The Impact of Artificial Intelligence on the Industrial World

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Introduction

In today's world, artificial intelligence is a rapidly advancing industry that has changed the face of the twenty-first century and has the potential to revolutionize traditional and modern systems to transform how the world functions. It is evident that as time passes, newer and newer technologies will be developed by the help of venture capitalist companies and giant enterprises that will incorporate artificial intelligence in a diverse range of instruments used all around the globe. According to Shanhong Liu (Liu, 2020), a research expert covering the global software industry, the global artificial intelligence and machine learning market is expected to grow at a rampant rate of fifty-four percent year-on-year. This extensive hike in market growth has helped the artificial intelligence industry to reach a forecast size of over twenty-two billion U.S. dollars in the year 2020. This evaluation is just the tip of the iceberg. The market demand is anticipated to rise to such an extent that, by the year 2025, the artificial intelligence market will become a whopping hundred and ninety billion U.S. dollars industry.

Being such a robust industry, with the capability to influence and improve other industries, artificial intelligence has managed to make its way into the industrial arena. From being the brainchild of many philosophers and neuroscientists throughout centuries to being able to break the German Enigma code during World War II to being implemented in a handheld device used to perform day-to-day activities, artificial intelligence has come a long way. From self-driving cars to surgical robots, artificial intelligence has now been infused into every machinery and equipment to improve productivity with minimum human assistance. These implementations of artificial intelligence in the modern industrial world raise a few critical questions, which this re-

search paper aims to answer. Following are the questions that this research paper intends to find answers to:

1. How does Artificial Intelligence affect autonomous industries?
2. How does Artificial Intelligence affect non-autonomous industries especially the health-care industry?
3. What are the key reasons for companies to replace human workers with machines?
4. What happens to the jobs in these fields, and what measures can be taken to avoid mass unemployment?

This research dives deep into the implementations of artificial intelligence and its effects on autonomous and non-autonomous industries. It talks about all the existing technologies and technologies in development that might change the face of these industries completely. It is essential to understand these changes because more than sixty-seven percent of modern enterprises will switch to some form of embedded artificial intelligence in their standard business processes (Chiu and Malhotra, 2018). This switch will lead to a significant chunk of jobs being taken away from industrial workers. This research paper also talks about what steps the government and businesses take to tackle the mass unemployment crisis.

This paper examines what the effects of artificial intelligence will be on industries by conducting two sets of interviews. The two interviews consist of two different groups of participants which include students and professionals in the field of machine learning and also employees working in the non-autonomous sector like restaurant workers and transportation service employees.

Methodology

Participants

For the purpose of this study, two different sets of interviews were conducted. The set one participants consisted of four people. Two second-year students from the University of Cincinnati and one third-year student from an Indian institute, all studying machine learning. The last person that was interviewed was a student who interned at an extremely renowned organization that is responsible for science and technology related to air and space. The second set consisted of three people that included one drive-thru worker working at a popular fast-food chain, a barista at a local coffeehouse, and a local cab driver. Set one participants were recruited by accepting a formal request via email and were further interviewed via video call. The second set of participants were chosen at random by asking to participate in a short interview.

Material

Informed consent forms/emails were used which contained information regarding procedures, benefits, and risks of participating, an explanation and purpose of the study, and contact information of the researcher. The materials for this study included two self-composed sets of interview questions (refer to appendices A and B). The interview questions included seven or eight open-ended questions with a few multiple-choice questions and subquestions depending upon the response. The set one participants were asked more technical questions concerning industrial change on a larger scale. The set two participants were asked more practical questions to analyze how everyday activities might be affected due to automatization. The set two questionnaire also included interval scale questions in order to get a quick response which also helped put things in perspective for further questioning.

Design and Procedure

The research design of this study was descriptive and correlational as it studied the connection between artificial intelligence and the industrial world. The set one participants were interviewed by zoom video calling service and the meeting date was mutually decided with proper communication and cooperation from both sides. Every set one participant was sent a consent form via e-mail. The set two participants were given a choice to take the interview either in person off office hours or virtually by a video call or a regular phone call. A documented consent form was given to set two participants. All the participants were explained the directions and procedure of the interview before the interview began. No personal or work-related questions were asked to any participants of the study. Every participant had the choice to deny answering a particular question if they didn't want to answer it. The participant also had the right to cease participation at any time during the interview. After the interview was completed, the participants were briefly explained about artificial intelligence and its effect on the industrial environment. The participants were then asked if they had any further questions and thanked for their participation.

