

Technology vs Humanity, a Detailed Lookback

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ABSTRACT

The past few years have seen more technological advancements than in the past century maybe. Humans are relying more and more on machines and automation. But is this leading to a safe environment? Many activists fear if technology takes over humanity completely it would mean the end of humanity. There might be a possibility that these artificially intelligent robots become more intelligent than humans and start controlling the human race. The research aims to put forth data on how the automation is replacing humans in the present day. The research also includes the prospective future of humans with these AI machines and the most advanced technologies that are expected to come up and are being worked on.

1 Introduction

Technology and automation are increasing day by day today. We cannot imagine our lives today without these technological innovations. Researchers and innovators are working day in and day out to come up with more advanced technologies than ever. An artificially intelligent robot working on deep learning algorithms, capable of sensory functionalities and adaptability is the seeming future. The humans have come a long way from the time of evolution and everything since the start has been a step further towards technology – even the invention of the simple wheel or discovering to light the fire with stones. Slowly and gradually things started evolving and humans worked on more advanced technologies as we moved towards the modern era. Most of the leading nations compete to establish them as the world's biggest superpower and the way goes through technology and automation. The future of technology seems so to be promising and frightening at the same time. Everything has its advantages and disadvantages and so does the evolution of these robots and AI machines. Where automation has potentially reduced human labor and made life much better, providing us with very high standards of living, at the same time it has also led to an exponential fall in the jobs in almost all sectors.

2 Past: Evolution of basic technology

The developments in the different fields of science, computing, and general machines technology have always been due to some specific reason like trying to make human work easy and get exponential results with minimum human input. So in simpler words, technology is anything that can't be done by humans (or at least is considered to be very difficult and exhausting for humans). It was not like we directly came into the ages of science and computer technology. Even before these modern technological advancements and developments, there were technological developments such as the invention of wheels as early as the starting of the Bronze age and the copper age [1].



Figure 1: Technology from the starting based on information [1]

Then slowly and gradually we moved towards the early modern era from the medieval times. This is when wind and water power came into the forefront and help in the milling of grain. After the early modern period, things started changing. Now technology was not only to bring down human input. It had started becoming a means to show one's supremacy over others and to conquer things. During the age of exploration, we had pioneers like Vasco da Gama and Christopher Columbus who sailed around the world in search of new trade routes and the discovery of new lands. They developed maps and charts which eventually started helping in navigation. Then came the industrial revolution where we developed things like textile machinery, steam engines, and machine tools. As we advanced towards the end of the second industrial revolution we had started making modern weapons for war such as rifle guns, machine guns, mortar, flame throwers, tanks to name a few. All this was being developed by different countries to conquer the whole world and to establish supremacy all around. [2]



Figure 2: War weapons [2]

20th Century laid the foundation for the major modern technological advancements - be it electronic computing devices, phones, automobiles or other hi-tech goods. Now we are here in the 21st Century controlling things such as room temperature and the song we want to listen just by our voice without any physical work. Where do we go from here? Have we reached the zenith already and now it's just a downfall from here or is there still more to come?

Is there a possibility of humanity being taken over by technology and these artificially intelligent machines? Or still, humans are ahead of these robots?

Well, let's see where we stand today and how technology has already taken over humanity in some of the fields.

3 Present Day

Today we are here in the 21st Century with the most advanced and modern technologies around us. We are already developing robots and artificially intelligent machines that are expected to do work like actual humans. We have intelligent voice recognition assistants like Alexa by Amazon, Siri which work on our commands (such as call someone, play some music and stuff like that). There are automatically driven cars that don't even need drivers. Large scale industries have these manufacturing machines that exponentially increase the production rate. Automation is increasing by the day in most of the fields today and the humans are slowly and gradually being replaced by these machines and technologies.

Artificial intelligence and machine learning tools are being developed to gather the data for analysis and further advance these technologies to successfully develop actual "human-like" robots.

3.1 Fields where technology is already replacing humans

There are already some industries where humans are being replaced by technology as much as possible. There has been automation in manufacturing industries and small scale factories which has brought down the human intervention as much as possible. [3] Instead of a large number of labor workers carrying out the work, as in earlier days, now there are robots and automated intelligent machines with only a very number of technicians keeping an eye on the proper and smooth working of these machines. It has not only reduced human labor and labor waste but has resulted in precision and accuracy along with higher production in less time as compared to earlier.



