

The Societal Impact of Automated Technologies and Facial Recognition

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Abstract

Automated technologies and facial recognition have a tremendous potential to positively and negatively impact society and with the most impact on the individual. This paper will outline the negative effects of automation on employment and ways to combat or eliminate inequality in consequence of automation, the positive effects of vehicle assistance technologies and automated vehicles, and the necessary ethical framework for the utilization of facial rejection technologies by government agencies, law enforcement, or other organizations. A survey consisting of questions related to automated technologies and facial recognition was administered to 28 Benedictine University Mesa students through Microsoft Forms, to measure their knowledge, awareness, and common attitude towards automated technologies and facial recognition. Results demonstrate that Benedictine University Mesa students view automated technologies as somewhat significant to society and their personal life, but realize the overall importance it has on some things in society, of which are addressed. Further exploration of survey results and their relation to the topics are discussed as well.

Keywords: Automation effects, Facial Recognition Ethical Framework, Benefits of Automated Vehicles and Vehicle Assistance Technologies, Solutions to Inequality Cause by Automation.

The Societal Impact of Automated Technologies and Facial Recognition

Technology has drastically changed society and how we live our daily lives, from the internet, smartphones, social media platforms, etc. these technologies are now part of us. In the early 2000s about half of Americans had internet access, now more than 90% of Americans have internet access and more than 50% of the entire world's population has internet access (Hillyer, 2020). Also, at the start of the millennium, there were only 740 million cellphone subscriptions worldwide, since then that number is now at more than 8 billion (Hillyer, 2020). Due to internet accessibility, the consumption of media has gone up significantly, social media platform Facebook had more than 2.6 billion users in 2018 (Hillyer, 2020) and since then that number has increased. This boom in technology has brought along many innovative solutions to communication and learning, however, it is not without flaws. In 2016 Facebook had partnered with Myanma Posts and Telecommunications, Myanmar saw an increase in Facebook users from 2 million to 30 million in 2017 (Saunders, 2018). Myanmar residents used Facebook as a primary source of news, because of this violent hate speech and misinformation about a persecuted group of the Rohingya Muslim minority group had been circulating on Facebook and other news sites (Saunders, 2018). The spread of anti-Rohinga Muslim minority group propaganda became prevalent all because of dull regulations on fake news, making Facebook a tool for spreading misinformation and blatant hoaxes. This was very damaging to the Rohingya Muslim minority group, more than 700,000 Rohingya had to flee their homes to escape death, as many were being killed (Saunders, 2018). This is just one example of how technology can be detrimental to progress or even to the individual, and as technology advances more sophisticated systems are created, these systems are revolutionary but come with risks that require attention. These sophisticated technologies will solve and optimize many of the most difficult problems we face but will inadvertently have side effects, because of this it is key to develop insight on solutions to either eliminate or mitigate the side effects of technologies on society.

Automation of Labor and an Approach to Lessen its Effects

The effects of Labor Automation

Automation and other technologies have transformed the economy in such a way that some compare this era to the Industrial Revolution going as far as to call it the Fourth Industrial Revolution (Hernandez et al., 2020). This technological revolution is transforming every sector of labor and will transform it even more in the coming years, possibly bringing more job losses than job creation (Hernandez et al., 2020). In order to understand the impacts of these technologies, it is essential to understand what these automated technologies are and how they are being used to automate tasks. First, what is automated technology? Automated technology is sophisticated software (machine learning algorithms) or robotic machinery that oversees and controls the production and delivery of products and services, the application of technology can interact in a physical environment without or with minimal human direction or interference. The most common forms of automated technologies are automated vehicle technologies, automated retail grocery and food technologies, and automated software technologies. Within the sector of retail-grocery and food lie the most common jobs in the USA with 3.66 million workings in Retail, 3.45 million working in Fast Food and counter jobs, and 3.3 million working as cashiers (bls.gov, 2020). In February 2018 Amazon opened its first cashier-less store Amazon Go. Amazon Go stores use sophisticated computer vision algorithms to identify customers and what they are purchasing (Goss, 2019), you simply need an Amazon account with a payment method then you head inside scan your account code and grab what you need without checking out at a cash register. These stores still require some employees that can aid customers but not as many as other common stores. This innovative technology is very promising and with more and more people using Amazon services, Amazon will continue to grow and expand. With over 112 million Amazon Prime subscribers in the USA (Sabanoglu, 2020), Amazon has cemented its mark as the most trusted and used retail and grocery service provider in the USA. What do Benedictine Students think about automated retail grocery technology? Among survey

