a warning sign, it will alert human security officers. Of course, the number of things that these computers can catch is currently pretty limited Wired talks about seeing flashes of color that may indicate an intruder or someone loitering around a schoolyard. Identifying actions that might imply a thief in a store are likely beyond the current technological limitations, but don't be surprised if this sort of technology debuts in the near future.

Music and Movie Recommendation Services:

While they're rather simple when compared to other AI systems, apps like Spotify, Pandora, and Netflix accomplish a useful task: recommending music and movies based on the interests you've expressed and judgments you've made in the past. By monitoring the choices you make and inserting them into a learning algorithm, these apps make recommendations that you're likely to be interested in. Much of this functionality is dependent on human-assigned factors. For example, a song might have "driving bass," "dynamic vocals," and "guitar riffs" listed as characteristics; if you like that song, you'll probably like other songs that include the same characteristics. This is the basis of many recommendation services; and while it's not futuristically advanced, it does do a pretty good job of helping you discover new music and movies.

Smart Home Devices:

Many smart home devices now include the ability to learn your behavior patterns and help you save money by adjusting the settings on your thermostat or other appliances in an effort to increase convenience and save energy. For example, turning your oven on when you leave work instead of waiting to get home is a very convenient ability. A thermostat that knows when you're home and adjusts the temperature accordingly can help you save money by not heating the house when you're out. Lighting is another place where you might see basic artificial intelligence; by setting defaults and preferences, the lights around your house (both inside and outside) might adjust based on where you are and what you're doing; dimmer for watching TV, brighter for cooking, and somewhere in the middle for eating, for example. The uses of AI in smart homes are limited only by our imagination.

Nest Smart Thermostat

One of the most highly visible and popular pieces of Internet of Things technology is the Nest, a smart thermostat that's connected to the internet. The Nest learns your family's routines and will automatically adjust the temperature based on when you're home or away, awake or asleep, hot or cold; to make your house more efficient and help you save on heating and cooling bills. The mobile app allows you to edit schedules, change the temperature when you're away from home, and even receive alerts when it looks like something has gone wrong with your heating or cooling system.

WeMo Switch Smart Plug

One of the most useful devices in the Belkin's range of WeMo connected home devices in the Switch, a smart plug. It plugs into a regular outlet, accepts the power cord from any device, and can be used to turn it on and off on a set schedule or when you hit a button on your smartphone. Another model of smart plug, the Insight switch, also monitors how much energy your devices are using, helping you make your home more energy-efficient. You can see when the plugs are on, how much power they're using, and set schedules for operation right from the mobile app.

Philips Hue Smart Bulbs

The Philips Hue lighting system is the most popular of the smart bulbs currently available. What can a smart bulb do that a regular one can't? For one, it can change colors—the Philips Hue lights can change to any color you choose; they'll even match the tones in a photo that you upload via the app. They can also be turned on and off on a schedule or from your smartphone, and the Hue bulbs can even be synced with your music for an awesome sound-and-light party. Other companies are starting to release smart bulbs as well, making this a more competitive niche; LIFX, Lumen, ilumi, and Belkin all have their own version of this technology. Like most other IoT smart home devices, these can help you save money on energy—as well as have a lot of fun playing around with your lights.

August Smart Lock

With this smart lock, you'll never need keys again—it unlocks automatically when you get home, and locks behind you when you close the door. You can grant guest keys to friends or the dog sitter, and have them expire when you no longer want to give that person access to your house. An optional keypad means you can set a code to open your door in case you don't have your phone with you (like if you're out for a run). You

can even view the activity log and grant access from your Smartphone remotely. Smart security systems are becoming more popular with the increase in options, and a smart lock like this one is a great place to start.

Canary Smart Security System

In the past, a motion detector was about the most advanced device that you could use to secure your home against intruders—but today's home monitors are much more advanced. For example, the Canary combines video, audio, motion detection, night vision, a siren, and air quality, temperature, and humidity sensors into a single device that you can control from your phone. Piper is a similar system that serves as a security system and a home monitoring device, and it can also serve as a speaker, letting you speak to anyone in your home even if you're away. These systems are pushing the boundaries of how in control you can be, regardless of where you are in relation to your home.

Samsung SmartThings Hub

Not all smart home devices are single pieces of equipment—there are entire systems that you can use to automate your home. For example, the SmartThings system lets you control lights, locks, plugs, thermostats, cameras, and speakers from a central hub that you can access from your smartphone, as well as a wide range of sensors that you can use with the Smartthings system to create a security solution that's integrated with all of the other electronics in your home. There are very few home electronic devices that you can't control with Smartthings or another hub-based smart home system, like Logitech's Harmony or the Lutron Smart Bridge.

