SKILLS BASED HIRING IN CONTEMPORARY JOB MARKET USING ARTIFICIAL INTELLIGENCE

Abstract

The job market is constantly evolving, and employers are seeking new ways to identify the most qualified candidates efficiently. In recent years, skills-based hiring has gained prominence as a methodology that focuses on an individual's demonstrated abilities and competencies rather than traditional qualifications like education or work experience. Artificial Intelligence (AI) has emerged as a powerful tool to enable skills-based hiring in the contemporary job market. This chapter explores the concept of skills-based hiring and its relevance in the current job market landscape. It examines the limitations of conventional hiring practices and highlights the benefits of adopting a skills-based approach. The integration of AI technologies into the hiring process is investigated, emphasizing its potential to transform recruitment and selection procedures. AI-based systems have the ability to analyze large volumes of data, including resumes, online portfolios, and social media profiles, to identify specific skills and match them to job requirements. Natural Language Processing (NLP) and Machine Learning (ML) algorithms can be employed to assess candidates' skills based on their digital footprints, projects, or contributions to open-source communities. Furthermore, AI can assist in creating skills-based assessments and conducting automated interviews, enabling recruiters to evaluate candidates objectively and efficiently. The chapter also addresses the potential challenges and ethical considerations associated with AI-powered skills-based hiring. Privacy concerns, algorithmic biases, and the importance of human oversight in the decision-making process are discussed, emphasizing the need for transparent and accountable AI systems. By implementing skills-based hiring practices supported by AI, organizations can potentially unlock a broader pool of talent, reduce bias in the selection process, and

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enhance overall efficiency. Job seekers, on the other hand, can showcase their skills and capabilities, regardless of their educational background or previous work experience, thereby opening doors to new opportunities.

Keywords: AI, Resume, Human Resource Management, Recruitment, Graph Theory, Machine learning, Natural language

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I. INTRODUCTION

The term "artificial intelligence" refers to a wide variety of computer programs and systems. Several explanations are presented, each of which focuses on a different one of the several "I"-related technological developments. The researchers in artificial intelligence came to this conclusion. A few examples of more specialized applications of artificial intelligence are natural language processing, speech recognition, machine vision, and expert systems. Another definition of artificial intelligence is supplied by Capgemini Consulting (2017), which describes AI as a collection of technologies that learn new information as they are exposed to it. This is yet another definition of artificial intelligence. In this context, the term "artificial intelligence" (AI) refers to a wide variety of technologies and approaches that include, but are not limited to, the following: speech recognition; natural language processing; semantic technology; biometrics; machine and deep learning; swarm intelligence; chatbots or voice bots; and other similar applications. The fields of medicine, business, education, banking, finance, law, manufacturing, transportation, and security are just few of the many fields that have found multiple applications for artificial intelligence. In spite of the fact that the hardware, software, and labour costs associated with artificial intelligence may quickly pile up, a growing number of businesses are integrating AI capabilities into their conventional products or enabling consumers to use an AI-as-a-service (AIaaS) platform. We would want to place a particular focus on this particular aspect. Individuals and businesses are now able to experiment with artificial intelligence (AI) for a broad variety of commercial objectives with the assistance of AI as a Service (AIaaS), all without having to commit to a single platform. Because these AI companies make AI and ML available through their widely used cloud platforms, they are now regarded as the most reputable AI suppliers in the business. This makes it possible for businesses to add AI capabilities to their goods without having to make significant investments in the development of software in-house. The following artificial intelligence (AI) cloud services are among the most popular ones.

1. **Amazon web services:** AWS AWS, the undeniable leader in cloud computing, provides artificial intelligence (AI) products and services geared at both consumers and businesses. Many of AWS's professional AI services expand on the AI services that are offered in its consumer offerings. Alexa, Amazon's intelligent speech server, delivers artificial intelligence into the house in the form of Amazon Echo's smart speaker. The three most important artificial intelligence services offered by Amazon Web Services (AWS) are called Lex, which is a commercial version of Alexa; Polly, which converts text to voice; and Recognition, which is an image recognition service.

2. **IBM Watson Assistant:** IBM Watson, the company's artificial intelligence (AI) cognitive service, along with AI software as a service and scale-out platforms aimed to disseminate cloud-based analytics and AI services have been the key objectives of IBM's research and development activities in recent years. These efforts have been directed primarily toward the development of IBM Watson. It has spent the past few years consolidating with other AI companies and acquiring new ones. Businesses stand to benefit in a number of different ways from having access to a dependable cloud platform.

3. **Microsoft Azure Cognitive Services:** The efforts that Microsoft is putting into artificial intelligence (AI) are aimed not only at consumers but also at enterprises and IT professionals. Cortana is a digital assistant that is bundled with Windows and is now accessible for devices that are not Windows Phones. Cortana was once only available on

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Windows Phones. In addition, the chatbot known as Zo has been programmed to mimic the voice of a young woman. Both of these features have been designed with the customer in mind. Through its Azure cloud platform, Microsoft makes available for purchase a number of different services that are based on artificial intelligence. These services include bot services, machine learning services, and cognitive services.

