

Impact of Automation and Machines on employment

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction and Methods

Automation was first introduced and coined in the automobile industry around 1946 to describe the increased use of automatic devices and controls in mechanized production lines. It involves the use of machines to perform repetitive, tedious tasks without human interference. The term is attributed to Delmar Sherille Harder, an engineering manager at the Ford Motor Company around 1946 (Groover, 2020). From there on, automation has slowly been introduced in other fields such as software production through the use of automated scripts in software testing. To businesses' bottom lines, automation has been a technological advancement eliminating the need for human labor and cutting costs. Over time, this can lead to job security issues in industries such as retail, customer service, and food/car production. Automation processes are a technological invention that have influenced and will continue to influence many industries into the future. Although automation brings efficiency and effectiveness to an engineering environment, it is also expected that automation will bring its share of harm to people and society. Therefore, it is vital to understand the impacts automation has had or may have in the future.

To understand these impacts, I took a historical and philosophical approach by reading and synthesizing previous literature to help understand the innovation and evolution of automation. Diving deeper into the history of automation allowed me to gather evidence of times automation was seen as a success, a failure, or a detriment. This historical research allowed me to establish connections to a common theme that automation was a widely used algorithmic approach to solve various problems. Alongside the historical significance, I traced connections between texts through an intertextual approach by relating similar ideas, concepts, and/or language in an author's description of automation. I also identified similarly automated jobs

highlighted in these texts along with the algorithms that determine how these roles are to be automated to gain background knowledge of the setting and use of automation throughout history. As such, there are lots of questions about whether automation is ethical or not.

Automation ties into social innovation under the umbrella of “developing and implementing new, effective solutions to solve social or environmental issues. Whether these come from national policies, governmental or non-governmental entities, such solutions should meet current social needs better than it has been done before” (Porumboiu, 2021, para. 2). Automation entails high-risk problems and liability issues, especially when the final solution deals with people, the environment, and resources. Automation is especially common in the manufacturing industry, and it was advantageous to use a case study approach to help pinpoint specific examples or scenarios of automation throughout time that have led to significant impact. This is because

“[t]he highly skilled technical jobs are in demand and highly paid, the low skilled service jobs are in demand and badly paid, but the mid-qualification jobs in factories and offices, i.e., the majority of jobs, are under pressure and reduced because they are relatively predictable, and most likely to be automated” (Baldwin, 2019).

When automation is used in the wrong way, it introduces ethical risks. For this reason, there are automation codes of ethics that the professional society must devise to safeguard against practices such as using automation to measure team performance or worker productivity. The historical, tracing connections, intertextual connections, and ethical perspective methods or research approaches aided me in depicting the impact automation has had in our society.

Results

As Karl Marx believed “[l]ike every other instrument for increasing the productivity of labour, machinery is intended to cheapen commodities and, by shortening the part of the working day in which the worker works for himself, to lengthen the other part, the part he gives to the capitalist for nothing. The machine is a means for producing surplus-value” (Marx, 1977, p. 492). Using machines to replace human labor is nothing new and has been around for a while but what does Marx mean? Marx explains that using machines is not necessarily to replace humans but instead help owners of the machines in increasing production by having the machines and humans cooperate. When Marx states surplus-value, he is referring to the profit earned by minimizing the unnecessary labor. Another instance of industrial automation and technological debate occurred with the Luddites. The Luddites were British workers who objected to the increased use of mechanized equipment. At the time, many “argued that industrialists should introduce machinery more gradually, to allow workers more time to adapt to new trades” (Thompson, 2017, para. 12). There were other issues aside from worker replacement, like workers fighting low wages and harsh work conditions. They tried to bargain but factories would not listen. The Luddites protested violently and were fighting for their livelihood to stay economically afloat. Today, there still exists a form of Luddites known as Neo-Luddites who are opposed to any modern technology, but their impact is not as great as the Luddites from the 19th century.

In a national bureau of economic research paper published in 2017, Daron Acemoglu and Pascual Restrepo studied the effects of industrial robots on US labor markets. Their findings

“imply that one more robot per thousand workers reduces the aggregate employment-to-population ratio by about 0.2 percentage points and wages by about

0.42% (compared with its larger local effects, 0.39 percentage points and 0.77%, respectively), or equivalently, one new robot reduces employment by about 3.3 workers.