Figure 3: Automation Equipment market for the year 2015 based on data [3]

As we can see in figure 3 (above) we have automation in most of the major industries – starting from automobile, electronics and electrical, food processing, packaging machinery, chemicals and pharmaceuticals, oil and gas, infrastructure and mechanical to name a few. Let us take a look at some data on how humans are being replaced in some of these industries.

3.1.1 Food Industry

The food industry has become so big that it is now being considered as a composition of two large industries: food serving and preparing industry and the food packaging industry. The large scale food packaging industries have already been automated to quite a large extent. Most of the work is being carried out by the automated packaging machines for which the items are running on conveyor belts and these machines just pack them in

whatever form is programmed into them. The overall increase in robotic capabilities and the automation levels shows that the productivity of the manufacturing units has gone up exponentially yielding better productivity to time ratio. According to a survey from the association of food packaging and processing technologies, 94% of food packaging operations are using robots already. Not only this, it is expected that this automation would further increase in the coming 2-3 years. [3]

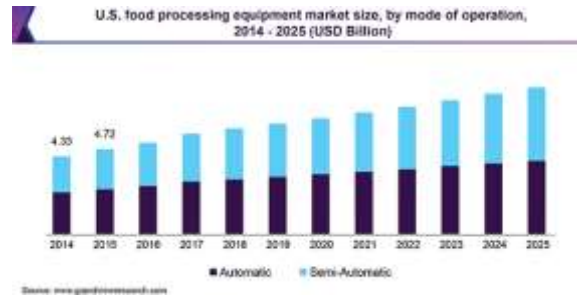


Figure 4: Growth of automatic and semi-automatic machinery in the US based on data [3]

We can see in figure 4 (above) that in the US the application of semi-automatic and automatic machinery and equipment is increasing linearly every year. It gives us a clear indication of how the food processing industry is replacing repetitive human labor with these automated machines to increase the efficiency and production rate and to cut down the human cost.

In the food serving and preparing industry, automation is trying to expand its reach. Some of the restaurants have even started using food serving robots and have deployed automated self-ordering kiosks for customers. There is a French start-up that goes by the name 'Ekim'. They have developed a robot that would make a pizza and serve it to you within a very short period as compared to a normal human chef. The Unique Selling Point (USP) of this startup is that the robots are equipped with 3 arms which help them to deliver 120 pizzas in an hour. A pizzalio (human pizza chef) delivers somewhere around 40 pizzas an hour. So if we use these robots we can have a production rate increase to 3 times. The main aim of this startup was to establish a completely automated pizzeria with automated and kiosks for customers and the robots serving the pizzas.

3.1.2 Electronics Manufacturing Industry.

The manufacturing and production of those small electronic parts like circuit boards and all is a very tiring job. It does not require much of the thoughtful side of the human brain and just involves the same work being carried out with as much accuracy and efficiency as possible. This is the reason why humans are being replaced in this sector by automated machines. It has brought down the physical labor in the electronics engineering part to a great level. It is the human tendency to commit errors and although the machines are not error-proof completely, they are bound to make fewer errors as compared to a normal human being. This improves the accuracy rate as the machines are not affected by environmental conditions. In addition to this, machines do not get tired and can work relentlessly as much as you want (apart from shutting them down for some time to let them cool down!). The most important outcome of this whole process is the potential rise in the rate of production and efficiency. The use of these hydraulic machines, mechanics, and pneumatics brings down the error probability to a very low percentage.[4]



Figure 5: Automated machine used for manufacturing circuit boards from [4]

It's astounding how these industries have used automation and implemented to make human work much easier as compared to before. All this has enabled humans to work more on the technical aspects rather than being stuck on the physically monotonous jobs which can be done with the help of a machine. While the machines do this monotonous and tiring job, humans can work on developing new technologies, giving the final touch to the end product and things like that.

3.1.3 Automotive Industry

The automotive industry is the one where we have seen the most automation in the past one-two decades. Earlier it was very difficult for humans to implement things without the help of automation and technology. They had to do things like putting parts in places that were not even easily visible. They had to slide under and try to put parts in place. Now we have automated all that to a great extent. Today we are using advanced technologies like:

- Machine Vision.
- CoBots – Collaborative Robots.
- AI for self-driven/Autonomous cars.
- Cognitive Computing in IoT connected cars.