Findings

General Perception of Artificial Intelligence

The purpose of this research was to analyze the influence of artificial intelligence on the modern industrial world. The interview made it very clear that artificial intelligence affects the industrial world and has the potential to revolutionize how industries function at present. The first set of questions aimed towards getting a professional standpoint on this topic. All the partic-

ipants in the first set believed that artificial intelligence software growth will approximately double in the coming years creating pathways for machine learning technology to be implemented across diverse industries in a much optimum way possible. When the participants were asked about the most common applications of artificial intelligence, every participant answered virtual assistants, smart home products like maintenance robots, Tesla auto-drive technology, or transactional AI's. The applications of artificial intelligence are not the most powerful but all of them use advanced machine learning systems. For example, Amazon's transactional AI uses refined algorithms to predict what a customer is interested in purchasing based on his or her online behavior and activity. A participant also added that even the smallest implementations of AI use the most advanced pattern sensing technology to learn and produce accurate results. These responses also confirm the fact that artificial intelligence is still utilized on a smaller scale and has a long way to go before it can be used in large scale industrial technology.

Affect of Artificial Intelligence on Autonomous Industries

Autonomous industries will get a massive head start compared to other industries. The automotive industry specifically will benefit the most from the artificial intelligence boost to control autonomous systems. This argument can be supported by the example given by a couple of participants about companies like Waymo and Tesla that have developed cars with built-in self-driving technology that use artificial intelligence to sense the environment and control the navigation system. They also added that this technology still requires some manual assistance and isn't completely reliable to operate on its own. Nevertheless, it is a remarkable achievement

for the autonomous industry. With more tools and updated technology, these vehicles would be ready to roll out with maximum precision and safety.

When the participants were further asked regarding their opinions on to what extent artificial intelligence would be used in autonomous technologies, majority of the set one members came up with the answer "Autonomous Weaponry". They further added that as seen in countless science fiction movies, autonomous weapons or autonomous soldier suits can definitely be one of the implementations of Artificial Intelligence in the future. All of them had a common opinion on autonomous weapons, they agreed to the fact that autonomous weapons can be an implementation but probably a lethal one. Majority of today's entrepreneurs and politicians are afraid that if this is not kept under control and regulation it might cause political instability (Haner and Gracia, 2019). Considering all the above arguments, it is evident that autonomous industries will benefit the most from the artificial intelligence boost in the coming years.

Affect of Artificial Intelligence on Non-autonomous and healthcare Industry

According to all the participants, the non-autonomous industry will be severely affected because of the utilization of artificial intelligence in regular routine work. All the members of the study including set one and set two believes that the non-autonomous industry will be affected the most because of the human workers being replaced with autonomous technology. This can be supported by the previous analysis about self-driving technology. The set one participants said that autonomous vehicles for transportation and trucking purposes will be developed in the near future that will help shipments to be delivered without any human assistance. On a smaller scale, taxis, busses, or any public transportation services will be completely automated. One of the set

two participants being a cab driver added that this technology can end up shattering the presently non-autonomous public transportation service industry like his and other industries like logistics and trucking that are dependent on drivers as a source of revenue.

Following this, a set two participant working in a local fast-food chain talked about how fast-food chains like McDonald's have already started using machines with equipped automated ordering machines and how that can be a threat to manual labor in the restaurant industry. Two of the set two participants working in the restaurant industry shared their personal opinions about how technology can take over but will never match the level of punctuality, hospitableness, and attentiveness of a real person. The set one participants also pointed out that the boost of artificial intelligence will also affect factory line workers because of the development of autonomous software bots that are programmed to perform routine work needed in most processes. All of these factors lead to a countless number of people being unemployed.

The healthcare industry will also undergo advancements due to the growth of technology. All the set one participants referred to a similar source which was a video of a machine practicing surgery on a grape. The video broke the internet in the form of a meme when surgeons at the Edward Hospital in the US had actually performed the surgery. 'Da Vinci Surgical System,' the complex machine performed the surgery on the grape by gently peeling off its skin and then stitching it back on. To sum up, the boost in artificial intelligence will have a negative effect on some sectors of the non-autonomous industries. While the industry will profit, the workers replaced by machines will be left jobless. On the other hand, the healthcare industry will undergo some positive advancements with newer technology.

