

Future of Jobs and the Challenge of Artificial Intelligence



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Abstract

This paper then looks at some important questions. First, does the age of automation and technological transformation often referred to as the fourth industrial revolution pose any threat to human employability? Second, what is the scope of the challenge and how soon should we expect it? Third, what might be the socio-political impact of such displacement around the world? Fourth, whether there is enough preparedness or at least awareness of the threat posed? Finally, what has been done and can be done to thwart an unemployment apocalypse. The theoretical framework adopted is plain old zero-sum game from game theory. And the entire scope of the study required simple deductive reasoning. An important caveat worth spelling out at the outset is that this piece focuses on the very latest and mostly current developments, therefore in the absence of widely accessible material internet resources have been used for sourcing.

Key Words: Future of Jobs, Artificial Intelligence, Political Governance

Introduction

Humanity has faced many existential threats in the past. But none has been offered as a seemingly appealing prize. Perhaps the tale of Trojan Horse comes the closest to the paradox we face today. The idea of automation seems simple at first. Smart machines are the reliable partners of humanity. Hours long boring, repetitive work done in a split second by your synthetic buddy. The idea of artificial intelligence was and remains to this day the most enticing concept of modern history. And while science fiction authors and movie makers present to you the picture of AI as a conniving villain hellbent to take over the world that is not where the true threat emanates from. To assign ambition to artificial intelligence is to confuse the very nature of man and machine. Machines work with a defined purpose and unless human beings nudge it in the other direction there is little chance that they would revolt against humanity or take a political turn. The real threat emanates from the ability of smart machines to replace humans as reliable workforce. This is not just plausible but probable. As we see in this paper the never-ending potential of the smart machines can easily replace mankind in every possible field (Merriam-Webster, 2019).

Artificial Intelligence

Merriam-Webster dictionary defines AI as “a branch of computer science dealing with the simulation of intelligent behavior in computers” and “the capability of a machine to imitate intelligent human behavior”. John McCarthy coined the term in 1956. The term is easy enough to comprehend. However, the processes involved are neither simple nor monolithic. One method that dates to the inception of the field is called the artificial neural networks or simply neural network. In this process various computational devices are arranged in an imitation of human neural

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networks in brains. Since the modern science has revealed that the human thinking process is based on chemically induced electric binary impulses (in 1s and 0s, like the computer languages) it is not impossible to create synthetic or artificial thinking process. This technology is witnessing a renaissance of sorts and therefore will deserve a little bit more attention later. The second approach is called "the rule-based systems" (Skillings, 2019). In this approach computer is given some rules to apply to the information it is presented to compute. The computers then process that data based on these rules, definitions or generalizations. For instance, in the rules-based approach you will offer some basic definitions to the computer about a cat before exposing it to the picture or behavior of cat and it will identify it immediately. Despite limiting in scope since this process is time efficient and gets the job done it has been in vogue until recently stymying the potential growth of the field. However, as pointed out earlier we have witnessed a return to neural networks based computational subroutines owing to the silent revolution in the processing power of machines. The processing work that required days if not months to complete between 1950 and the end of the previous century now can be finished in minutes if not seconds. The neural networks-based processing is often referred to as 'machine learning' (Teich, 2018). Machine learning is essentially a trial-and-error method where instead of inducing a certain and limited thinking process to the machine, the logic circuits allowed to process raw data and tabulate working hypotheses. Through this method and unlimited exposure, the computers update their information repository and develop cognitive abilities. All you need is as much raw data as possible. Another approach to understanding artificial intelligence is presented by author and physicist Max Tegmark in his book Life 3.0 (Tegmark, 2017).

He classifies living organisms into following three categories:

- i) Life 1.0 characterizing organisms like paramecium which can renegotiate neither their software nor hardware. They are preprogrammed to function in a given manner and cannot break that code.
- ii) Life 2.0 is us, humans. We cannot change our body but can surely change our thinking process through learning, experience and introspection.
- iii) Life 3.0 is the synthetic technological being that can reprogram its software and hardware. (See Figure below).

Can it design its hardware?	✗	✗	✓ See you later!
Can it design its software?	✗	✓ ¡Hola!	✓ ¡Hola!
Can it survive & replicate?	✓ Hi!	✓ Hi!	✓ Hi!
	Life 1.0 (simple biological)	Life 2.0 (cultural)	Life 3.0 (technological)

It must be pointed out here that there also is the talk of Artificial General Intelligence (AGI) which fits neatly into the superhuman category. However, if any serious breakthrough is made in the field it is most certainly kept away from the prying eyes and ears of the media and analysts. In the absence of any public information however we are forced to surmise that the AGI revolution which could endow machines with the human level or beyond intelligence, emotional development and cognitive functions has not been achieved yet. That would essentially mean that the doomsday scenarios of machines overthrowing human civilization for lust for power are far away if not wholly improbable (Gelsinger, 2018).