It is also important to note that various types of organizations have utilized AI to diverse degrees to varying degrees. We are able to place things into one of these three major categories. The first is that big tech companies have invested billions of dollars into building a wide range of I/ML tools and applications, which has propelled them to the forefront of the artificial intelligence (AI) market. These businesses include the likes of Google, Amazon, Microsoft, and the Baidu Group, which is a Chinese global technology company. The second scenario involves high-tech companies that have achieved significant levels of commercial success and are capable of deriving value from AI at the corporate level. 1151 respondents out of a total of 2395 who took part in the McKinsey global study on artificial intelligence (McKinsey & Company, 2020) said that their companies have used AI into at least one facet of their business operations. This was the response given by fifty percent of those who participated in the poll. It is possible to recognize these businesses by the fact that they have implemented AI technology into some component of their business operations. They are still fumbling their way through the process, despite the fact that it is probable that they will start generating money off of the technology in the near future. Not the least among these is the large majority of companies, who have not yet understood the benefits of and, as a result, have not implemented any technology that is connected to. In addition, it is important to point out that the most successful companies have increased their investment in AI in the wake of the COVID-19 crisis. Despite the fact that the adjustments are different depending on the industry, the AI employment roles generally adhere to the three-tiered adoption scheme that was discussed earlier in this article.

II. LABOUR MARKET AND NEW TECHNOLOGIES

There are a lot of moving parts in the link between automation and employment. Although automation causes the loss of certain jobs, it also has the potential to provide new employment opportunities at both the micro- and macroeconomic levels. In this and the next subheading, we will focus on bringing attention to two areas of employment that are related to the development of new AI technologies. That is, on the one hand, there has been a significant increase in unemployment while, on the other hand, there has been an increase in employment at the same time. People's day-to-day lives are becoming progressively easier to manage as a direct result of advances in technology. One illustration of this phenomenon is the substitution of robots and other forms of automation for human labour. Things that we once believed could only be done by people are now being accomplished by machines. Concerns have been raised on a global scale over the impact that AI will have on the global work market. Subjective assessments of the danger are quite variable.

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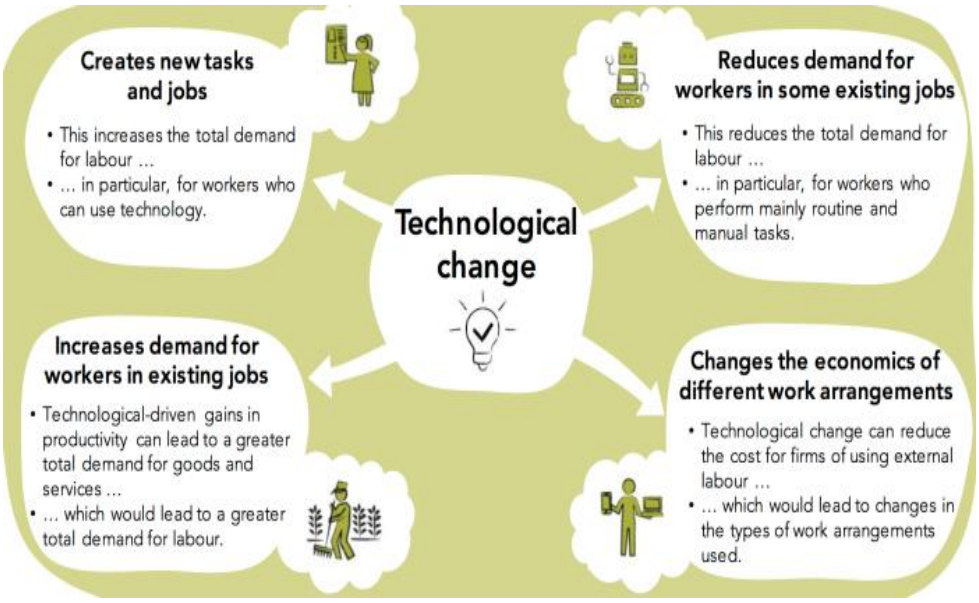

Figure 1: Labour Market and New Technologies

The OECD research recognizes just 9% of US employment as being at "high risk" owing to the prospect of automation. However, some writers and executives believe greater percentages of US jobs being at "high risk," as referred to in the work of Frey & Osborne (2017). The OECD report identifies only 9% of US jobs as being at "high risk." According to the findings of the OECD, just 9 percent of jobs in the United Kingdom are assessed to be in "high risk" categories. Their position is bolstered by the fact that a significant portion of the actions performed in the working world are repetitive and routine in nature. Their model predicts a high risk for employees in the United States who do jobs linked to transportation and logistics, as well as for those who give office and administrative support, and for those who provide physical labour in the manufacturing sector. Additionally, the model predicts a high risk for workers in the manufacturing sector who provide assistance with office and administrative chores. They believe that people with lower levels of competence would focus their efforts into non-automatable occupations, such as those requiring both creative and social intelligence, if they knew automation was coming. The implementation of public policy responses to technological shifts in the job market should centre on providing the youth of today with the tools necessary to prosper in the modern economy. The United Kingdom assembled a group of leading authorities in the subject of secondary education, and among its participants were some of the most powerful figures in the country's academic and commercial sectors. The results of the study led researchers to reach a number of conclusions, one of which was that "empathy and other interpersonal skills are as important as proficiency in English and mathematics in ensuring the employment prospects of young people." The group suggested that all students in secondary schools should have the opportunity to master these abilities, with the caveat that the process of acquiring them should begin much earlier in a student's academic career. The aforementioned information and skills "ought to be woven into the fabric of the curriculum." That is to say, everyone will need these abilities, but those who wish to work in industries less vulnerable to automation in the future will gain the most from them. Some examples of such fields include personal care providers, first responders, social workers, nutritionists, nurses, and so on.