participants 89% percent have heard of Amazon Go stores, however, they are unlikely to shop there, and most importantly 82% of participants believe these forms of automated grocery and retail stores will have drastic employment effects on retail- grocery workers. Self-checkout and self-ordering kiosks have been on the rise in most large retail stores and some fast-food chains. Recent research conducted by RBR shows that there has been a 52% increase in shipments of self-checkout terminals worldwide, and this momentum will continue to grow, with global installations expected to surpass 1.1 million in 2025 (RBR, 2020). As for self-service kiosks, there were 135,000 new kiosks installations worldwide in 2019, with McDonald's one of the world's largest fast-food chains accounting for more than a half of all installations and the US accounting for 40% of global installations (RBR,2020). When asked "How often, when shopping or ordering food, do you use self-service checkout systems or food ordering kiosks", the average participant will very often use self-service checkout systems or food ordering kiosks when shopping or ordering food, only 14% responded with never using self-checkout or service technologies when shopping or ordering food. These technologies are revolutionary and provide solutions that attract more customers whilst making their shopping experience enjoyable and convenient, however as these technologies become more prevalent workers will start receiving fewer work hours eventually many will be forced to seek employment elsewhere and these common jobs will slowly cease out of existence.

Steps to Diminish or Eliminate Negative Effects of Automation on Society

What can be done to mitigate the effects of automation? Some solutions to tackle mass unemployment from automation are, expand and focus on government-funded training programs relating to technology and other in-demand disciplines (vocational training), free college, universal basic income, guaranteed jobs and a livable minimum wage, a corporate tax increase especially on automated technologies and a possible maximum wage. Vocational training programs provide rigorous training and preparation for in-demand jobs in fields like construction, repair, health care, emergency services, culinary arts, automotive industry, etc.

Students greatly benefit from vocational programs by allowing them to specialize in certain in-demand skills, whilst helping deter students who are least likely to graduate college if they enroll (Kreisman & Stange, 2020). However, the most crucial benefit vocational training will provide, is to prepare individuals for technical fields, especially fields relating to automotive technologies, software engineering, information technology, automated systems repair, etc. In the US, the rising cost of attending a four-year college has increased faster than inflation for 30 consecutive years, however, attendance continues to grow despite this because obtaining a higher education is a worthwhile investment for young people (Deming, 2019). A study conducted in 2018 found that 61% of US adults believe higher education is headed in the wrong direction, with 84% of those believing it was due to increasing tuition costs (Deming, 2019). The need for higher education has prompted support for free college legislation, eleven states have passed or pending free college legislation (Deming, 2019). Instituting free college would benefit more Americans than the Depression-era Works Progress Administration Initiative, which created work for the unemployed and offered skills training for about 8 million workers (Winograd & Lubin, 2020). Free college is effective in helping lower inequality by increasing enrollment, increasing completion rates, and lowering student dependence on loans (Winograd & Lubin, 2020). In fact, the state of Tennessee in the first year of the Tennessee Promise program saw an enrollment increase of 24.7%, with over 4,000 plus students enrolled (Winograd & Lubin, 2020). Tennessee Promise program also saw an increase in graduation rates with a 52.6% success rate compared to a 39.9% success rate in non-Promise program students (Winograd & Lubin, 2020). Finally, Tennessee had a decrease of 17% in student loan applications in the first year along with loan amounts decreasing by 12% (Winograd & Lubin, 2020). It is necessary to provide free college to all Americans to prepare them for the ever-increasing jobs that demand college credentials of some form. As technology advances and automates away manual labor, is highly probable that greater wealth inequality will increase, as companies will obtain record profits from optimization of production, low cost of operation, and