Machine vision has enabled us to develop safer, reliable and robust automobiles. Machine vision uses technologies such as image viewing of all types, smart cameras and smart sensors for automatic inspection and analysis.

CoBots are collaborative robots that help humans in this job. This does not essentially mean that CoBots work alongside humans simultaneously. It

depends on the kind of CoBot and we have four different kinds of CoBots based on their functionalities: Safety Monitored Stop, Hand Guiding, Speed & Separation Monitoring, and Power & Force Limiting robots. CoBots help humans in doing a large part of a specific task and might stop during a human invasion in their workspace (depending upon the type). [5]

The pie chart, (below) in figure 6, shows the various sectors undergoing automation in the automobile industry. According to this data recorded in 2018, logistics and warehousing account for the largest percentage of automation.

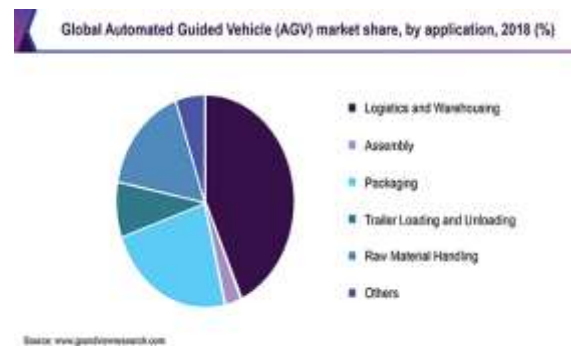


Figure 6: Automation in the different sectors of the automotive industry based on data [6]

Self-driven cars are being developed using artificial intelligence, smart sensors, pre-installed maps, trajectory emulators, Coded driving protocols, obstacle avoidance algorithms, predictive modeling, and smart object discrimination and such technologies. Tesla, under the leadership of Elon Musk, is doing commendable work in this field.

There are 3D printers that are used to manufacture small parts and are quite efficient. These automotive industries are trying to expand the use of 3D printers as much as possible.

3.1.4 Amazon Go

Amazon Go is a new kind of store that does not require any checkout or waiting in long queues. It uses technology similar to those of self-driven cars like sensory and computer vision, sensory touch, sensor fusion, deep learning. The main objective of amazon was to develop a shopping experience without lines and checkouts. Amazon Go offers items such as ready-to-eat snacks along with the common grocery products.

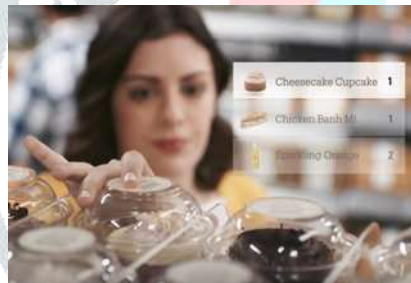


Figure 7: The concept of Amazon Go

It is so simple. You have the app installed on your smartphone. Then you scan your QR code at the entrance of the store. This is when your id is now linked and you have a virtual cart on your app. When you pick up an item from a shelf, it is automatically added to your cart using sensory technology. In case you drop the idea of buying that item, you just put it back on the shelf and the app automatically retracts that item from your virtual cart. When you are done, you just walk out of the store without having to wait in a queue. After a while, an automatic receipt of all the items is sent to the app and money is charged from the linked amazon wallet.

To get the exact ground reality, I did some research and one of my friends had visited this Amazon Go store in Seattle. I interviewed him about his experience and I'll quote him here: *"The store opened its store to the general public in January 2018, and I decided to be one of its first customers. I downloaded the Amazon Go app on my phone. It asked me to sign in into my amazon account and add a payment method. When I arrived at the location, I realized I wasn't the only one excited about the opening of this checkout-free store. There was a long line to enter the store (well, the only queue I had to get into!), but I believe that it was because it was the first day of the store. To enter the store, I had to scan the barcode in the app. One inside, I just picked up things I wanted to buy and walked out. There was free Wi-Fi inside the store and charging stations too. It was a hassle-free experience. I was only charged for items I took out of the store. This is the future of shopping!"*

3.2 Statistical Data

There has been a subsequent fall of jobs in the above-mentioned industries and many more which have not been mentioned here. In the early 1900s, the average workweek was approx. 70 hours but since the introduction of automation and technology this has gone down to almost an average of 40 workweek hours and this, I believe, has resulted in increasing the quality of life.