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In an interview with The Guardian that was published in 2015, writers Martin Ford and Geoff Colvin voiced their fear that in the next decades, an increasing number of professions might be automated, and that a significant number of these new roles could not be "accessible to people with average capability, even with retraining." Even though economists point out that historically technology has had a tendency to promote rather than diminish general employment, they do concede that "we're in uncharted territory" when it comes to AI. This is because AI is still in its infancy. They assert that the great majority of American jobs are in the service industry, specifically as salesmen, cashiers, office clerks, and drivers. They claim that the vast majority of Americans are still engaged in the same kinds of jobs that were typical a century ago. Website designers, social media marketers, mobile app developers, and other comparable occupations make up a very small portion of the workforce; but, in many contexts, they need significant technical skills and expertise.

According to Bessen's argument, it is not viable to evaluate the effects of technology on the labour market based just on the rate at which a new technology is undergoing change. In order to provide an explanation for this, he poses the following question: "To what extent will AI completely automate occupations, and to what extent will it instead merely automate some, but not all of the tasks performed by an occupation?" Because there would no longer be any need for human beings, demand would be unable to influence the amount of people looking for work. In the past, a number of jobs were done away with for a variety of different causes. Many of these occupations, such as boardinghouse keepers, experienced a reduction in need as a direct result of the changes in the economy, while others, such as telegraph operators, saw a decline in need as a direct result of developments in technical innovation. On the other hand, this is not the same as the utilization of automated systems. Only in the instance of elevator operators is it possible to clearly blame automation for the decline and elimination of a job. In spite of this, the use of automation has seen a meteoric rise in popularity over the course of the past 60 years, albeit primarily in the form of partial automation.

III. INDICATIVE AREAS OF APPLICATION OF AI TECHNOLOGIES

In this part, our goal is to provide a high-level summary of the multiple ways that AI technology may be put to use in various fields of Endeavour. An overview of some of the artificial intelligence technologies, fields of usage, and industries that have been suggested by various suppliers, consultants, scientists, and specialists in the subject is presented in the following paragraphs.

For example, Capgemini Consulting (2017) outlines a series of technologies that are typically grouped together and referred to as "artificial intelligence" in the following order:

- Online chatbot that is able to communicate with humans in their native languages and provide assistance to such individuals.
- The capacity of artificial intelligence to take in human speech and decode it.
- Interactions conveyed in words and paragraphs written in appropriate Standard English format.
- Through the use of data analysis, you may contribute some context to the decision-making process.

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- It is possible to determine a person's age, emotions, and motivations based just on their physical appearance and facial expressions.
- Interpretation of the meaning contained within the information provided by visual media.
- The capacity of machines to acquire new skills without being provided with explicit instructions on how to do so.
- Using algorithms that have characteristics similar to those of the brain in order to create a computer network with the same structure and function as the human brain.
- Utilization of a great number of distinct entities, each of which plays a part in the problem's ultimate resolution. In this regard, the main fields of AI applications are the following:
- Natural Language, which includes chat and voice bots, speech recognition, and the production of natural language,
- Computer Vision and Biometrics Intelligence, which consists of biometrics, image/video analysis, and computer vision.
- An examination of the technological foundations behind machine learning, deep learning, and swarm intelligence

Recent advancements have been achieved in Data Mining, Machine Vision, Computational Statistics, and other subfields of AI. These subfields are all closely connected to Machine Learning (ML) since they focus on the development of algorithms that can automate cognitive activities. This is because, over the course of the last few decades, ML has had a spectacular surge in popularity. The advent of computers has made it possible to automate more manual labour owing to the application of machine learning technologies in mobile robotics (MR). Based on a study conducted by Capgemini in 2017 with 993 AI users, the company discovered that 49% of telecom firms, 41% of retail organizations, and 36% of financial institutions have adopted AI at scale. Immediately following these sectors at a distance are the industries of utilities (34%), insurance (31%), automotive (26%), and manufacturing (20%), respectively. More than one-third of businesses (36%), who are actively pursuing artificial intelligence (AI) efforts, are expanding the size at which they are implementing these projects. That is to say, companies are expanding their use of AI applications beyond the scope of limited pilot and test projects into more widespread usage of AI tools. These sectors are actively searching for candidates with experience in artificial intelligence (AI) to fill available roles.

The following are some examples of how artificial intelligence is now being utilized, as provided by Professor Nikolaos Bourbakis:

The use of AI is resulting in increased revenue in all types of businesses. For instance, Harley-Davidson made use of AI to hone in on a more specific audience for its advertising and to zero in on prospective customers who mirrored the characteristics of the company's most valuable customers from years gone by. The application of AI made it simpler to produce leads, and it analyzed hundreds of different characteristics to determine which approaches were successful and which were not. Because of this, the number of sales leads generated in a period of three months increased by 2,930%. Artificial intelligence is causing a change in the way that businesses operate in their day-to-day activities. The legal staff at J.P. Morgan spent tens of thousands of hours researching a wide variety of financial transactions. An artificial intelligence system is now being used to analyze commercial loan agreements,

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which was a process that previously required attorneys and loan officers to spend the equivalent of 360,000 man-hours on. In the past, people were required to do these tasks manually. The articles are analyzed by the AI system in a matter of seconds, and the mistake rate that it produces has been significantly reduced. Because of advances in technology, the number of errors that occurred when servicing loans has been considerably decreased. The majority of these errors occurred as a result of misunderstandings of the 12,000 yearly wholesale contracts.

