THE TRUTH ABOUT AI AND
THE FUTURE OF HUMANITY

EVIL ROBOTS, KILLER COMPUTERS, AND OTHER MYTHS

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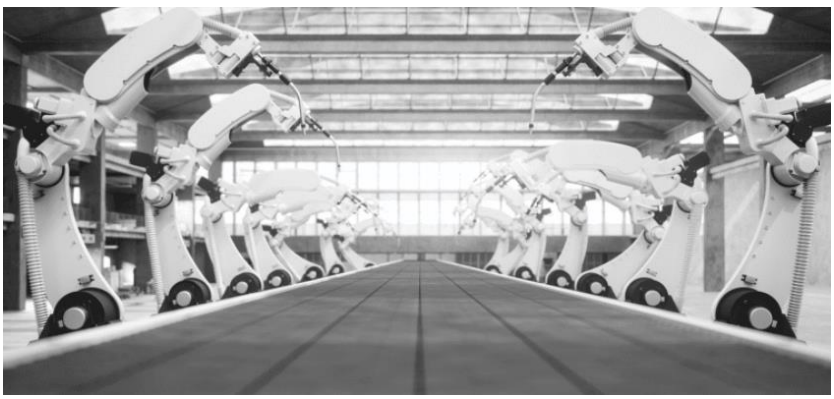

Figure 4.1 Robotic arms on an assembly line.

One fear about AI that might even trump fears about killer robots is the fear that AI will take away jobs. Losing a job is one of the worst things that can happen to a person. It can precipitate a personal crisis, and when people look back on their lives, job loss is often among their most negative experiences.

People losing jobs is also a societal issue. High unemployment, in general, is a destabilizing force. When capitalistic forces destroy an entire industry segment (e.g., typewriters), this creates displaced workers who need training to find new jobs. Politicians argue back and forth about the best way to provide retraining and debate on how much, if any, security net should be put in place to support displaced workers and help them get back to work. A McKinsey report points out that, while there may be plenty of jobs in 2030, it is likely that 15 percent of the workforce will need some sort of retraining.[1] In the US Congress, legislators have introduced several bills proposing funding for various forms of retraining.

People fear AI more than other types of automation because they envision human-like robots replacing people in many kinds of jobs. Not only are they able to work 24/7, but robots also do not get sick, do not need vacations, and do not join unions. Most importantly, they do not even get paid!

If AGI systems were created, they would be able to read manuals, take classes, and learn to do almost every job. Worse, they could read thousands of books in the time it takes a person to read one. If this happened, nearly every job would be at risk. Fortunately, AI systems cannot, and will not, do this, because they do not understand natural language.

Although the fear of AGI robots is groundless and we do not have to worry about AGI systems threatening every job, many kinds of jobs are vulnerable to being lost to advances in narrow AI.

AUTOMATION OVER THE LAST TWO HUNDRED YEARS

While technology automation has improved our quality of life and created jobs, automation has been taking away jobs for over two

centuries, and there have always been detractors. The Luddite movement, which began in the early 1800s, organized textile workers who objected to the loss of jobs in the textile industry due to automation. The Luddites destroyed automation equipment to protest job-destroying machines.

In an essay he wrote for *Time* magazine, Warren BuRett[2] looked way back in history to 1776, when farms employed 80 percent of workers. He commented that today, that number is 2 percent as a result of technological progress such as tractors, planters, cotton gins, combines, fertilizer, and irrigation. He notes that if people had known this in 1776, they would have asked how all those unemployed farmers would find work. We can imagine that futurists circa 1776 might have taken the position that automation would create many more jobs than were lost and that they would be higher-paying, more exciting jobs. But in 1776, BuRet added, no one would have believed them. This cycle has repeated over and over as farm jobs moved to factory jobs and factory jobs moved to knowledge-based jobs.

Futurist Ray Kurzweil[3] noted that, as recently as 1900, 66 percent of all jobs were on farms or in factories. By 2015, that number was down to 16 percent. So, half of all the jobs available in 1900 no longer exist today. Yet in 2019 in the US, unemployment was near an all-time low. Each day, new and exciting jobs emerge in the computer industry, the automotive industry, and many other industries that would have seemed like science fiction in 1900. Moreover, according to Kurzweil, we have gone from 24 million available jobs in 1900 to 140 million jobs in the US in 2019, and the new jobs are paying eleven times higher wages than the jobs in 1900, even after adjusting for inflation. We produce far more food than we did in 1776 or 1900, but automation has dramatically lowered the percentage of jobs in agriculture.