low human labor. The need for both vocational training and free college is vital for combating inequality due to education level. When asked if automated technology has a chance of causing unemployment and higher wealth inequality, 75% of participants believed automated technology has a chance of causing unemployment and higher wealth inequality, with only 11% feeling otherwise. Universal basic income is direct periodic cash payments to all citizens of a country, without any test to provide whether or not an individual is living above the poverty line (basicincome.stanford.edu), in other words, no matter your income or situation you can receive periodic cash payments. However, not all individuals may need universal basic income, so it is best if the program allows opting in and out at any given time as preferred by the individual, the government cannot tell a citizen whether they need or do not need a universal basic income. Universal basic income may be an essential solution to tackle the automation of manual labor and the increasing wealth inequality, in fact, many have proposed such solution especially those in or around Silicon Valley (basicincome.stanford.edu), earlier proponents of similar programs included Thomas Paine, economist Milton Friedman, economist Anthony Atkinson (Prady & Francese, 2018), and Martin Luther King Jr. Universal basic income has the potential to save on administrative costs whilst increasing the transparency of transfer systems diminishing discretion and corruption (Prady & Francese, 2018). Around the start of the 2020 Sars-cov-2 pandemic, millions of Americans became unemployed, with the highest rate of unemployment in the USA being 14.8% during the month of April ([bls.gov](https://www.bls.gov), 2021). The outbreak prompted a government response that required large spending through stimulus packages to keep economic stability. It is during these harsh times when the aid of a universal basic income program could have tremendously helped Americans thrive or at least sustain them while staying at home. Many who are opposed to this idea point that no country can sustain regularly handing out money to its citizens, and it is a valid criticism of the idea, but the surge in inequality, social tensions, could cost more in the long run while simultaneously opening a path for social conflict (Wignaraja & Horvath, 2020). Large corporations are not paying their fair share, they pay

extremely limited amounts in taxes while taking advantage of loopholes in the tax system (Wignaraja & Horvath, 2020). Some wealthy people such as Warren Buffet and Bill gates have advocated for the wealthy to pay higher taxes, 10% of the wealthiest people own 85% of the wealth (Wignaraja & Horvath, 2020). If these corporations and billionaires paid their reasonable share of taxes an adequate universal basic program could become a reality that most Americans could benefit from (Wignaraja & Horvath, 2020). A federal job guarantee could provide every citizen with a legal right to employment especially on projects and jobs in neglected communities that are dependent on human-to-human interaction or cooperation such as education, child and elder care, arts and culture, infrastructure, environmental preservation, etc (jobguaranteenow.org). With more than 40% of Americans earning less than \$15 per hour, and another 40% percent not being able to afford a \$400 emergency (jobguaranteenow.org) the need for financial and job stability is essential not just because of automation. With a job guarantee, the desperation and feeling of uncertainty for obtaining employment to make ends meet will be a thing of the past (jobguaranteenow.org). Workers will be liberated from unwanted jobs that have discrimination, harassment, wage theft, or other work exploitative tactics and will no longer need to fear leaving due to economic reliance on said job (jobguaranteenow.org). Many of these proposed solutions may be able to mitigate the effects of automation, however, would such proposed solutions be accepted by most individuals. Participants were asked "According to the PwC by the mid-2030s one-third of all jobs could face the risk of being automated away (pwc.co.uk). Should regulations and new government assistance programs be introduced to combat wealth inequality and unemployment caused by automation in the near future?". Surprisingly 82% of participants responded with yes, regulations and new government assistance programs should be introduced to combat wealth inequality and unemployment caused by automation, only 7% of participants believed the opposite, the rest were uncertain. Established in 1938 as a part of the Fair Labor Standards Act, the federal minimum wage guarantees fair compensation for work to ensure a decent quality of life (Cooper, 2019).