But a confluence of technological advances when coupled with the breakneck pace of innovation will most certainly replace human workforce in days to come. Four technological advances in particular have been highlighted by experts. We add a fifth to the list (Boyd, 2019).

Four Superpowers and A Fifth

CEO of VMware, a subsidiary of Dell Technologies, Pat Gelsinger believes mankind has four superpowers today: Cloud computing and storage (unlimited space and processing power), mobile technology (unlimited reach), internet of things (where machines interact with each other) and artificial intelligence (autonomous thinking capability). We propose here to add a fifth superpower namely 3D printing which gives man and machines an unlimited ability to create without the help of large-scale factories (Gelsinger, 2018).

Imagine now a machine that can upgrade its software, can replicate its source code to other machines through internet of things and unlimited access through mobile telecommunication, has infinite memory at its disposal owing to cloud computing and can generate a body through 3D printing at will and you realize we are only inches away from darkest prophecies of science fiction authors (Boyd, 2018).

The processing power of machines keeps increasing exponentially as time passes by. According to Moore's law, a prediction made by American engineer Gordon Moore in 1965, the number of transistors on an integrated silicon chip doubles every year. This may change as the chips get smaller and reach molecular level. But that is exactly where the above mentioned five technological superpowers come to the rescue. Thanks to advance mobile technology and cloud computing such machines can access added processing power and data storage remotely in a heartbeat and solve complex problems instantaneously (Gelsinger, 2018).

Now consider another serious issue. We, human beings, have a large but finite number of neurons in our brains. A commonplace misconception about human brain is that it is underutilized. In truth however the parts of brain which are not being used for processing are used to store memories. So, in case of problems too complex for human brain we cannot add more neurons to our brain at will. However, this is not true for machines which can benefit from additional processors and clouds alike. Likewise, human beings have two eyes each but there is no limitation as to how many camera sensors can be added to a machine's body. This makes the fourth industrial revolution quite a seductive and yet lethal mix (World Bank, 2019).

If there was any dearth of data needed to train machines to think and grow, man's lab rat like dependence on modern technology is working overtime to more data than might be needed. As per IDC's Digital Universe Study sponsored by EMC dated December 2012 mankind has generated 130 Exabyte between the inception of civilization and 2005. Entire civilization cycle generated a measly 130 Exabyte. And this includes work of Shakespeare, Mozart, Iqbal, Dead Sea scrolls and those cheap suspense novels people read. In next five years until 2010 this number had reached 1200 Exabyte. By 2015 it had reached 7900 Exabyte. And by 2020 this figure will reach 40900 Exabyte. The analysis of this data is beyond human mind's reach. However, machines through automated software can help us solve these riddles. Add to it the invasive data collection techniques of controlled economies like China and you marvel at the scope of data available for AI training (World Bank, 2019).

Now simply put all these elements together. You can visualize the combined power of the incoming change. To think that any job can be saved from such a brute onslaught seems childishly laughable.

Bottlenecks in the AI's Way

But it is not as if there are no challenges in the way of AI's march towards absolute job market domination. Most technologies being highly experimental remain highly cost prohibitive. But as with all technologies when these products are launched in the market, economy of scale results in dramatic cost reduction. If you took today's common smartphone to yourself of ten years ago

you would perhaps be robbed in an instant owing to the worth of the technology. But today these smartphones can be acquired at a very cheap cost (Rutkin, 2015).

Another bottleneck is called the Turing Test after its proponent English mathematician Alan M. Turing who came up the process to assess the intelligence of a machine. Encyclopedia Britannica explains it in the following

words: “a remote human interrogator, within a fixed time frame, must distinguish between a computer and a human subject based on their replies to various questions posed by the interrogator. By means of a series of such tests, a computer’s success at “thinking” can be measured by its probability of being misidentified as the human subject.” While Turing predicted that by year 2000 at least one computer would pass at least seventy percent of the test, however so far it has not happened (Britannica, 2019).

But failure to pass the Turing Test might be important for the development of AGI. It does not, at least to this scribe; present a limitation to the AI’s potential to displace us from our jobs. The next bottleneck however does (Trucking.org, 2019).