According to the research and statistical data by the International Federation of Robotics, it is expected that the total no. of robots would be almost 3 million by the year 2020.

Figure 8 (below) shows us the increase in industrial robots over the last decade. It shows us that from the year 2008 – 2013 the increase in the number of robots was almost linear. But for the past 5 years, the trend is changing rapidly and we can now see more exponential growth in the graph with each passing year. This indicates how the humans are trying to increase the production of robots as much as possible and move towards a more

automated life. In all probability, by the year 2020, we will be having 1.5 times the robots and the advanced automated machines as we had 2 years back – or even higher than that. [7]

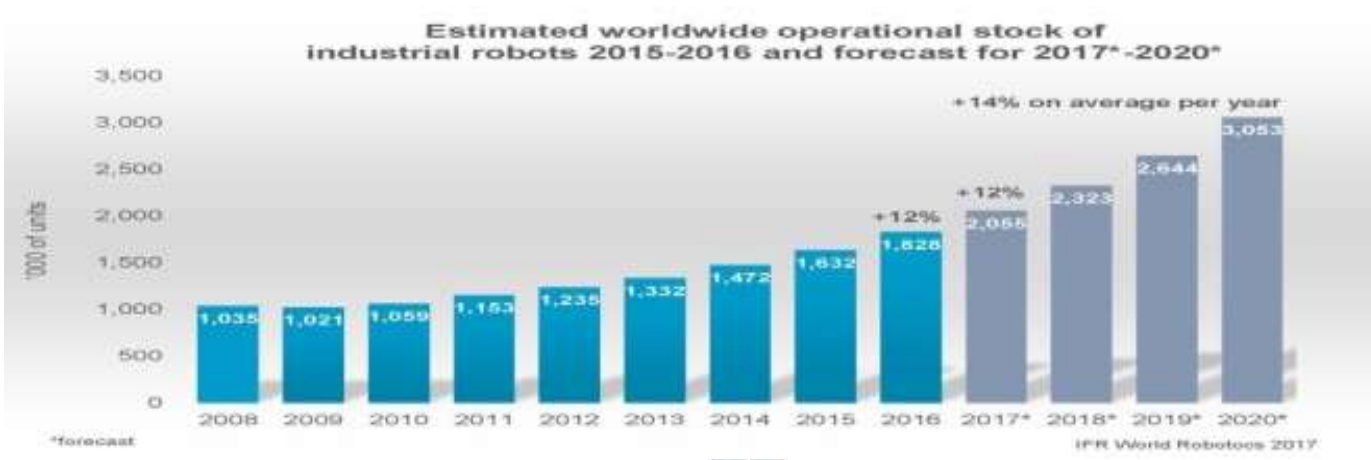


Figure 8: Growth of robots over the years based on data

from [7]

Figure 9 (below) gives a better understanding of what kind of jobs are being replaced. Jobs that involve the same repeated work without any frequent changes are the most displaced jobs such as toll takers. While on the other hand jobs such as physician assistants (medical field) and plumbing, which require much adaptability to different situations and cannot be hardcoded, are at the present most durable jobs and at the least risk of being replaced by automated machines and robots. [8]

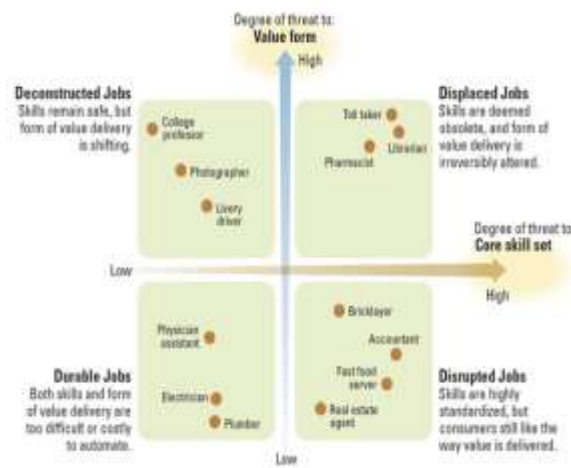


Figure 9: Axis showing job takeovers based on data [8]

Talking about the present day scenario, still, there are many places and industries where technology has not completely taken over. There have been technological advancements but not the replacement as we have talked in the above examples. One such example is the medical industry. There have been considerable advancements with numerous machines and equipment coming up which diagnose a disease but we cannot see humans being replaced by robots in this industry - at least not at the moment. We are away from that kind of take over and until and unless we develop robots that are capable of human-like emotions, we won't be able to achieve that.