However, since the end of the 1960s, the federal government has not reevaluated the minimum wage to meet income needs for an adequate standard of living all whilst inflation increases reducing the buying power of minimum wage workers (Cooper, 2019). This increase in inflation means some workers must work more hours and possibly other jobs to achieve a viable standard of living that could be considered the bare minimum (Cooper, 2019). Increasing the minimum wage to \$15 by 2024 would directly or indirectly lift the wages of 39.7 million workers, 26% of the workforce, and would also positively impact people of color (Cooper, 2019). This wage increase would also generate \$118 billion in additional wages, that would benefit workers and their communities, stimulating the economy, and promoting business activity and job growth (Cooper, 2019). Over a fifth of families in the US cannot afford to pay all their monthly bills (Pizzigati, 2018). More than one-fourth of families skip medical care because of the expenses associated with basic care (Pizzigati, 2018). 40% cannot cover an expense of \$400 without having to borrow cash or sell their personal property (Pizzigati, 2018). With 40% of annual household income being less than \$40,000, millions of Americans do not have much in savings (Pizzigati, 2018). In contrast, some of the top-earning households in the US take in more than \$40,000 per day, with half of the CEOs in the US making over \$336,538 per week (Pizzigati, 2018). During the 1940s Franklin Roosevelt proposed a federal income tax on all annual income over \$25,000, approximately \$375,000 in today's money (Pizzigati, 2018). However, Congress settled with a 94% tax rate on all income over \$200,000, the top rate would stay at around 90% for the next 20 years (Pizzigati, 2018). Around the mid-1960s top rate began to fall to 70%, then to 50% in 1982, and 28% in 1988, with the current top rate set at 37% for direct income and 20% for investments (Pizzigati, 2018). With the continuous growing inequality is imperative to introduce a maximum wage or maximum net worth to the individual along with an increase of the corporate tax rate, especially on corporations that solely or primarily utilize automated technologies for labor demands and production.

The Positive effects of Automated Vehicle Technology

In 2019, 36,096 people died in motor vehicle accidents, research suggests that these accidents are due to human error (nhtsa.gov,2021). With the rise of driver assistance technology accidents could potentially be mitigated saving thousands of lives (nhtsa.gov,2021). These assistance technologies can keep both the driver and pedestrians safe and may reduce accidents. These technologies include lane departure, lane keeping, backup camera, blind-spot detection, automatic emergency braking for pedestrians, and crash imminent braking, forward collision, and 911 notification (nhtsa.gov,2021). These assistance technologies are important additions to road safety that can keep vehicle drivers and passengers safe as well as pedestrians and other drivers out on the road. The continuous evolution of automotive technology has brought along self-driving vehicles to the conversation. Self-driving vehicles have the potential to radically transform the transportation industry and personal use. However, the question is whether this new technology is safe. Consider the fact the more than 35,000 people die yearly from vehicle-related accidents. Automated vehicles (AV) are much safer than humans, in fact, 94% of severe crashes are directly attributed to human error (nhtsa.gov,2021). Automated vehicles remove human error which will help protect everyone on the road and will save thousands of lives in the long run, so in short, their safety is greater than that of a human, as humans are prone to distractions. Companies must also ensure their automated vehicles are up to Federal Motor Vehicle Safety Standards and must rigorously test them before they get approved for road use. 89% of survey participants have heard of automated vehicle technologies, demonstrating that the average participant has some awareness to be able to think critically about automated vehicles. Participants were asked how safe they would feel sharing the road with an automated vehicle, 43% of participants feel somewhat safe with the possibility of sharing the road with automated vehicles, however, 32% leaned toward feeling somewhat unsafe to very unsafe, in another question regarding how regulated automated vehicle should be, 57% of participants believed automated vehicles should be very regulated, with 32% believing they should be

