The Contrasting Impacts of 21st Century Technology on Society

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Introduction

For better or for worse, technological innovations have always had a significant impact on society, and today this still holds true. Modern computational technology has both positive and negative impacts on societies and will continue to do so for years to come. These contrasting effects can be seen in the ability to spread information over the internet, the ability to automate human jobs, and the ability to alter human DNA through genetic engineering. The future of these technologies will be shaped by the popular answers to ethical questions such as: Is it right to allow everyone the freedom to share what they want on the internet regardless of the information's validity? Is it right to automate human labor? And, is it right to alter human DNA? The answers to these questions will arise by considering the pros and cons of these different technologies

Endless Information

To begin, the invention of the internet has allowed a large proportion of the world population to connect with one another online. In December 1995 it was estimated that 16 million people, about 0.4% of the world population had internet access. As of June 2019, that number has risen to 4,536 million people, about 58.8% of the world population (Internet World Stats, 2019). As more people connect to the internet, the ease at which information is passed between individuals increases drastically. Internet connections allow billions of people to transmit information across the planet in the blink of an eye, and the speed and scale of information flow among humans can be both beneficial and detrimental to societies.

The growth of the internet has many positive effects on human societies. Arguably, the largest advantage is that it is easier for people to obtain new information. The increased availability of educational resources online has led to better learning experiences for students (Akpan, 2017). The internet has led to an increase in the number of educated people which has led to more educated societies who have the knowledge necessary to solve large scale societal problems. In geographical areas where current textbooks are scarce, the internet becomes an "indispensable source of information for students looking for ideas for projects, term papers, assignments, news, video conferencing, and for general knowledge gathering" (Akpan, 2017). Furthermore, a connection to the internet also enhances people's ability to collaborate between individuals and organizations without concerning themselves with geographical proximity to one another. The internet is the central platform that facilitates communication and engagement for research and instruction both locally and internationally (Akpan, 2017). Even though the internet has allowed for the rapid acquisition of useful information, it has also brought forth a plethora of false information that can be detrimental to societies as well.

The information on the internet is not equally valid. The widespread adoption of the internet has accelerated the pace at which false information is able to spread across the human population. The ease at which people can author online content allows false information to easily become viewable and sharable among the world's people. When false information gets passed between many people, it creates a viral effect that is amplified when the search and recommendation algorithms of popular online platforms notice that the information is being accessed by many people. Once these algorithms notice that something is trending among many people, the algorithms will recommend it to more people. A professor of journalism at the University of Texas, Austin says that "Google delivers what other people have clicked on" (Nieva, 2016). Two tech giants Google and Facebook acknowledge that their platforms share fake news, but they have not shown an overwhelming interest in removing false info, because this would give them authoritative power over shared information online. Facebook CEO Mark Zuckerberg says the company should be cautious about becoming an "arbiter of truth" (Nieva, 2016). The amount of text online is messy, and it is difficult to determine which information is true and which information is false. Furthermore, as new "deep fake" software becomes popular, not only will text be difficult to decipher as legitimate, but so will photos, audio, and video. "Deep fakes" are computer generated replicas of a persons that could be used to convince other people that a certain person has said or done something that never actually happened (Schwartz, 2018). Beyond the questionable validity of information online, the internet has also created societal problems through the misuse of information.

Widespread internet use has also resulted in a lack of privacy and information security. As more sensitive information is shared online, it becomes more likely that the information will eventually fall into the wrong hands. Before the creation of the internet, sensitive info was likely stored on a physical medium in secure locations such as people's homes or corporate file cabinets. To steal a person's identity or an organization's trade secrets, a thief would have to partake in risky encounters that would likely result in them being exposed by other people. Today, it is easier to steal sensitive information because of the internet. Personal information and organization secrets are scattered across the web, and "system hacking and identity theft have become a common feature of the internet world" (Akpan, 2017). A modern thief does not need to leave their home to steal since they can hide behind their computer screens and become virtually anonymous when committing crimes.

Overall, the accelerated pace at which humans can pass information between one another has created ups and downs for society. Educational information is more readily available, and collaboration across geographic borders can be achieved with less effort. However inaccurate and false information also spreads like a virus, and sensitive information can end up in the hands of criminals when that information is not properly secured.

Job Automation

Modern technology has also resulted in contrasting effects in the availability of work for humans. Robotics coupled with hardware sensors, computer vision, and artificially intelligent algorithms that rely on machine learning can replace human workers by the millions and will continue to do so as technology advances. Job automation is not a new idea, but the types and

number of jobs that can be automated are increasing due to increased sophistication in robotics and computer software. Thus, there are few jobs which are safe from partial or complete machine automation with the help of modern technology.

Some of the jobs that could soon be automated are considered "low-skill" while others are not. To begin, retail and manufacturing jobs are likely candidates for automation because many of these jobs require predictable and repetitive tasks. This sector of employment is large, and the automation of these jobs could be extremely profitable for companies (Ford, 2016, pp. 26-27). Next, self-driving technology is advancing and has the potential to replace the human driver. Taxicab and commercial truck drivers will likely be replaced by automated vehicles (Ford, 2016, pp. 189-191). Also, when motorized vehicles drive themselves, it makes sense for vehicles to be shared when they are not in use since the vehicle can drive itself to someone else in need. Thus, the number of vehicles people need can be reduced. This results in fewer jobs for manufacturing vehicles, fewer mechanics, and fewer car salespeople (Ford, 2016, p. 189).