Major reasons for companies to replace human workers with machines

According to set one participants, there are several reasons for companies to replace human labor with machines. The main reason for this is, machines are a one-time investment compared to their human counterparts who are employed on a daily or annual wage basis. The company can save a fortune by replacing dozens of workers with just a single machine. This means the company no longer has to give salaries, bonuses, and health benefits. The machine might cost a pretty penny initially, but once it starts operating, the company simply has to pay for its servicing once in a while. The return on investment of a machine is much higher compared to an average human worker. Moreover, machines are capable of rapidly managing routine tasks with consistent focus and extreme strength, and speed beyond human capabilities. The participants also added that humans are bound to make mistakes and during tedious tasks human errors are common. Thus, there is no doubt that more and more companies will be interested to invest in robots that excel at managing these tasks with minimal errors possible. Lastly, machines are capable of working twenty-four hours, seven days a week without breaking down or malfunctioning. There are endless reasons as to why machines are better than humans. Therefore, in the long run, companies will certainly appeal to robots instead of manual labour.

Measures to avoid Mass Unemployment

All the set one participants agree that avoiding mass unemployment is going to be a difficult task. One of them suggested that the easiest solution to avoid this disaster would be to introduce intermediary levels. For example, rather than immediately replacing factory line workers with machines, engineers can find a way to develop wearable robotic vests. This ensures that for

every vest manufactured, one less human worker losses his daily wage job and at the same time, a technological advantage is achieved over just manual work. Although, a downside to this solution is workers would be required to have information about the new technology being installed and its functioning. Thus, either regular workers would be forced to learn about the new machinery, or the company might ultimately just resort to hiring professionals.

The set one participants also added that, although factory line workers might end up losing jobs, other job opportunities might open up like quality assurance inspectors for machines and service engineers. While on the other hand, the set one members agreed that industries like public transportation and trucking would be massively affected and there might be less to no alternatives regarding this crisis. In the restaurant industry, different fast-food chains might have different opinions on whether machines are better than their human counterparts as discussed earlier by set two participants. To conclude, all the participants agreed to the fact that when the day comes, all the industries will be responsible to come up with unique strategies to avoid mass unemployment.

Discussion

The findings of the research show that artificial intelligence is a booming industry in itself and has the capability to influence other industries and help revolutionize how they function. Currently, businesses in divisions such as automotive, manufacturing, mining, and other industries, have been remarkably effective at using artificially intelligent technologies to deliver exceptional results, safety and to achieve sustainability. The automotive enterprises especially are expected to be one of the biggest beneficiaries of autonomous technologies. Applications of arti-

ficial intelligence in the automotive industry are diverse, ranging from automating core testing functions to decrease errors and streamline processes to implement detection and decision systems that are capable of imitating fundamental human reflexes by using intelligent telematics to help address concerns regarding manual error and reaction times. This technology is a big step towards the automatization of an advanced human process with high-level complexity that requires extreme hand-eye coordination and cognizance to achieve.

Following this, artificially intelligent weapon systems have been developed that can independently search for and engage targets based on programmed constraints and descriptions. According to Dr. G.V.V. Ravikumar, in his research paper "Autonomous Technologies to Power Tomorrow's Enterprises" (Ravikumar, n.d), at present, the aforementioned technology is concentrated in a handful of powerful and wealthy countries that have the resources and capital needed to invest profoundly in advanced robotics and machine learning research. By the year 2010, the United States of America had already invested four billion U.S. dollars towards researching Autonomous Weapon Systems (AWS) with an additional eighteen billion allocated for autonomous advancement by 2020. These examples represent the autonomous spectrum which includes artificial intelligence in day-to-day lives such as voice assistants and smart vehicles to military-grade weapons. Therefore, there is no doubt that the autonomous industry will benefit the most from the growth of artificial intelligence.

The non-autonomous industries as mentioned before will be affected the most because of the development of autonomous technologies to replace human labor in regular routine jobs. Respondents believe that the major hit will be taken by the trucking industry because of how underrated and easily replaceable the occupation is. According to Dana Schneider, in her article "Five

Reasons Not to Worry about Self-Driving Trucks" (Schneider, 2019), autonomous self-driving technology will take a lot of time to be the industry standard for major companies and services to replace human workers with technology. She also talks about the government regulations and how the federal government has to get involved to make amendments to existing rules for the safe movement of autonomous, eighty thousand pound trucks across the country. On the other hand, smaller scale vehicles like taxis and shuttles are bound to be automated.