IV. AI JOB OPPORTUNITIES IN AI AND SALARIES IN THE SECTOR

In the modern workplace, the ability to solve problems is essential for the majority of positions. Because of this, it is more probable that they will use the information that they have gathered during their careers to fields as varied as robots, business forecasting, intelligent search, video games, music and entertainment, chat bots, medical diagnostics, and self-driving vehicles. These are just some of the sectors that might benefit from their expertise. A prominent topic of discussion right now is how quickly and in what ways intelligent robots will automate occupations, and a related concern is whether or not the same technological forces can produce enough new jobs. Both of these questions are interrelated. It is anticipated that by the year 2030, the field of artificial intelligence would have resulted in the creation of 2.3 million extra employment openings. According to study conducted by the Digital Transformation Institute at Capgemini, eighty-three percent of businesses that use AI technology have stated that AI is already helping to contribute to the creation of new employment. In Table 1, we present a variety of perspectives about the growth of work professions in the next years, as well as jobs that are now experiencing high levels of demand. Table 1 displays several professions in accordance with the degree to which they are now in demand. In their 2017 study, Wilson, Daugherty, and Morini-Bianzino carried out an innovative T Sloan analysis of possible vocations. They conducted a survey with over a thousand of the largest firms in the world that are either already implementing AI or ML solutions or are in the process of doing so. They discovered that entirely new jobs had come into existence, some of which could only be carried out by humans. These new responsibilities come on top of the ones that have previously been established. Because of the one-of-a-kind nature of these problems, additional expertise and information will be required. These new ideas for labour entail jobs such as "trainers," "explainers," and "sustainers," and greater discussion of these topics may be found lower down in this paragraph.

Table 1: Categories of New Job

Trainers	Customer-language tone and meaning trainer	Teaches Al systems to look beyond the literal meaning of a communication by, for example, detecting sarcasm
	Smart-machine interaction modeler	Models machine behavior after employee behavior so that, for example, an AI system can learn from an accountant's actions how to automatically match payments to invoices
	Worldview trainer	Trains Al systems to develop a global perspective so that various cultural perspectives are considered when determining, for example, whether an algorithm is "fair."

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Explainers	Context designers	Designs smart decisions based on business context, process task, and individual, professional, and cultural factors
	Transparency analyst	Classifies the different types of opacity (and corresponding effects on the business) of the Al algorithms used and maintains an inventory of that information.
	Al usefulness strategist	Determines whether to deploy AI (versus traditional rules engines and scripts) for specific applications.
Sustainers	Automation ethicist	Evaluates the noneconomic impact of smart machines, both the upside and downside.
	Automation economist	Evaluates the cost of poor machine performance.
	Machine relations manager	"Promotes" algorithms that perform well to greater scale in the business and "demotes" algorithms with poor performance.
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People who will be responsible for teaching AI systems like Alexa and the Koko algorithm about the feelings that are behind the questions that people ask of them are referred to as "Trainers," which is a term that uses the word "Trainers" as its noun. Specifically, the inflection of a human voice, the manner in which words are utilized, and the feelings that are communicated to the listener. People who are plainly under stress include people who have misplaced their bag, bought an item that turns out to be faulty, or are getting ready to take an exam. Other instances of people who are visibly under stress are people who have lost their money.

It is necessary to teach AI systems about these feelings in order for them to behave in an appropriate manner. In an ideal world, the software would be equipped with just the appropriate amount of empathy, compassion, and maybe even humor to assist individuals as they work through challenging circumstances. With the assistance of a human trainer, Koko's machine learning algorithm is able to improve over time in its ability to anticipate the best possible answer. The trainer assists in correcting Koko if it makes a mistake. As was said previously, the poll in question provides evidence to support the notion that "explainers" is yet another possible function for humans in the foreseeable future. The explainer is responsible for bridging the gap between technologists and business leaders in order to fulfill their duty. Explainers will assist in providing light where it is required the most as the complexity and opaqueness of AI systems continue to develop. Because of the "black box" nature of many complex machine learning algorithms, the chiefs of many companies are hesitant of using them. They discovered that around one third of businesses have full trust in the honesty and openness of their AI systems, and almost half of the organizations had the same level of faith in the safety of their AI systems. To this end, the function of the maintainers will be of the utmost importance. The aforementioned writers come to the conclusion, as is the case with a significant portion of technological advancement, that the barriers are generally more human than they are technical. It is vital to keep in mind, while evaluating the present employment climate, that the highly mathematical statistical ML field dominated the area of artificial intelligence in the early 21st century, and that many of the unfilled positions are connected to I/ML application work. This is because I/ML application work is where the majority of the work being done now is being done. Or, to put it another way, throughout the first few decades of the 21st century, machine learning was dominated by highly sophisticated statistical techniques. These techniques have proven to be extremely effective, helping to resolve a wide range of difficult issues in both the business world and academia. The two basic types of employment that may be classified into this category are (a) those that are associated with machine learning applications and (b) those that need specific expertise in the design and development of mobile applications. This is because (a) tasks associated with ML applications involve the creation of ML-based applications.

1. Machine learning engineers who work mostly with product ionize online services. These employments satisfy around 90 percent of the demand.

2. Data scientists, who are often subject matter experts in modeling data, work in conjunction with machine learning engineers to product ionize applications and web-services. In most cases, a doctoral degree is necessary to qualify for these positions.