However, agriculture jobs are not the only ones lost to technology. In the first two decades of the current century, we've seen automation displace large numbers of factory workers.[4] Word processors have replaced many secretaries, tax preparation software has reduced the need for accountants, automated toll booths have replaced human toll collectors, internet travel sites have displaced many travel agents, e-commerce (especially Amazon) is taking a toll on brick-and-mortar retail,[5] and self-checkout technology is threatening the 3.6 million US cashier jobs.[6]

People who have worked their whole lives at one job only to see it replaced by automation suRer immensely. Losing your livelihood to automation is a terrible thing. Many textile workers who lost their jobs to automation had difficulty finding other jobs and settled for lower-paying, less-satisfying jobs. Automation also has been a primary cause of the widening wealth gap between the rich and the poor. These are all serious social issues, and solving them is above my pay grade.

However, so far technology has been a job creator. Computer-related jobs employed 4.6 million Americans in 2019. None of these jobs were possible before the invention of computers. People feared that ATMs would cannibalize bank teller jobs. Surprisingly, ATM technology increased the number of bank teller positions. While ATMs reduced the number of tellers per branch, more branches opened because ATMs reduced the operating costs in each branch.[7] A Deloitte study[8] found that from 2001 to 2015 in the UK, technology automation had displaced 800,000 workers but had created 3.5 million new jobs. AI is expected to add over $13 trillion to the global economy by 2030.[9]

In some industries, technology is creating and destroying jobs at the same time. Uber and Lyft are displacing jobs in the taxi industry but increasing the number of people hiring rides, thus increasing

the demand for drivers. That said, if driverless car technology ever matures, those same drivers may be displaced.

AI is a form of automation. The question is to what degree AI will cause job loss. Is it just another form of automation that will create some jobs and destroy others? Will AI create more jobs than it destroys, or will it destroy so many jobs that unemployment will rise and remain permanently high?

HOW WILL AI AFFECT JOBS?

There will be several new job categories created because of AI. For example, the research and advisory firm Cognilytica forecasted in 2019 that new spending on services that label data for supervised learning would reach $1 billion by 2023.[10]

You can find many job creation statistics related to AI in the *2019 AI Index Report* put out by Stanford University.[11] In the US, the share of AI-related jobs grew from 0.3 percent of all jobs in 2012 to 0.8 percent of all jobs in 2018. Investment in AI start-ups increased from $1.3 billion in 2010 to $40.4 billion in 2019. Globally, autonomous vehicles received the most funding in 2019, with $7.7 billion invested, followed by medical research, facial recognition, video content analysis, and fraud detection.

Some categories of jobs are certainly at risk from narrow AI technology. The biggest impact might occur if autonomous vehicle technology matures to the point where it can have a widespread rollout. Such a rollout would impact several job categories, including truck drivers,[12] taxi and bus drivers, and Uber and Lyft drivers. However, this is likely to remain an unrealized concern for the next twenty to forty years,[13] giving existing workers time to retire and new workers the opportunity to choose other career paths.

Robert Gordon, professor of social sciences at Northwestern University, said that, in the 250 years since the first industrial revolution, there has never been a technology that caused mass unemployment, and there is no reason to believe AI will change this pattern.[14]

According to James Manyika,[15] the chairman of the McKinsey Global Institute (MGI), MGI has produced several reports on the impact of AI and automation in general on work and wages. They analyzed the eighteen types of cognitive, sensory, and motor skills needed for over two thousand job descriptions and eight hundred occupations. The MGI team analyzed which skills are most susceptible to AI automation, and their reports project which jobs will disappear over the next fifteen years. They found that 50 percent of the activity types will be automatable, which is a scary number. However, that does not translate into a 50 percent job loss, because only 10 percent of occupations are composed of more than 90 percent automatable tasks. Although parts of a certain job might be replaced by AI, that other 90 percent of the job will still need to be done by a human being; that means that, although your job duties might change, your job is likely safe (at least from AI). MGI compared this level of job loss with two hundred years of job declines in the US and found that the level projected is very much in line with previous trends.