somewhat regulated. This shows that participants have grand expectations for automated vehicle safety, and rightfully so, but it should be noted that these vehicles will be much safer than any human being and will be a revolutionary technology that positively impacts society, it is best to look at the benefits rather than the possibility of failure as the positives outweigh the negatives. With approximately 49 million Americans over the age of 65 and 53 million who have some form of disability (nhtsa.gov,2021), self-driving vehicles can provide many benefits to elderly and disabled individuals who otherwise could not drive a vehicle (nhtsa.gov,2021). The mobility options provided by automated vehicles to people who need special accommodations can drastically help them live independently or aid them in connecting to opportunities that will greatly benefit them such as jobs, training, education (nhtsa.gov,2021). Automated vehicles could be beneficial for the economy and may also have some societal benefits (nhtsa.gov,2021). In 2010 motor vehicle accidents cost \$242 billion (about \$740 per person in the US) in damages, with \$57.6 billion (about \$180 per person in the US) (about \$180 per person in the US) in lost work productivity and \$594 billion (about \$1,800 per person in the US) (about \$1,800 per person in the US) from loss of life and injury (nhtsa.gov,2021). In 2014 approximately 6.9 billion hours (7,871 centuries) were spent in traffic delays, cutting time from productivity such as work or being with family whilst increasing the cost of fuel and harmful emissions (nhtsa.gov,2021). Traffic flow could be improved by reducing traffic congestion from accidents and bad drivers, freeing up as much as 50 minutes each day if automated vehicles are to be adopted in the near future(nhtsa.gov,2021).

Necessary Ethical Framework for the Application of Facial Recognition Technology

Facial recognition technologies have been on the rise and can commonly be seen in smartphones, social media platforms, or while shopping in stores. Facial recognition is also being used for other more important applications such as finding missing people and identifying criminals (Kufilinski, 2019). In 2009, approximately 30 million surveillance cameras were in use

in the US, with an average of 4 billion hours (about 460,000 years) of recording per week having facial recognition detection integrated within, since then that number has continued to grow (Kufilinski, 2019). The rise of this type of surveillance might increase the probability of finding a missing person, the main starting point to find missing people is to track the movement of the missing person close to where they disappeared, and with limited time, the probability of finding said person diminishes (Kufilinski, 2019). The combination of surveillance cameras and facial recognition detection could increase the probability of finding a missing person by tracing the last appearance of the person to derive a close location of where they might be (Kufilinski, 2019). Facial recognition detection may also be able to effectively identify wanted criminals that may pose an immediate threat to public safety (Kufilinski, 2019). However, it is not without drawbacks some risks involved with this technology include accuracy, data storage, and constantly surveilling unsuspecting citizens without their consent (Kufilinski, 2019). The accuracy of a facial recognition system must be near 100% in order to avoid discrimination towards people of color or women, as systems can present errors of up to 35% for women of color (Kufilinski, 2019). If a person is deemed suspicious of criminal activity, the facial recognition systems may run a scan through databases to search for a potential criminal record and may lead to unwanted and unnecessary confrontations with law enforcement solely based on assumptions (Kufilinski, 2019). Since the USA PATRIOT Act of 2001, government surveillance power has been drastically increased (aclu.org). The government gained the right to conduct searches of third-party records without consent or knowledge from the individual in question, the ability to search private property without notice to the property owner, and expanded on an exception to the Fourth Amendment that was created for collecting foreign intelligence and for spying in order to obtain addressing information regarding origin and destination of communications (aclu.org). Some of the changes caused by the Patriot Act were part of an enduring law enforcement ambition that had previously been rejected by Congress multiple times for having the potential to violate the Fourth, First, and Fifth amendments

(aclu.org). The power granted to the government in terms of surveillance of Americans brings up the question, should the government and law enforcement be allowed to utilize facial recognition technologies. When asked "Should law enforcement and governing bodies have access to facial recognition technologies?" 54% believe law enforcement and governing bodies should have access to facial recognition technologies, 21% of participants believe law enforcement and governing bodies should not have access to facial recognition technologies, 25% were unsure. When asked "Is it possible that facial recognition technologies violate our right to privacy?" 64% of participants believe that facial recognition technologies may violate our right to privacy, 22% of participants do not believe that facial recognition technologies may violate our right to privacy, 14% were uncertain. This means that at least 50% of participants believe that the government and law enforcement should use facial recognition detection although it violates our right to privacy, with this, it can be inferred that full implementation of facial recognition technology by the government and law enforcement requires an ethical framework. The entity whether a government agency, law enforcement, or other organizations must obtain voluntary written consent from any individual being enrolled into facial recognition database, the individual can at any time withdraw consent (ntia.doc.gov). The entity utilizing facial recognition technology cannot use it to determine race, religion, sex, origin, age, or disability (ntia.doc.gov). The sharing of any information obtained from the use of facial recognition technology cannot be shared or sold unless consent to do so is granted by the informed individual in question (ntia.doc.gov). All individuals must have full access to all information gathered by facial recognition technology including faceprint and may correct, exempt, or delete any information they see fit (ntia.doc.gov). If an entity allows public access to data regarding faceprint and other biometric information, they must implement high measures of security to protect individuals by degrading faceprint images and not allowing automated access to databases containing sensitive information (ntia.doc.gov). When using facial recognition to authenticate the identity of individuals, the entity must always provide a