   Professionals with expertise in artificial intelligence are in great demand across a wide variety of industries. Some of these industries include private businesses, nonprofits, public organizations, educational institutions such as schools, colleges, and

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universities, healthcare facilities such as hospitals and clinics, government agencies, and the armed forces, to name just a few. Due to the potentially sensitive nature of the information that workers in certain vocations may be expected to handle, some positions may require candidates to get a security clearance before they can be hired. The following is a list of typical sectors in which AI professionals are engaged.

The field of artificial intelligence makes extensive use of scientific concepts rather frequently. Engineers need a broad variety of talents to be able to make a livelihood in the field of artificial intelligence (AI), and the majority of these skills can only be obtained via significant study and practice. Within the fields of artificial intelligence and machine learning, there is a diverse array of careers that may be pursued, ranging from the study of theory to the application of AI in real-world settings. For instance, scientists put their theoretical and practical knowledge to work in order to uncover new capabilities and systems. Scientists hypothesize about unproven ways for computers to reason, and then put those speculations to the test to evaluate whether or not the proposed methods have any real-world implications. Researchers in artificial intelligence come up with new ideas, while algorithm developers take those ideas and turn them into reusable, mathematically-based procedures that can be implemented in software and hardware. These algorithms are essential for computer scientists and anyone who design software because they allow them to create more complex systems with features like understanding, analysis, and decision making. Engineers that work in hardware design and build machines (like robots) that can communicate with and respond to their surroundings. Without their own individualized programming, robots are unable to move or do any other activities.

According to a post published on Expatinvestots.com6, in 2018, even the largest and most well-known information technology organizations were grumbling about how tough it was to hire AI professionals. Because of the demand, the earnings are currently at absurdly high levels. According to the findings of market research conducted by The New York Times on the industry of artificial intelligence, the average annual wage for individuals with a few years of expertise runs from $300,000 to $500,000, with the very top professionals earning millions of dollars. An independent AI lab recently stated in an interview with the online daily Expatinvestors.com that the number of people across the world who possess the abilities necessary to begin large new AI projects is just 10,000. According to the aforementioned source, the nations with the highest need for AI and ML developers include the United States of America, Europe (particularly Sweden and Germany), the United Kingdom, China, Canada, and India. Other countries with a high demand include Canada and India. Due to the intense competition for competent individuals, Paysa's personnel recruiting system (Career Advisory Platform) offers adverts from large U.S. corporations such as Amazon, Google, and Microsoft, among others, providing the following aggregate net salary for such positions.

Amazon: $227,769,001

Google: $130,048,389

Microsoft: $75,158,057

Facebook: $38,636,827

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The extravagant prices listed above make it abundantly clear that the most successful technology companies in the world are engaged in a cutthroat rivalry for the most talented individuals and are willing to spend whatever it takes to get qualified professionals. Intel, Rocket Fuel, General Electric, Cylance, Oculus VR, Booz Allen Hamilton, Huawei, Adobe, Accenture, iRobot, Magic Leap, Rethink Robotics, BAE Systems, HERE, IBM, Samsung, Lenovo, MoTek Technologies, Uber, PCO innovation, Rakuten Marketing, and Wells Fargo are some of the other top recruiters in the United States. In addition, it is anticipated that the nation would have 2,500,000 available data science positions by the year 2024.

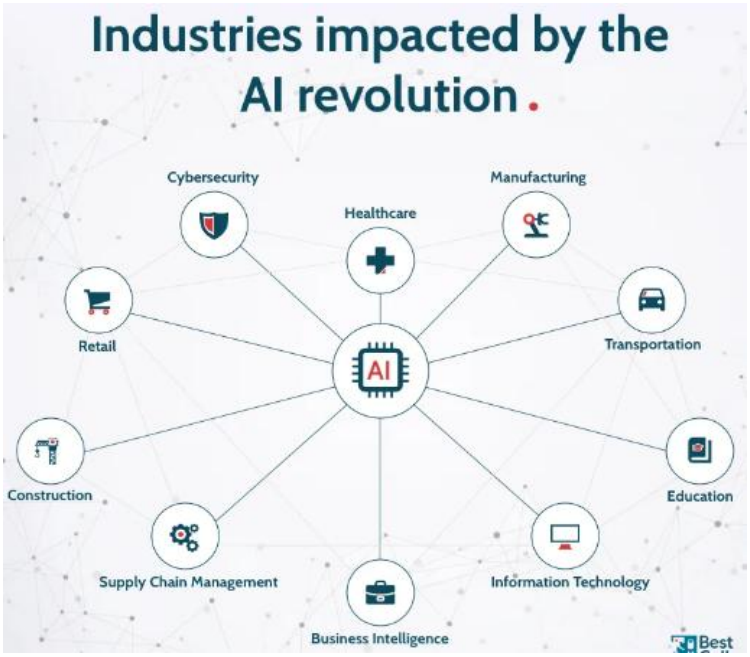

Figure 2: Industries Impacted By the Revolution

In addition, China is making massive investments in AI and is actively attempting to bring the technology to market. Chinese AI companies have become the world leaders in the AI industry as a result of a combination of factors including a large pool of talented people, a sizable market, and substantial funding from venture capital. China's artificial intelligence (AI) market is second only to the United States' in terms of the number of AI-related enterprises, patents, and financing opportunities. About half of China's AI companies are dedicated to developing cutting-edge methods in machine vision, service robots, and NLP. Beijing, Shanghai, and Shenzhen are home to about 80% of these companies, making them the global hubs of artificial intelligence (AI) development. However, China has the same problem as other countries, albeit on a far greater scale: a shortage of almost 5 million AI skill specialists. Chinese companies have a significant need for AI professionals. The huge quantity of available jobs can't be filled in the domestic labour market. Specialists with at least five years of experience who are now looking for job are in short supply in China; therefore companies there are actively recruiting from across the world to fill the void. For example, in order to fill roles involving machine learning, data mining, and computer vision algorithms, Baidu Inc. has started a new round of international recruitment. The firm is actively recruiting at nine of the country's most respected universities. Artificial intelligence (AI) engineers in China