4 Future

No one knows what our future is going to be. But one thing is sure; it would be revolving around artificial intelligence and human-like robots. The leading research and development environments around the world are working on this day in and day out today. We are already using artificial intelligence in many places but what these researchers and innovators wish to develop is a complete human-like robot that can not only work exponentially as compared to a human but is also capable of human emotions using all those machines and deep learning algorithms.

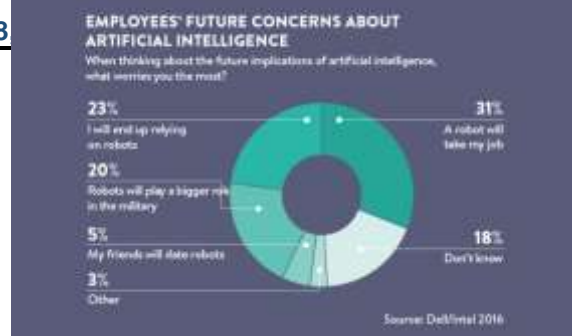


Figure 10: Future with

automation based on data from dell/Intel

2016

The pie chart, in figure 10, shows the concerns of the future with all the automation. There would be risks of more jobs being taken over, more dependency on robots and even some risks and problems that we will only be able to know when this happens. [12]

Some of the most ambitious projects going on are:

4.1 In the field of medical science

Even though today the field of medical science is more advanced than ever, scientists are looking forward to introducing more and better technologies. Developing machines that would develop the likelihood of being diagnosed with a disease in the near future by processing our health and activity data is the utmost priority.

4.1.1 Trans-humanism

The scientists want to make our human bodies much smarter, stronger and efficient by introducing things such as exosuits which would make us even stronger, brain and RDIF chips using which we can open locks and doors just by a mere hand motion, biological augmentation which would lead to increased eyesight power, powerful CRISPR gene-editing technology and things like that to make the embryo intelligent and more capable even before it actually transforms into a small living being!

Organizations such as Elon Musk's Neuralink, Facebook and DARPA are working on these wearable augmentations and other brain-machine interfaces (BMIs). These body augmentation technologies would produce humans that are more capable, optimized and much more resilient. [9]

4.1.2 Genetic Engineering

Humans are trying to read DNA – the code of our biological systems, hack it and then rewrite it the way we want it to be. Gene-editing tools like CRISPR are being studied to transform human DNA and introduce powerful stem cells to fight these cancer cells to execute clinical trials. Just some time back a person was treated with a simple metabolic disorder of hunter's syndrome by the gene-editing of his cells. [10]

4.1.3 General Advancements

Humans want to develop robots that are capable enough of performing surgical operations all by themselves. Implementation of more accurate 'polygenic scoring' is being tried where big data analysis would take over to predict some complex disease risks by analyzing large number of sequenced genomes.

Recently Arnav Kapur, An MIT media lab researcher developed a device named 'AlterEgo' which can translate the thoughts into speech. When speaking, the brain sends signals and vibratory cells to the tongue. This device catches these signals and vibrations sent to the tongue or the larynx and translated it into actual speech without explicit speaking. Such devices can prove to be so useful to people suffering from paralysis and other speaking disabilities.[11]

4.2 In the field of Nuclear Weapons and Military

The whole technological advancements started with the aim of different nations to conquer the world. As we move into the future, the thirst for the same has grown exponentially. All the nations want to exert their supremacy now more than ever. All the leading countries are developing state of the art of nuclear weapons and military equipment. At the moment the US has almost 90-94% of the world's nuclear weapons. The US government predicted that between 2014 and 2023 it will spend around \$350 billion on modernizing its nuclear arsenal. Similarly, other nations like China, Russia, India, and North Korea do not want to stay behind and are developing their weapons using the latest technology and most lethal ideas.