As pointed out by The Economist recently an IKEA chair assembly task took robots 20 minutes in an experiment whereas it takes humans far lesser time to assemble it. Often described as Moravec’s paradox, this assumption is explained by Tegmark in following words: “It’s natural for us to rate the difficulty of tasks relative to how hard it is for us humans to perform them... But this can give a misleading picture of how hard they are for computers. It feels much harder to multiply 314,159 by 271,828 than to recognize a friend in a photo, yet computers creamed us at arithmetic long before I was born, while human-level image recognition has only recently become possible. This fact that low-level sensorimotor tasks seem easy despite requiring enormous computational resources is known as Moravec’s paradox, and is explained by the fact that our brain makes such tasks feel easy by dedicating massive amounts of customized hardware to them—more than a quarter of our brains, in fact” (Tegmark, 2017).

But here is a simple logic to counter the Moravec’s paradox. While it may take machines longer time now, it is in the very nature AI and robots to keep perfecting their processes. What is more the shape of human body is such that it can bend or show flexibility only in a few directions, whereas in machines there is no limitation of number of axles or limitation of movement. Together this will easily be able to cater to the needs of a manual labor (Tegmark, 2017).

A common misperception is that machines may take a long while to evolve. Human beings after all took millions of years to reach where they are right now. But that perception again ignores the nature of the beast itself. With virtually infinite computational power, rapidly improving hardware quality and the remarkable amount of data mentioned above this technology does not needs millions of years to evolve. Just a few years will do nicely (Hawes, 2019).

There are three more important aspects that cannot be ignored. First, the ability of Artificial Intelligence (AI) is to meld. While human beings can work together, often in harmony, but cannot merge their consciousness without the help of some hitherto unknown technology or significant hardware changes, by virtue of primarily being a self-improving code, it is in the nature of AI to merge with similar software. Consequently, the knowledge database of one along with the significant resources at its disposal can benefit the other and all AI software can plausibly work as one entity that can travel through networks. Imagine an internet with an ability to think for it, with added characters like taking whichever shape suits it (Reisinger, 2019).

The second aspect is of expendability. Machines, no matter how smart, continue to be viewed as hardware or inanimate objects. Until AGI finally evolves into its fullest potential and some conscientious citizen like the author moves courts for the right of it being considered a conscious entity not mere property it will be far less risky for the employers to replace man with them. After all, in the event of any damage you do not expect a lawsuit to follow (Reisinger, 2019).

And the third advantage is of the sense perception. You have two eyes which have a limited sight range of colors and do not have any optical zoom. Along with the number of visual sensors

that can be placed on a machine the range of colors and optical zoom is potentially unlimited. The same is true for hearing and talk. Together these elements add much value to the smart machines and make them far more fetching prospect and investment than human beings ((Hawes, 2019).

Jobs and Automation

A job is a combination of an opportunity to work, specialized knowledge and skills to accomplish a task and ensured profitability in return for the services rendered. If you are plumber you need an opportunity to perform a plumbing duty, have skills and knowledge to do so and are paid in return for the services. This is how job market has always functioned (World Bank, 2019).

The world population currently stands at 7.5 billion. This of course is an extrapolation because no worldwide population census has ever been conducted and not all members of the UN regularly conduct population census. Likewise based on ILO data World Bank claims that total working, employed population of the world is 3.46 billion. This number again is an extrapolation. But let us presently work with it. This would essentially mean that less than half of the world's population employed and/or employable. It also naturally means that not all unemployed/unemployable are above legal age. Still, it is a staggering number. Now just for a second conduct a mental experiment. Consider that they have all lost jobs in a single day (World Bank, 2019). What do you think will happen?

Remember, real change is silent change. It ambitious you when you are not paying attention. Now consider this. Automation has already rendered countless jobs redundant. Remember the photograph store where you used to go to develop your photograph films? It is gone. Its place is taken by color photo printers, smartphones, Instagram and snapchat. Or the video store around the corner where you had to wait for your turn and your desired movie to be returned by another customer? It's gone too. Its place taken by Netflix, Hulu, Prime Video, pay per view and in some cases YouTube. Similarly, the audio music shops have been replaced by online music apps. The number of cashiers in banks around the world has gone significantly down due to the availability of auto teller machines. Bookshops also regularly undergo job cuts because of the e-readers and eBooks. And consider the products that were once in vogue, like Walkman, VHS video players, tape recorders, analogue cameras, CD players, DVD players and on. They have been replaced by small things like USB devices, SD cards, smart televisions, mobile internet and smartphones in the palm of your hands. Postal services are also shrinking around the world partly because of text messages and emails and partly because of web based services like Amazon. This is simple observational information discernable by plain common sense. And yet we are too busy to pay attention. If truth be told due to this slow silent erosion of jobs and careers, we have become complacent. We think that our professions will not be affected by automation and AI (World Bank, 2019). They most certainly will.