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have seen their salaries soar in recent years due to the country's booming AI industry. Earnings for top AI jobs were 55% more than average ICT industry earnings in 2017, according to the Internet Unicorn Salary Report issued by IDG Capital (www.ig.com). Pay packages for senior jobs were 110% greater than those for entry-level positions, while packages for intermediate levels were 90% higher.

V. TECHNICAL SKILLS

To begin defining the kind of technical abilities that the labour market requires for a job in the I/ML business, we must first take into consideration the types of risks that are assumed, which include the following categories of dangers: (a) formulating skills that may have changed in a relatively short period of time due to the rapid progress of technology; (b) failing to take into consideration skills required by new professions created in the AI/ML sector; and (c) failing to describe all technical skills due to a lack of sufficient data. a) Formulating skills that may have changed in a relatively short period of time due to the rapid progress of technology. In view of the dangers that have been discussed, the following are some of our suggestions as to which technical abilities are the most essential for pursuing a successful career in the relevant field.

Employers often need applicants for entry-level jobs to possess at least a bachelor's degree; however, master's and doctorate degrees are preferable for individuals pursuing supervisory, leadership, or administrative responsibilities. This is true in the vast majority of circumstances. A strong basic grasp of subjects such as mathematics and the natural sciences is required for all subfields of artificial intelligence, independent of the particular specialization of each subfield. The following list compiles the top skills and talents available.

VI. RECENT DEVELOPMENTS IN AI AND HUMAN SKILLS

Over the past several years, there has been a significant rise in the number of advancements in AI that have practical implications in business and industrial settings. AI-based solutions have made it possible to automate a variety of traditionally performed back-office jobs, including data entry, document management, customer support, and accounting, to name just a few examples. This was made possible by the utilization of natural language processing in conjunction with artificial intelligence in order to comprehend and simulate human interaction with computers. The implementation of "generative AI" brings about a substantial shift in the game play. Systems are said to have generative artificial intelligence if they produce new material or data rather than only processing or analyzing already existing data. These algorithms can produce material that is aesthetically or semantically comparable to the input by learning from the data that is already there and using it. A machine learning model that has been trained to identify patterns in a huge picture library may be thought of as one type of generative artificial intelligence (AI). After being trained, the model may produce wholly new pictures that have never been seen before but have a style that is analogous to the data that was inputted into it. The fabrication of realistic visuals and text is only one of the many potential applications for generative artificial intelligence, along with the discovery of new treatments and construction materials. Generative AI systems may also be able to duplicate or replace humans in Trans discipline domains such as communication, problem solving, and conflict resolution. This possibility exists due to the fact that these areas cut across several disciplines. For example, if an AI system is equipped with natural language

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processing skills, it may be able to comprehend what customers are saying, recognize the emotions they are experiencing, and reply with comments that are both useful and compassionate. It is also possible for it to acquire insights from interactions with customers in order to develop its replies over time and give personalized help that is targeted to the particular requirements of each unique customer. Other forms of generative artificial intelligence have the ability to simulate human cognitive processes such as reasoning, problem solving, and creative ideation. ChatGPT is a fantastic illustration of the use of this concept since it simulates human contact through the use of natural language production. Techniques such as sentiment analysis, natural language processing and machine learning are utilized by these kinds of systems in order for them to comprehend the context of the discussion and deliver replies that are suitable. These systems are able to answer with inventiveness and challenge the user in the same way that a human could since they can recognize particular words and offer responses based on them.

VII. JOB MARKET USING ARTIFICIAL INTELLIGENCE

DALL-E 2 is an example of an artificial intelligence system that has the ability to imitate or replace human cognition and creativity. This system combines natural language processing with computer vision in order to generate visuals based on textual descriptions. These systems are able to increase their picture-making abilities as a result of the lessons they learn from their errors. They are also capable of generating imaginative pictures that are not restricted to the ones that were requested in the text. The concept of "Edge AI" has come to signify yet another new advancement in recent years. Edge artificial intelligence, also known as edge computing, is the usage of AI technologies that are installed at the network's peripheral rather than in the cloud or a centralized data center. This is in contrast to traditional AI, which is implemented in the cloud or a centralized data center. Edge artificial intelligence is typically utilized in commercial applications such as industrial control systems, monitoring systems, and autonomous cars since these kinds of applications demand real-time processing or decision-making. Edge AI may have an effect on people's abilities since it may lead to the automation of certain vocations, which may result in the replacement of humans who now hold such employment. On the other hand, it may create job prospects in industries that are primarily concerned with the creation and use of cutting-edge AI systems.
In addition, artificial intelligence at the edge has the potential to increase both productivity and efficiency by providing individuals with the knowledge they require to make well-informed decisions in the here and now. It is generally accepted that the use of artificial intelligence is necessary in order to establish the foundation for "Industry 5.0." The trend that is now underway toward more factory automation and data communication is referred to as "Industry 5.0." Examples of this type of technology include artificial intelligence (AI), the Internet of Things (IOT), and cyber-physical systems. The benefits and drawbacks of human-machine interactions in the age of Industry 5.0 within the context of a literature study that is centered on work-based learning. The author contends that the ability for technology to supplement human work has the potential to increase both production and efficiency, in addition to opening up paths for career progression and guaranteeing permanent employment. However, in order to reap these benefits, it is required for management to handle legal, psychological, and ethical problems. In the context of Industry 5.0, it is also vital to emphasize the importance of positive externalities such as increased living standards and greener development that may arise from a healthy mix of human and technology resources. This is because these kinds of positive externalities may result from a healthy mix of human and technological resources. One strategy for accomplishing this objective is to allocate