“(Acemoglu et al., 2017, p. 5).

Their estimates show that robots may reduce employment and wages.

Matt Vidal writes, in a piece titled *Contradictions of the Labour Process, Worker Empowerment and Capitalist Inefficiency*: “I agree with criticisms of these utopian visions [workers are unproblematically empowered, contradictions resolved, and mutual gains realised], which are inconsistent with the diversity of employment arrangements in advanced capitalism, including declining employment security, increased work intensification and rising inequality” (Vidal, 2019). Vidal describes the impact of automation had on jobs by discussing the invention of the assembly line. Automation in processes such as the assembly line significantly drives the lowest skilled worker out of work and forces the worker to have to reskill themselves. During this time known as Fordism, mass production was the mission. Automating certain processes such as car production helped improve effectiveness.

Using the case study approach, one study looked at how companies outsource duties such as resume screening to automated Artificial Intelligence programs (Fuller et al., 2021). Programs like these are used to replace humans and fill job vacancies. These programs are used to pre-screen candidates and helps manage the application processes. The study was done by the Harvard Business School along with the consulting firm Accenture. The purpose of this study was to help contextualize the job market post-covid19 to understand factors affecting employment. They found

“that 99% of Fortune 500 companies use an ATS [an Applicant Tracking System is designed to identify a limited number of candidates who most closely match specified criteria for a given position]. Our employer survey confirmed that even midsize enterprises—those with between 50 and 999 employees—use such filtering technology quite extensively [Because of the use of this automated system to find talent], an enormous and growing group of people are unemployed or underemployed, eager to get a job or increase their working hours. However, they remain effectively ‘hidden’ [willing and able to work full-time if given an opportunity] from most businesses that would benefit from hiring them by the very processes those companies use to find talent” (Fuller et al., 2021, p. 20).

The common theme of automation is that the invention is innovative across many industries, but it is not widely accepted in our society because many believe it that it is not the right thing to do. There are two sides to it. For some, the impact it has on jobs and employment is hard to ignore especially for hidden impacts such as those caused by ATS activity. Others only see the endless dimensions our society can achieve.

Analysis

Automation is becoming highly proficient, and for this reason, people have started worrying more about their replacement. While it does bring efficiency and effectiveness to an engineering environment, it is expected that automation will bring its share of harm to people and society. During the 2020 democratic election, Democratic Candidate and former Silicon Valley executive, Andrew Yang, made claims regarding automation saying we face social and economic crisis because automation is taking good jobs. According to an article published by Catalyst, Yang believes that “[a]utomation is no longer just a problem for those working in

manufacturing. Physical labor was replaced by robots; mental labor is going to be replaced by [Artificial Intelligence] and software” (Marchand, 2020, para. 2). Because of the effectiveness and efficiency of automation, many have this fear. The increased use of robots provides safer work environments and reduces human error. This is due to the fact that machines are programmed to follow guidelines and rules better than humans. In addition to other emerging technologies, automation may offer the “potential to reduce emissions. They could also theoretically improve resource-use efficiency, provided increased efficiency does not trigger over-consumption.” (Dusik et al., para. 5). For many, the short-term or clear positives of automation outweigh the long-term or hidden detriments.

In the long run, there are questions surrounding prescriptive ethics. The role of prescriptive ethics is to avoid any harm that arises from the decision and behavioral pitfalls (Barakat, 2011). Prescriptive ethics in automation is linked to how the robot's decisions and behaviors can incorporate human conditions. In *Weapons of Math Destruction*, Cathy O’Neil describes how some algorithms can be racist or flawed. O’Neil writes that

“this underscores another common feature of WMDs [weapons of math destruction]. They tend to punish the poor. This is, in part, because they are engineered to evaluate large numbers of people. They specialize in bulk, and they’re cheap. That’s part of their appeal. The wealthy, by contrast, often benefit from personal input. A white-shoe law firm or an exclusive prep school will lean far more on recommendations and face-to-face interviews than will a fast-food chain or a cash-strapped urban school district. The privileged, we’ll see time and again, are processed more by people, the masses by machines” (O’Neil, 2016 , p. 207).