Another question studied by MGI is how many jobs the economy will create. They noted that, in every ten-year period in US history, 8–9 percent of current jobs did not exist in the prior ten-year period. This means that over the fifteen-year period in which 10 percent of jobs are lost, 12–14 percent will be created. So, there will be a net gain in job creation.

In 2017, IT industry analyst Gartner Group predicted that, by 2020, AI would have created 2.3 million jobs while eliminating only 1.8 million jobs.[16] Rather than replacing humans entirely, Gartner

argues, AI will augment existing employment and thereby improve productivity. Along the same lines, a 2018 study by consulting firm McKinsey[17] polled twenty thousand AI-aware C-suite executives in three thousand large companies in ten countries. They said that, for the most part, their primary goal in using AI was not to reduce the number of workers. Instead, it was to drive initiatives that would be more likely to increase the number of available jobs.

Some analysts disagree, however, that AI is just another form of automation. MIT researchers Erik Brynjolfsson and Andrew McAfee, in their book *Me Second Machine Age*, argued that the job loss due to AI will be far greater than the job loss seen in the past due to other revolutionary forms of automation. They point to advances in language capabilities in systems like Siri, Google Translate, and the Watson DeepQA computer that beat the *Jeopardy!* champions. Based on the fast-moving progress to date, they assume that computers will continue to get smarter at a rapid pace and take over more and more jobs. However, there is a cap on the intelligence level that these systems can achieve because they are all narrow AI systems that cannot progress to AGI. Therefore, I believe that the pattern of job losses due to narrow AI is unlikely to diverge from the pattern of job losses due to technology automation in general over the last fifty years.

It seems to be in vogue these days to blame all automation job losses on AI. For example, *Vox Magazine* asked 2020 US presidential candidate Bernie Sanders if technology companies should be responsible for the jobs they eliminate. He responded by saying, "I will tell corporate America that AI and robotics are not going to be used just to throw workers out on the street."[18]

The biggest technology driver of job loss today is not AI. Conventional software that uses explicit coding of instructions and rules, such as e-commerce, rideshare software, and robotics, destroys

far more jobs than AI systems. E-commerce is devastating brick-and-mortar stores but uses conventional software, not AI. Conventional rideshare software like Uber and Lyft is displacing taxi drivers (although, again, this may be oRset by the increase in customers). The robots that take jobs in factories and warehouses use a sixty-year-old conventional software technique known as *dynamic programming*; researchers are studying how to replace this tedious conventional programming with AI-based reinforcement learning to make this programming less expensive and more capable, but these advances are happening relatively slowly. Conversational customer service agents that replace human agents are improvements on the conventionally programmed interactive voice response systems and knowledge-based search engines that first started replacing human agents forty years ago and are now ubiquitous, but here, too, AI is providing incremental improvement rather than causing a big-bang job loss. Robotic process automation (RPA) is a group of technologies used to eliminate manual eRort in repetitive business process workflows. Because it has the word *robot* in the title, it is easily confused with intelligent robots. RPA, which has gained momentum over the last twenty years, started with an older, conventional software technology known as *screen scraping*. It is a set of conventionally programmed tools that have been augmented with AI-based features such as recognition of voice commands, but it is not AI—and certainly not AGI.

These conventional software technologies have all been responsible for gradual job loss. However, they have not impacted the low US unemployment rate of the five- to ten-year period before the onset of the COVID-19 virus. AI will continue to marginally enhance these technologies, but there is no reason to believe it will change the long-term trend of no net job loss due to automation.

TRAINING IS THE KEY

Jobs will be lost and jobs will be gained as AI increases its presence, but no more than any previous form of automation. People have been debating for centuries whether more jobs are created or destroyed by technology. No one disagrees that job displacement creates significant human suRering, and few disagree with the need for job retraining programs to move displaced workers into another field. To fund retraining, Bill Gates has called for a tax to be applied when a robot replaces a human worker with the proceeds used to fund retraining activities.[19] Our society and government need to address the issue of displaced workers with job training and a safety net.

People worry that AI will take all their jobs. If AGI were possible, this would be a legitimate concern, because AGI systems would threaten nearly every job. However, it is highly unlikely that we will ever develop AGI systems. Narrow AI systems, on the other hand, will take some jobs and will create others. Most likely, the impact on jobs will be similar to that of earlier technologies—not only computers, the internet, and e-commerce, but also the spinning wheel and the steam engine. Still, the loss of a job can be a devastating life experience, so we need to find a way to retrain people who have lost jobs to technology.