Another industry that will be heavily affected is the restaurant industry. According to the participants of this research, the restaurant industry will utilize autonomous robots like voice-activated drive-thru ordering machines, robotic french-fry makers, and automated beverage equipment. McDonald's has already started using automated ordering machines to place orders. The popular coffee-chain Starbucks is teaming up with Microsoft to experiment with new artificially intelligent technologies to generate a more personalized experience for its consumers (Pollock, 2019). Furthermore, the participants believe that machine line workers will be replaced with automated bots to complete regular daily wage work. These bots are a one-time investment for the company and hence will be more economical with a greater return on investment. Moreover, machines are capable of rapidly managing routine tasks with consistent focus and extreme strength, and speed beyond human capabilities. Machines are also capable of performing activities with maximum efficiency and precision, which no human can practically achieve. Therefore, there is no doubt that companies that focus on productivity and a higher supply and demand in the market will rely on robots for completing machine line work. All these factors point towards mass unemployment during the artificial intelligence era. At the end of the day, it will be the company's decision whether or not to replace human workers with machines. For example, participants

assume that different fast-food chains might have different opinions on whether machines are better than their human counterparts in terms of punctuality, hospitableness, and attentiveness, which are qualities of an ideal worker in the industry.

The Healthcare industry might be the only non-autonomous industry to benefit due to the development of artificially intelligent systems to assist healthcare professionals. In the research paper "The Potential for Artificial Intelligence in Healthcare" (Davenport and Kalkota, 2019), the authors mention that the most common application of traditional machine learning is precision medicine which is predicting what treatment protocols are likely to succeed on a patient based on various patient attributes and the treatment context. He further adds surgical robots were initially approved in the USA in the year 2000 that provided "superpowers" to surgeons, enhancing their ability to see, create precise and minimally invasive incisions, suture wounds, and so forth. IBM developed Watson gained significant recognition in the media because of its accuracy in precision medicine using a combination of machine learning capabilities, especially cancer diagnosis and treatment. Watson employs a combination of machine learning and Natural Language Processing (NLP) capabilities. Participants also mentioned that machines equipped with artificial intelligence are being developed that are capable of practicing surgery without any human assistance. To sum up, artificial intelligence can yield ground-breaking results in the healthcare industry.

Conclusion

The results of this research prove that artificial intelligence will have a huge impact on the industrial world. The impact will be different for different industries. Some might get a

greater advantage from automatization while some might have to face conflicts due to the same but one thing is for sure, there's no stopping artificial intelligence to unite with industries and transform the future of industrialization in the twenty-first century. Acknowledging that most of the second set participants were not familiar with the concept of artificial intelligence in real-world applications indicates to what extent is society aware of the rise of artificial intelligence and its effects.

The industries will eventually switch to robots for routine based work and let go of manual labor in the future to boost overall profit, which may cause a wide instability in the job recruitment stage. Therefore, it is a key reason why further research on this topic with a perspective of the people affected by this unemployment crisis is important in order to construct a wider understanding of all points of view that can help shape a better and stabler future for everybody.

Through this study, I was able to achieve my goal of expanding my knowledge base on the advancement of artificial intelligence in the industrial world and why does it appeal to such a broad range of companies. Widening our understanding of this topic could help us understand where artificial intelligence has put down roots and how it has prospered in industries around the globe. This understanding also helps develop necessary steps that should be taken to avoid any conflicts in the future.

Appendix A

Set 1 questionnaire

1. What are your views on the growth of artificial intelligence?
2. What are some of the common uses and applications of artificial intelligence?
3. Are you aware of the effects of artificial intelligence on autonomous industries?
    a. Yes
    b. No

    If your answer is yes, how do you think, artificial intelligence will affect autonomous industries, and to what extent? If your answer is no, why do you think so?
4. Are you aware of the effects of artificial intelligence on non-autonomous industries?
    a. Yes
    b. No

    If your answer is yes, how do you think, artificial intelligence will affect non-autonomous industries, and to what extent? If your answer is no, why do you think so?
5. Do you think artificial intelligence will make its way in the healthcare industry?
    a. Yes
    b. No

    If your answer is yes, how do you think it will affect the industry?
6. What are your views on artificial intelligence taking over regular daily wage jobs?
7. What are the major reasons for companies to replace human workers with machines?
8. What steps can be taken to avoid mass unemployment?

Appendix B

Set 2 questionnaire:

1. On a scale of 1 to 5, how familiar are you with the concept of artificial intelligence?

   _____

2. Do you think artificial intelligence will affect jobs, skills, and wages in the future?

   (Scale 1-5: Strongly disagree; Disagree; Neutral; Agree; Strongly agree)

   _____

3. How do you think artificial intelligence will affect jobs?
4. What are your views on artificial intelligence taking over jobs?
5. What do you think will be the final result of this expansion?
6. According to you, what steps can be taken to avoid this?
7. If this ever happens, what according to you should be done to compensate for all the lost jobs?

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