Kolibree Smart Tooothbrush

Of course, the IoT extends to things that are much smaller than an entire smart home setup. A great example of this is Kolibree, the smart toothbrush. Kolibree connects to your smartphone and encourages good brushing habits for both kids and adults by turning brushing into a game and saving data on your phone about your brushing habits. The Kolibree doesn't yet transmit this data to your dentist, but don't be surprised if that becomes an option!

Petnet Smart Pet Feeder

Why should humans be the only ones to benefit from the Internet of Things? Petnet's smart feeder helps you calculate the best type of food for your dog or cat, how much they should be eating, and even sets up delivery of pet food for when you run out. You control the smart feeder via your smartphone, and can monitor your pet's food consumption even if you're away from home.

Scanomat Topbrewer

Have you ever wished that you could have a café-grade coffeemaker built into your kitchen? With the Topbrewer, you can—and not only do you get access to top-quality coffee whenever you want, but you can also make it from anywhere with the companion app. Choose the type of drink you want—latte, Americano, mocha, cappuccino, juice, hot chocolate, even carbonated water—and all you need to do is hit "Start Now" to kick off the brewing. And it's fast: the Topbrewer only takes 15 seconds to make a filter coffee.

Healthpatch Health Monitor

Most of the Internet of Things devices we've discussed so far have been for your convenience—you *could* use normal bulb, you *could* set up a security system, and you *could* have your neighbors feed your pet. But the Healthpatch serves a greater purpose than your convenience. It can be used for out-patient care by healthcare providers, letting them get ECG, heart rate, respiratory rate, skin temperature, body posture, fall detection, and activity readings remotely. This can alert doctors to potential health problems before they arise, or give them additional insights into which treatments will be most effective for their patients, even when their patients aren't in the office.

Lively Personal Emergency Response System

Similar to the Healthpatch, the lively system aims to help people who may have medical problems. The central hub connects to a smartwatch that will indicate to family members that the wearer might need help. It also enables the wearer to alert their family or an ambulance that they require assistance in case of a fall or other mishap. Passive sensors placed around the home can also track activity, enable medication reminders, and send out alerts for things like missed meals or decreased physical activity. The Android app even lets monitoring continue when the wearer is away from the hub. IoT products like the Lively system are helping more seniors live independent lives instead of requiring in-patient or assistive care.

Automatic Car Tracking Adapter

Until now, the examples of Internet of Things devices have focused on the home—but the IoT reaches far beyond the walls of your house. The Automatic app, for example, tracks information about your car by using an in-car adapter. It keeps track of things like mileage, hours driven, fuel cost, fuel efficiency, location, and ignition status. It can be connected with other apps, too, making it even more useful. Dash is an alternative to Automatic that gives you similar information, and calculates an overall "Dash score" to help you improve your driving. Many fleet vehicles are now getting IoT capabilities so they can be monitored and made more efficient, as well.

III. RESULTS AND DISCUSSION

DHL's IoT Tracking and Monitoring
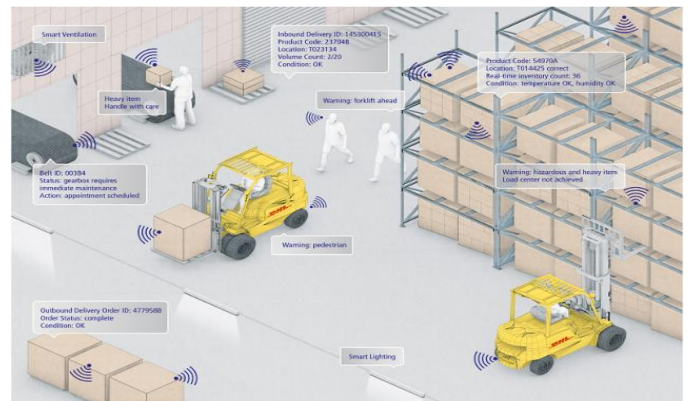
On a very large scale, the Internet of Things can help a great deal with logistics. For example, DHL provides shipping, warehousing, distribution, and supply chain management all over the world, and this requires a huge amount of communication. DHL released a report detailing some potential uses of IoT technology that includes vehicle monitoring and maintenance, real-time tracking of packages, environmental sensors in shipping containers, information-gathering on employees and tools, and a number of safety-enhancing

features for vehicles and people. While it may take a while for all of these kinds of technologies to emerge, the efficiency of logistics and shipping could be significantly increased if they work as expected.