reasonable alternative form for authentication (ntia.doc.gov). Extra precaution must be taken when dealing with biometric, faceprint, or other information gathered by facial recognition of underage individuals, verifiable parental consent is necessary (ntia.doc.gov). The entity must also implement a system that measures its compliance with all the listed principles for an ethical framework, all actions must be recorded with relevance to location, date, time, and verification of consent along with notifying individuals in the vicinity of a facial recognition system in use (ntia.doc.gov). The accuracy of the algorithm performing facial recognition operations must be evaluated for accuracy and results must be made public (ntia.doc.gov). Finally, the entity must be fully transparent with its policies and must publicize what is done with collected data, how long is data kept, and how or what entities utilize said data (ntia.doc.gov). Together this framework will allow the use of facial recognition technologies for societal benefit while simultaneously protecting privacy and addressing the concerns of all individuals.

Conclusion

Automated technologies are central to the development of society, it has the power to transform the economy and every sector of labor. It can reshape our transportation industry saving countless hours from traffic problems while providing driving assistance to drivers for safer roads. It can allow some independence and transportation aid to elderly and disabled individuals connecting them to employment, training, or education opportunities. Facial recognition can prove useful in finding missing people or identifying criminals to stop potential threats. However, not everything is without side effects, the automation of labor may lead to mass unemployment requiring assistance programs to get individuals back on track. Assistance programs such as universal basic income, guaranteed jobs, and an increase of the minimum wage are essential and are the correct measures that will lighten or eliminate the issues resulting from automation. Facial recognition technology requires an ethical framework if it is to be widely implemented especially by government agencies and law enforcement, as the privacy of the individual is of high importance. The accuracy of the facial recognition system is crucial as the potential for errors can

lead to unnecessary interactions and even discrimination. When asked "Overall how trustworthy do you believe automated technologies are?" from a scale of 1-10, 1 being not at all trustworthy, 10 being very trustworthy, 68% of participants overall found automated technologies to be untrustworthy, or very untrustworthy, 18% of participants overall found automated technologies to be neutral, or somewhat trustworthy, only 14% of participants overall found automated technologies to be trustworthy, or very trustworthy. Therefore, it is pivotal to develop accurate and transparent automated technologies as one incident could ruin its reputation and public trust.

When asked "Overall how impactful do you believe automated technologies are to society?" from a scale of 1-10, 1 being not at all impactful, 10 being very impactful, 36% of participants overall found automated technologies to be impactful, or very impactful to society, 36% of participants overall found automated technologies to be neutral, or somewhat impactful to society, only 28% of participants overall found automated technologies to be not at all, or not very impactful to society. When asked "Overall how impactful do you believe automated technologies are to your life?" from a scale of 1-10, 1 being not at all impactful, 10 being very impactful, 54% of participants overall found automated technologies to be impactful, or very impactful to their life 25% of participants overall found automated technologies to be neutral, or somewhat impactful to their life 21% of participants overall found automated technologies to be not at all, or not very impactful to their life. Participants were also asked (Question 7) "Do you believe automated technology is important?", 71% of participants believe automated technology is important, 25% of participants responded with not knowing whether or not automated technology is important, 4% of participants believe automated technology is not important. With this in mind, it can be inferred that participants may see automated technologies as somewhat significant, and may not believe in or even know the influence both negative and positive that automated technology has on society and their own life, but may realize its importance to some things in society. Technology has the power to transform not only our lives, but society and it is up to us to address and conquer the issues stemming from it.

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