Scope of Job Displacement

Reports of potential job displacements caused by these advances have been trickling in through media in recent years. But if you want to witness how job displacement looks like you need to visit what was once called the US industrial belt and is now known as the rust belt. Saint Louis, Missouri, at the height of its industrial growth was the third most populous city in the US. Now is not even a shadow its former self and has drastically shrunken in population with shuttered and rusting factories littered across its landscape. This is the precursor of what is to come. In the new age factories may continue to function for growth will only be enhanced by the efficiency added by automation but with little or no human labor present (Trucking.org, 2017).

According to 2017 data there were 7.7 million trucking related jobs in the US alone. In 2015 German manufacturer Daimler was cleared to launch its fully autonomous 18-wheeler truck in the US state of Nevada. Although it was meant to be a ten-year long trial run since then the cutthroat competition has forced Daimler to take its plans global and launch global autonomous group. This

massive competition in every walk of life and rush to be the next gold standard means that 7.7 million jobs in the US alone will evaporate within no time (Trucking.org, 2017).

Likewise, robots and AI are colluding to introduce service robots in mass production pizza chains and even pizza delivery may soon be fully automated. In defense industry we have already how effectively drones have replaced fighter planes in high-risk warzones. Automation will soon mean that these devices will not even need the pilots who fly them from the safety of their homes or workstations. And while various pundits believe that it will take this technology some time to come to fruition. However, the nature of capitalist enterprise, pace of and heavy investment innovation and pure human ingenuity means that it will arrive much before actually anticipated (Trucking.org, 2017).

And yet the denial is remarkable, even tech and AI wizards like Kai Fu Lee, who has produced a remarkable book on the subject recently, believes that in the next 15 years AI might replace only 40 percent of global jobs. While staggering in itself, the claim does not hold much water because the fast pace of innovation is not steady but accelerating with every passing day. So, 15 years is a long time and we can witness these changes taking place right now. At best, the humanity has less than a decade before all of its jobs (yes, all not 40 percent) will be replaced by machines. The author of this paper believes he has already made this point in painfully lengthy details. So, what happens when all jobs are gone? We know that with automation at helms production is bound to grow, the quality may increase, and the cost of products may decline. But in order to benefit from this remarkable advancement people will need money. Unemployment may mean their purchasing power declines, if not vanish at once, drastically. This may lead to societal collapse. The 0.01 percent of the rich may get richer. However, the rest may have to hustle to scrape together two square meals. The decline in the biodiversity and the environmental degradation would mean that the society cannot go back to the hunter gatherer phase either. The idea of over 7 billion hunter gatherers sounds outlandish at any rate (Teich, 2018).

Politically too it may mean collapse of democracy all over the world and power drifting into the hands of a few rich business corporations. Many believe that the recent surge in the support of populist nationalism is essentially being caused by the distress caused by the existing automation related displacement. Riots, violence, fratricide, suicides and terrorism may raise their ugly heads at once. Mankind may seem an unsustainable project. In other words, total dystopia (Gelsinger, 2018).

Is Mankind Ready?

But data and analysis show that far from it. The policy response so far can be summed up as four deadly sins. First, there is lack of alarm about the direction the world economy is taking. Two, there is significant denial about the scope of the threat. Three, there is absence of significant policy debate or preparedness to combat the challenge. Four, no realistic solutions are offered by anyone, because although we have heard of many ideas like universal minimum income, robot tax and even neural lace to upgrade human hardware to compete with AI, none of them seems plausible in the near future. The fact of the matter is no one has an answer to simple questions like what will entire humanity do and earn a living in case of total unemployment. This does not augur well for the future of human civilization (International Data Corporation, 2020).

Conclusion

The Way Forward

Mankind needs to do three things immediately. First, drop everything else and double down on research to find possible and workable solutions. This will need commitment of significant resources to research. Regardless of the irony this may need the use of AI to find some answers as well. Two, come up with legislative and policy frameworks to shield the workforce as much as possible. It will require lawmaking at the global level and in codifying laws and treaties it must be remembered that such technological innovation can neither be reversed nor should be

reversed. The purpose should be to regulate the growth of AI to ensure that policymakers have some semblance of control on how much displacement is affordable. The third is to open up and raise profile of debate on this highly critical matter. Without these three steps humanity is toast already.

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