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financial resources to employee training and development programs. These programs should instruct workers on how to make the most of technical advancements that have recently been made in their field of work. By adopting more flexible work arrangements, employees have the opportunity to take benefit of the efficiencies brought about by AI while also maintaining a healthy work-life balance. These are just a few instances of the many different strategies that may be utilized to accomplish this objective.

VIII. AI IN HUMAN RESOURCES AND HIRING

In the second half of the 20th century, the process of hiring staff was often very uncomplicated. When responding to jobs that were offered or advertised, applicants would provide a CV, cover letter, and occasionally sample responses to position-specific questions along with their application materials. The hiring committee went through hundreds of applications and resumes before choosing just a few candidates for further consideration after narrowing the field. Following a number of rounds of interviews, an offer of employment was made, with the understanding that some aspects of the position may be subject to change. Candidate acceptance and subsequent employment start at some future date. As a direct result of the development of AI over the course of the last decade, employment patterns in developed nations have seen significant shifts. Businesses have used AI-based technology at each stage of the process in order to improve speed and scalability. This is the case despite the fact that the individual steps of the process are essentially comparable to one another. By utilizing artificial intelligence's potential to do large-scale resume matching with job postings, time may be saved for both the candidate and the hiring manager. Utilizing AI makes it feasible to evaluate applicants' resumes, eliminating those who aren't a good match for the post; the AI may then put the candidate through tests, further decreasing the pool of potential employees to choose from.

Humans often do not become engaged in the hiring process until the very end, when it is time for final interviews, pay negotiations, and attempting to convince prospects to accept an offer. All of these responsibilities are obligatory for those who work in human resources. However, once the applicant has accepted the post, the AI will return to assist with the responsibilities of maintaining and promoting the candidate once they have accepted the role. Even while the end aim of recruitment has remained the same, the tools that are available to hiring managers have undergone significant transformations over the course of time, mostly as a result of advancements in artificial intelligence. The team at the Council of Economic Advisors conducted in-depth interviews with some of the most important stakeholders in the employment market in order to gain a deeper understanding of the effect that AI has had on the employment business. During the course of the summer of 2022, they carried out a total of six interviews with various individuals. For the purpose of this study, interviews were conducted with four businesses and one professor who possess knowledge in artificial intelligence. In order to get truthful replies from everyone, a series of questions regarding the present state of AI in recruiting were posed to them. These questions were asked. The team from CEA obtained the material for this case study by conducting in-depth interviews, compiling data, doing supplemental research, and consulting with partners from the European Commission.

1. **AI in Practice for Hiring:** Consider the case of a company that is looking to fill a large number of vacant positions with qualified applicants. They need to discover the finest applicants for each position while also improving the quality of the match in order to

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accomplish this objective as quickly as they possibly can. Due to the fact that the firm is facing the same high rates of employee turnover as the rest of the modern business world, this necessitates the recruitment of a big number of new workers. In the past, the company did not have the same level of urgency to fill available jobs, and as a result, it did not publish as many job advertisements on its website. The number of job openings, applications, and positions being offered in today's labor market is far more than it was in any other time period in history. Companies are increasingly turning to AI solutions as they strive to process more applications in less time while simultaneously hiring a more diverse and competent staff without compromising the quality of any given 25 matches. This is all while trying to satisfy the expanding demand for their services, which has caused companies to struggle to keep up with the demand.

The individual who is in charge of hiring now has the responsibility of supervising a group of recruiters while also managing a big number of available positions that are in varying phases of the recruiting process. Nevertheless, humans may always turn to AI for assistance and help while the treatment is being carried out. Trey Causey, an employee at Indeed, made the observation that "it is difficult to think of a place in hiring where AI is not appearing." This is a perspective that sheds light on the bigger picture of the recruitment environment. Human resource managers have the option of combining human contact with the usage of AI tools in order to locate the most qualified applicants. The first step is to market the position online. This requires the hiring manager to develop the content for the job description, which will then be uploaded on a variety of job search websites. However, it is possible that they will not do everything on their own and will have assistance along the road. As an alternative, they have the option of enlisting the assistance of any one of a variety of businesses that apply natural language processing in order to speed up the process of developing job descriptions. The capacity of these systems to match the words that are uttered with the effects that can be quantified is what gives them their strength. This makes it easier for the person in charge of recruiting to compose advertisements for job openings that are more likely to result in applications from candidates who fit the prerequisites for the position. After the information for a new job posting has been created, the hiring manager must then select how the vacancy will be made known to candidates who meet the qualifications for the position. They make use of an algorithmic application that is commonly employed in the process of recruiting people. This program's purpose is to match applicants with open positions.