4.3 Robots vs Humanity

Today we have robots and intelligent machines all working around us. But still there exists the difference between these intelligent machines and humans. There are many aspects where robots are exponentially much more efficient as compared to humans and so following there are equally as many aspects where robots do not come even close to performing like living beings.

Some of the human limitations where the robots and the most advanced technologies have an upper hand are:

- Using technology we can have exponential efficiency.
- Robots are capable of working much more without getting tired, with greater accuracy and production rate as compared to human beings.
- Robots think more logically than living beings and are almost not persuaded by any emotional scenarios.
- Robots and intelligent machines are not affected, in any way, by the surrounding and environmental conditions.

The debate does not end here because humans have equally good advantages, maybe not in terms of efficiency but some of them are:

- Humans can adapt to changes and external stimuli. Humans can bend and twist their bodies for any task they want to perform which robots are not capable of. Many trial processes have been there where these robots failed to grab a particular object for long by bending their fingers.

- Robots and technologies are pre-defined and programmed for certain situations only and can work efficiently only under those circumstances.
- The emotional aspect – the machines lack emotions and hence cannot be deployed for delicate tasks such as carrying out surgical operations.
- Thinking, planning, and decision making on its own is one forte where robots are much behind humans. Research is being carried out using deep learning algorithms and machine learning to come as close to humans in this aspect still seems to be a concept way ahead in the future.
- The creative thinking, the spontaneity, and the instincts still provide humans the edge over robots and the most advanced technologies.

4.4 What if artificially intelligent robots and technology take over completely?

This seems to be way ahead in the future. If this happens the results would be catastrophic. Even though we know how much these robots and machines reduce human work and make our life easier if these machines take over completely it could prove to be quite dangerous. As of now, we control these technologies but what if we develop self-thinking robots that might become evil and start controlling us? Well, we do have many books and movies on these fictional scenarios and we all know it does not end well. AI robots are already taking our jobs, particularly those requiring simple cognitive and mechanical skills. There would be a greater cut down in jobs for humans and would lead to unemployment. The competition for the selected number of jobs around the world would get even higher and this would lead to a negative environment in my opinion.



Figure 11: Automation probable impacts based on data from

Being exposed to so much technology has a lot of negative drawbacks as well. Some of which are:

- Big companies like Facebook are already keeping an eye on all our moves over the internet. All these moves are being stored as data that is being utilized in training and developing machine learning and deep learning algorithms for the AI robots, which aspire to take our place one day.
- Data security and privacy breaches as all our data are being monitored - every click over the web is being monitored and stored.
- Digital technology means that vast amounts of data can be collected and stored. This can be private information concerning individuals or organizations. It can be very difficult to keep this data safe. Just a single breach can mean vast amounts of private information going into the hands of criminals, terrorists, foreign enemies, or other malign entities.
- AI robots taking over would mean the humans would become less and less intelligent with each passing day as there would be no need for us to do any work on our own.
- Apart from all this, we have the aspects of social disconnect, depersonalization and second-hand electronic living.

China has been deploying artificial intelligence and this has led to a very negative environment in some of the places in the country. Every movement of its citizens is under surveillance. China is using the 'social credit score' system where these artificially intelligent machines judge and score a person according to their everyday actions and movements. There are face recognition and movement capturing cameras and devices installed everywhere. These devices capture the actions and then score you on parameters such as obeying traffic rules, bad behavior such as stumbling against people in a rush while walking through the streets. The social credit score keeps on being automatically updated and it decides if you are authorized to avail yourself to certain luxury/service in China. For example, if a person has a low 'social credit score', they might not be given discounts in the supermarket, might have to pay higher tax and so on. It does not stop here and gets worse. It may reach to such an extent where you cannot even send your children to a reputed school. This is actually how artificial intelligence is controlling life in China today. The aim is to collect as much data as possible for analytics and for developing more advanced intelligent – 'human-like' – robots. The system is killing the will of the people to live or to just stay inside their home because even going to the supermarket means they would be monitored all the time. One of the Uyghurs living in Xinjiang said: "You don't want to live anymore". Uyghurs are the people living in the Xinjiang area of China. Life is very harsh for them living there. There was an interview with a person, who somehow took his family out of this electronic prison – China. To move out of China, he had to produce stacks and stacks of documents. He was actually in tears when being interviewed about his life in China.