Cisco's Connected Factory

Cisco, a leader in the IT field, is encouraging companies to make their manufacturing and production processes more efficient by integrating IoT technologies in their plants. Remote monitoring and access to the equipment used in manufacturing could greatly improve efficiency, allow issues to be resolved more quickly, and, in the end, result in production being increased. While most people will never see these benefits, stakeholders and businesspeople will likely to become more interested in these types of technologies over time, as the return on investment becomes more clear.

Oceanit Laboratories' Smart Cement

When you think about it, cement seems like one of the least "smart" things out there—you pour it, it becomes rock-hard, and that's that. But Ocean it Laboratories (along with other research companies) is trying to change that by embedding nanosensors in the material, allowing it to "[behave] more like a sensor, capable of transmitting and responding to mechanical, acoustic and magnetic signals." They give the example of oil drilling; the cement surrounding a well could pass information back to workers, helping them understand the integrity of the well and better assess risk. There are many conceivable uses for this technology, from sidewalks to hydroelectric dams.

Advantages and Disadvantages

➢ One of the major advantages of artificial intelligence is that its decisions are based on facts rather than emotions. Even after our utmost efforts, it is a wellknown fact that human decisions are always affected in a negative way by our emotions

➢ Unlike humans, machines with artificial intelligence do not need any sleep, thus overcoming the inherent disadvantage of tiredness in humans.

➢ Easier spreading of knowledge. Once an artificial mind is trained for something, it can be very easily copied to the others reducing the time wasted in

otherwise passing on knowledge to other humans through training.

➢ Lack of creativity in responses.

➢ Inability to explain the logic and reasoning behind a certain decision.

➢ Current development is at a stage where the AI cannot know when there is no solution to a particular problem.

➢ Any malfunctioning can lead to the AI producing wrong solutions and since it cannot explain the reasoning behind its answer, blind reliance on AI can lead to problems.

➢ Lack of common sense in reasoning can also cause major problems.

➢ It can be used to cause mass scale destruction if given in the wrong hands.

All this being said, one of the most concerning problem with the development of AI is that it will soon start substituting humans in every field thus causing a high rate of unemployment, which would lead to depression, crime and poverty. Also, there are some fields that require the human touch and there is a growing sense of belief that machines will quite possibly never be able to replace humans. The caring behavior of nurses in hospitals is one example of a job that humans feel machines will never be able to do justice to.

Today's Limitations are Tomorrow's Potential

Even though it is important to understand the current limitations of AI, it is equally important to understand the evolving technological progress which is unfolding in rapid speed. It is essential to understand that computational power is growing exponentially. Exponential growth is difficult to comprehend for humans as we generally think in linear terms. The most famous equation which stands for this exponential growth is Moore's law. Moore's Law states that CPU processing power will increase exponentially by a factor of 2 every 18 to 24 months. In other words, Moore's Law claims that CPU processing power will double approximately every two years. Assuming that computers continue to double in power, their hardware dimension alone will be over two hundred times more powerful in 2030. Differently put, the next decade will witness more than thirty times as much increase in power as the previous one.

Regardless of whether this growth will continue and whether the growth of computational power means that

the abilities of AI systems will grow exponentially as well, people have the tendency to underestimate the potential of tomorrow's applications by evaluating them in terms of today's enabling technologies. This tendency is sometimes referred to as "technological myopia". This should be born in mind, when we discuss the application of technology in the legal realm. Current techniques used in legal technology tools are called machine learning (including deep learning and predictive analysis) and natural language processing (NLP).

Even though there are some substantial limitations today this does not mean that these limitations will still exist in five or ten years. The ability of technology might change more radically and sooner than we expect. Hence, although machines are just beginning to perform legal tasks, it is likely that we can expect substantial progress in the coming years. Someday computers may mimic intelligent legal reasoning. Until then, the question is not whether they're replacing Humans, but how they impact the way a Human works.

IV. CONCLUSION

From the above discussions we can see the devices are smarter as humans, the reason behind it is The Internet of Things is a fascinating field, and connecting everyday devices to the internet can be hard to wrap your head around at times. But with the technologies above, and the others being researched and released every day, we're moving toward a future where devices are smarter, we're more in control, and we'll be able to leverage technology to create more efficient & intelligent machines. From this paper we conclude that the researchers are still actively involved and trying to close the gap between human intelligence and artificial intelligence.

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