Computer technology also has the potential to replace many workers in fields that often require a college education. For example, new software can assist in patient diagnosis. IBM's *Watson* is a machine that assists in the diagnosis of ill patients by associating the patient's symptoms with extensive databases of clinical trials, textbooks, and medical journals (Ford, 2016, pp. 96-102). *Watson* could replace a panel of specialized doctors attempting to diagnose a complicated illness. Beyond the medical field, advanced computer technology is competing for journalistic employment. Software projects such as *Quill* can gather data from the web to generate news articles about sports, politics, and business (Ford, 2016, pp. 84-85). Lastly, artificially intelligent (A.I.) algorithms are being used in finance and education. Software is also learning to assess the written word of people. A.I. algorithms are being developed to grade essay responses of students (Nitze, 2018). In the past machines could only grade exams that had a definitive right or wrong answer such as multiple-choice responses, but now machine learning is being utilized to score responses that have traditionally required a human grader.

The potential of widescale job automation will have substantial impacts on societies across the planet, and some of these impacts will be positive while others will be less than favorable. On the positive end of the spectrum A.I. and robotics can do jobs that people do not want to do. Thus, freeing up time for people to do something more enjoyable. Also, automation can increase productivity, since machines can often work faster than humans. The machines can cut costs on organizational labor too. Each human employee must be trained, but machine learning only requires that one machine learn a task, and then that information can be shared with the other machines almost instantly. So, the time and cost needed for training could be reduced sharply (Ford, 2016, p. 75). Other than training, a machine does not need an income, nor does a machine need company benefits such as paid time off, health/dental/vison insurance, a retirement fund, etc. One final benefit to widespread automation is human safety. Autonomous machines can reduce the number of human fatalities caused by human error while operating dangerous machinery such as vehicles, lifts, cranes, and more.

Unfortunately, there are many downsides to computational job automation. First, each job that is given to a machine is a job lost by a human. When unemployment rises, fewer people

have jobs, and when people do not have jobs, they struggle to spend money. Therefore, economies will suffer. Automation will also cause economic inequality where the people who own the automation machines will prosper and those without the machines will not. In the most extreme scenario automated machines may replace most of the jobs that humans have today, which would call for a complete change in societal structures. If nobody has a job, then how will people get money? Will people still need money? Will the people who own the machines get to keep all the wealth, or will the wealth be shared with all of humanity? These are complicated questions that do not have simple answers, and drastic changes in societal structures can result in societal instability. As with widespread connectivity via the internet, automated labor can be beneficial yet detrimental to societies. Furthermore, the same can be said about human DNA editing through genetic engineering.

Genetic Engineering and Human DNA

DNA is the building block of life that determines human skin and eye color, body shape, susceptibility to disease, and much more. The technology needed to alter human DNA is improving and becoming more readily available. Once humans are born with modified DNA, that DNA will remain in the gene pool and live on through the genetic record of humanity. Thus, there are major implications to altering human DNA through genetic engineering. Thomas Hurka, a philosophy professor once said, "Genetic engineering is like nuclear technology: it can be used for evil but it can also be used for good" (Hurka, 1992).

Human gene editing does offer some benefits for societies. To begin, the study of gene editing allows scientists and medical professionals to grasp a better understanding of how life is created. This knowledge can be used to combat genetic diseases that make humans more susceptible to heart disease, high blood pressure, cancer, and diabetes (Stöppler, 2019). Also, genetic engineering will allow parents to prevent their children from inheriting genes that cause disease. Beyond disease prevention, parents will also be able to choose more desirable physical features for their children (Pang & Ho, 2016). Additional research from future geneticists will eventually uncover the extent to which humans can improve and/or compromise humanity's genetic record.

It is possible that the future of genetic engineering could also wreak havoc on human life as it is currently known. A small group of humans with heritable genome edited DNA will pass that altered DNA to future generations. If gene editing goes wrong, then humanity will continue to live with those mistakes (Mahony, 2018). Human gene editing is in its infancy, and while the alteration of one gene could be believed to make a person stronger, it may also have unintended consequences that could for example cause individuals to die at a younger age. Therefore, there are serious implications to human gene modification, and humanity must ask if the benefits of genetic engineering outweigh the risks.

Conclusion

In the end, the internet, job automation, and human gene editing are transforming the modern societies of the world. These technologies have broad and significant implications on how human societies function, and in some ways these technologies are beneficial to humanity,

but in others these technologies cause a great deal of harm. No innovation is perfect, and there will always be negative consequences when societies adopt new technology. So, societies must determine whether the benefits of a technology outweigh its faults. Therefore, the future of the internet, job automation, and gene editing will be determined by the ethics of the societies who harness them. There is no question that these technologies are impacting society, but there is the question of whether it is right or wrong to do something about it.

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