4.5 Perspective of some pioneers in the field

There has been much debate and thinking on whether it is right to attain the innovation of artificial super-intelligence and what will happen if technology takes over humanity completely. Elon Musk fears that the development of artificial super-intelligence is humanity's "biggest existential threat". He, along with the likes of Stephen Hawking, believes that AI could result at the end of humanity. To be honest, nothing is shocking in what he thinks. There is a great possibility that if an artificially super-intelligent robot is developed, which decides on its own, it would prevent us from making any changes in it if things go south.

5 Conclusion

According to all the research and survey conducted above in this paper, I can say that there is a great chance that if technology takes over humanity, it would eventually mean the end of the world. Technology is good as far as it replaces repetitive and unnecessary human work. But the day technology replaces humans things would not go very well. AI robots would never be able to replace jobs like medical surgeries because there not always everything goes as planned. Hence, a mere computer program would not be able to handle such a situation and humans would be a perfect fit for such a job. However, all this is far into the future. We are far from achieving such an advanced AI robot that would be considered capable enough for performing surgery. According to Turing's test, as proposed by Alan Turing, a robot would be considered AI and the most advanced the day it would be able to fool and manipulate a normal human being. We have come really close with AI systems that can pretend to be humans like the Google Assistant but to manipulate and completely fool an actual human being is a whole other thing. So, humanity is safe only till the day technology is treated as a add on to human capabilities which reduces human work and makes our life easier and much more comfortable. The day technology starts taking our decisions and controlling us directly or indirectly is the day when the end of humanity would start.

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APPENDIX

Ground Research

To make things clear on technology vs humanity, I did a small research to access the thinking of people on what they feel about this whole scenario and how important is the involvement of such advanced technologies in our present and future life.

The analysis data is described below:

How likely is it that technology will take over humanity? (5 being highly likely)

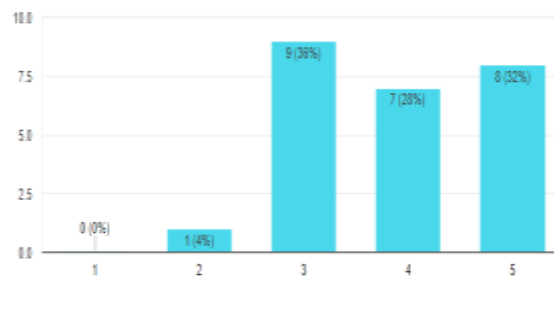


Figure 12: Chances of technology taking over humanity

The graph in figure 12 shows us that 96% of people according to the survey believe that there is a quite high chance of technology taking over in the future and the pace at which we are researching in all the fields certainly points in that direction as well.

Would you be comfortable being surgically treated by a highly-skilled but completely independent AI robot or you would trust a human being more?

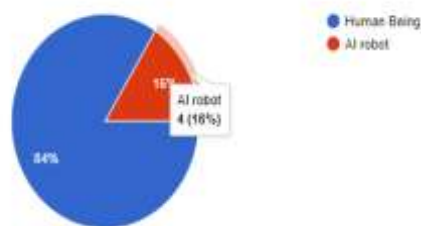


Figure 13: Humans still the preferable option for jobs like performing surgery

Almost 84% of the people would still feel safe undergoing a surgical operation by a normal human being rather than a highly skilled independent AI robot.

How likely is it for trans-humanism and genetic engineering to increase new racism and discrimination? (5 being highly likely)

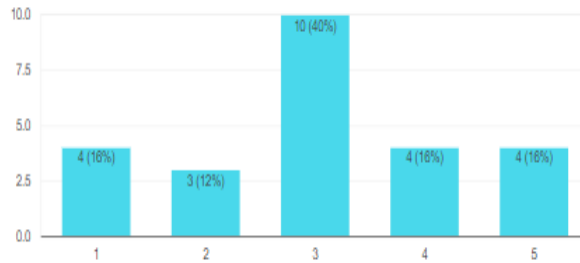


Figure 14: Possibility of trans-humanism and genetics resulting in racism

This was a hypothetical situation and it may or may not eventually become true as we can see some people believe that this can give rise to racism and discrimination while an almost equal group of people think that this is unlikely.

How do you see technology?