In many industries using similar algorithms to those O'Neil mentions, people are under the impression that the numbers or data analysis of these algorithms will "tell them everything." In the resume screening case mentioned above, a computer lacks the human skills to think emotionally or in simple terms, give someone a chance. Machines are binary creatures and do not have an emotional component attached to them as they base their calculations on logic. These computers and robots are programmed to behave objectively and, in some areas, addressing employee performance and efficiency. On top of that, companies use these evaluations to assess if their employees are working hard enough according to the standards set by Artificial Intelligence systems. These AI systems are self-taught meaning it can train itself and recognize patterns amongst data given to it. O'Neil states that the masses are processed by machines and this true for many jobs. As I continue to reiterate, automation brings efficiency but is it effective in the resume screening process? The systems implemented by these companies in their hiring processes are very selective, but the systems miss out on a lot of great candidates. But how can applicants fight against this?

As Newton's third law states: For every action, there is an equal and opposite reaction, this is the same for any technological advancement. Although, these ATS services make career or job hunting hard, people need to adapt and change. Many of these ATS services are subscription based and people are able to use the service to score their resumes before submitting it to a job listing. This allows the candidate to get a score then go back edit their resume to effectively submit a detailed resume with specific terminology to trick the systems used and pass the resume screening process for a job. This method is used by many students across universities. Specifically, to UVA, this is taught at the career center using a service known as VMock. Although this may work, many are not privileged to gain access to these services either because

they are not aware of them or because they cannot afford them. With proper awareness, applicants could give themselves a chance against these biased and racist software systems.

A recent article published in The Verge, mentions a worker “who recently quit a Staten Island Amazon warehouse to take a job loading and unloading delivery trucks. He had scanners and metrics there, too, but they only measured whether his team was on track for the day, leaving the workers to figure out their roles and pace. ‘This is like heaven,’ he told his co-workers” (Dzieza, 2020). In his new job, the automating software only assessed if he and his team were up to speed with completing their responsibilities. On the other hand, many people in other industries have robot co-workers so they are being compared to machines who can get so much more done than they can. In doing this work intensification is introduced. Work intensification or labor intensification refers to the increasing effort a worker must invest because resulting from pressures such as automation. Going back to Karl Marx, his view on introducing machines in the workplace was based on seeing the economical profit to be gained. Similar to a capitalistic view back then, the companies’ implementing these automation changes, only goal is decreasing overhead and making a profit as well. Unfortunately, unemployment is not a concern to them and for the workers, all they are told is to reskill themselves. But these workers now can learn from the Luddites. As I mentioned above, the Luddites were textile workers who were against the use of technology as their jobs were being replaced. While these people were fighting against harsh and unequal treatment, a lot of their time was spent protesting with their skills going to waste. In the future, this will become a never-ending cycle where workers get replaced, reskilled, and then replaced again as technology improves. One observer in London noted

“technology is making cab-driving worse. Cabdrivers in London used to train for years to amass “the Knowledge,” a mental map of the city’s twisty streets. Now GPS has made it

so that anyone can drive an Uber—so the job has become deskilled. Worse, he argues, the GPS doesn't plot out the fiendishly clever routes that drivers used to. "It doesn't know what the shortcuts are," he complains. We are living, he says, through a shift in labor that's precisely like that of the Luddites" (Thompson, 2017, para. 30)

While this may be hard to accept, people should learn to adapt to the changes to give themselves an opportunity in a world controlled by technology. Whether that is reskilling themselves or becoming more technically aware, people can have a chance to be well off. Regardless of what one may think, there will always be a place for humans in the workplace. As more machines begin to be introduced in the workplace, there are humans needed to operate those machines.

Discussion

It is crucial to understand that there is a considerable positive to automation where robots have the role of improving all the services available to people through security, higher quality, and a safe working environment but at what cost. In an Aspen Institute article about the Future of Work, they write "Today's workers are especially vulnerable to the impacts of automation. Financial insecurity, an aging workforce, and falling geographic mobility, make it difficult for many to retrain and transition to new occupations following displacement" (Aspen, n.d). Automation is being introduced in many industries and fields with the primary objective to increase efficiency and effectiveness but there exists little to no concern about the economic security and opportunities for a worker. It will become necessary to implement policies or programs to safeguard against automation unemployment. Automation is an innovative solution to many problems in our society, but it needs to be addressed as a problem because automation will become a significant problem economically for many years to come.

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