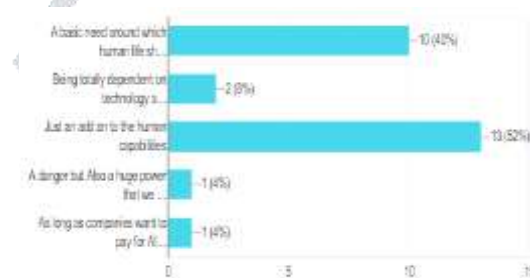


Figure 15: Technology is just an addition to human capabilities

According to 52% of people, technology to them is just an add on to human capabilities and 40% of people that it is a basic need around which our lives should revolve.

What is the most important feature you will look for in an AI robot?

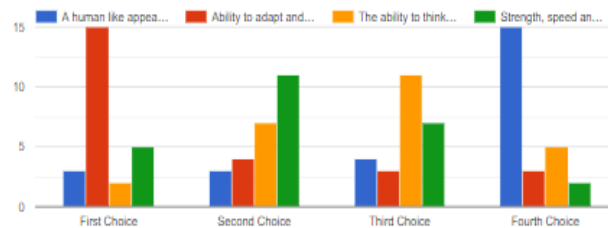


Figure 16: The most important feature of an AI robot

Considering the most important feature in an AI robot that people look forward to, there was quite a mixed response. Some felt speed and accuracy are the most important while some believe a robot with greater adaptability skills and instantaneity to react to situations would account for a better robot.

What is your perspective about automation in industry-leading to job cuts?

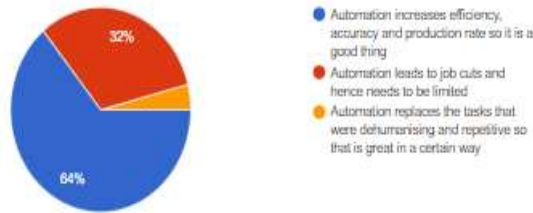


Figure 17: Technology

replacing human jobs

Most of the people believe that automation in the industry helps to replace repetitive work and as far as it is limited and reducing unwanted human work, it is a great thing.

How comfortable would you be if your every move is being recorded and analyzed to collect data for deep learning of the AI machines? (5 being fairly comfortable)

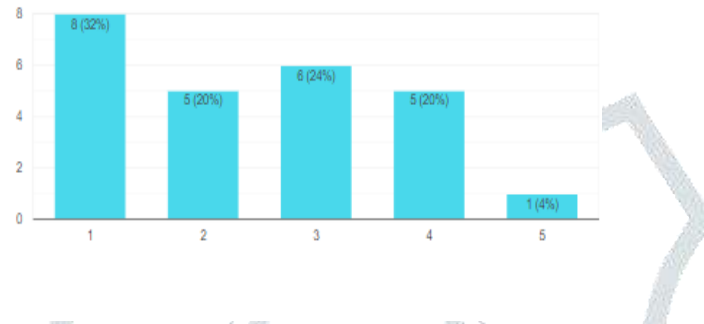


Figure 18: Data being recorder for machine learning

Our data is being recorded on the world wide web and social media applications. In real life, China monitors and records every step of its citizens and just 4% of people think that they will be fairly comfortable if every step is monitored.

What is the actual reason, in your opinion, behind all the development in the field of modern technology?

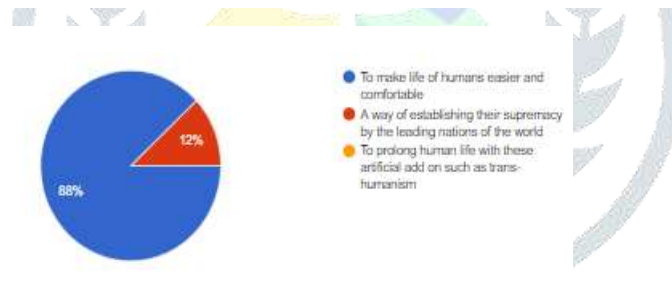


Figure 19: Technology makes human life easier

According to most people, all the developments in the field of technology are made to make the life of humans easier and much more comfortable.

Would all these technological advancements result in an even more rapid environmental decline of our planet?



Figure 20: Effect of these advanced technologies on the environment

According to the survey, it is quite uncertain whether these technological advancements and AI robots would bring a positive impact on the environment or would affect the environment adversely.