Figure 3: Career in Artificial Intelligence

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These algorithms examine not just the written content of applications and job postings, such as resumes and cover letters, but also data about the job openings and the people who are applying for them. This allows them to identify which candidates are the most qualified to fill certain openings. This typically results in a quantitative "fit score," which is then used by hiring managers as a tool for evaluating candidates after the fact. As a result of the prominence of these systems, the individual in charge of hiring may be given the responsibility of supervising the procurement of advertising space on numerous recruitment platforms. This is done in order to draw the attention of qualified candidates to the job posting. A fresh employment advertisement was published by the management a few days ago, and interested parties have already begun making contact with the manager to obtain further information on the position and the application process. On the other hand, the person in charge of recruitment has not replied to any of these mails. Instead, candidates are requested to submit precise and one-of-a-kind inquiries regarding the vacant positions, and a tiny army of chatbots that are driven by natural language processing are charged with answering those questions. The possible uses of chatbots are just beginning to be explored at this point. The recruiter may make use of chatbots in order to exclude candidates who do not meet the requirements. Given the number of applications, this is an absolutely necessary step in the process. These bots will gather information on the histories and experiences of the applicants, which will be considered in the ultimate decision of whether or not to proceed with a candidate. The person in charge of recruiting can make their selection from among a more limited pool of applicants based on a larger variety of criterion. Tools that fall under this category range from time-honored procedures, such as recorded interviews followed by a transcribed and analyzed version, to more innovative ways, such as "gamified" examinations, which incorporate aspects of games, such as logic puzzles, in order to evaluate potential applicants' skills. Because of this, they are able to evaluate an applicant's personality, talents, and IQ without ever having to interact with the candidate in person. Research that links test results with the ability being measured is another way that the validity of these tests may be shown. However, the manager who is responsible for filling job 26 is hesitant to employ such approaches in their search for a candidate. This is due to the fact that the links between the skill sets and work performance have not been researched as deeply, and also to the fact that they have witnessed the discontinuation of such tools in the past as a result of overt bias concerns. The person in charge of hiring thinks that these resources are useful since they can cut down on the amount of time spent reviewing applications and help better matches be found.

2. **AI for Applicants:** Job seekers may take use of a variety of AI-based tools that can help them improve their interview skills and resume preparation regardless of whether they are looking for their first job after graduating college, moving jobs within an industry, or contemplating a career change. These resources can help job seekers improve their interview skills and resume preparation. They may also utilize these tools to prepare for job interviews and improve their chances of getting hired. Tools for analyzing resumes, driven by AI and developed by companies like as Indeed and VMock, may analyze a candidate's credentials and make recommendations for how those credentials might be improved. In light of the growing use of artificial intelligence-based systems for the purpose of resume reviews, include keywords on a resume that assist a candidate in getting beyond a first screening is a particularly essential tactic for boosting a resume's overall quality. This is extremely important given the growing prevalence of the usage of these technologies in the screening of job applications.

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Job searchers may benefit from artificial intelligence in a variety of ways, including the enhancement of their ability to hone in on abilities that are applicable in more industries than the individual had previously considered. VMock provided an illustration by stating that a typical day in the life of a chef includes the supervision of a big crew while also being subject to tight time restrictions. These are highly transferrable talents that are relevant in a wide variety of different industries in addition to the hospitality industry. ZipRecruiter uses an active learning algorithm to try to understand which open positions appeal to a candidate the most based on their interest level in the positions they have shown them so far, and a similar algorithm is used on the hiring side to learn what types of candidates hiring managers are looking for in order to find the best possible candidates. These machine learning techniques improve matching throughout the whole recruiting process, from the application phase to the hiring phase and everywhere in between. It's possible that in the near future, thanks to developments in natural language processing, chatbots may be able to interact with job seekers in a manner that is difficult to differentiate from human communication. Following the submission of a job application, a candidate could get a message from a chatbot similar to those that were detailed before. Indeed investigates the benefits and drawbacks of utilizing chatbots in the recruiting process. They note that although chatbots may help limit applicants' exposure to unconscious biases, they also have the potential to make candidates feel as though they are not being acknowledged enough.

IX. ARTIFICIAL INTELLIGENCE AND TRANSVERSAL SKILLS

Companies that have included AI systems in their operations have discovered that doing so has resulted in an increase in the importance they place on locating and cultivating transferrable talents in their workforce. The term "transversal talents" refers to those abilities that may be utilized in a variety of contexts and areas. These competencies are also referred to as "soft skills" or "transferrable skills" in some circles. Thinking critically, being able to solve problems, communicating effectively, and working well with others are the skill sets that must be had for constructive contact with AI systems. They make it possible for people to adjust to new technologies and processes, continue learning, and advance their careers in spite of the rapid pace of technological advancement. The ability to work with AI systems requires transversal skills, which can not only be created and enhanced with the help of AI, but are also required for working with AI systems. AI has the potential to free up staff time and resources, which may then be allocated to higher-stakes activities that need Tran’s disciplinary expertise. The automation of some operations is how this goal may be accomplished. With the assistance of artificial intelligence (AI), certain business processes may be improved and streamlined. This enables businesses to provide their staff with chances to learn and enhance their cross-functional talents, which in turn boosts both productivity and creativity.

The authors of the third report that was put together by the ESCO Member States Working Group in 2021 propose a new taxonomy model for TSCs, which stands for transversal skills and competencies. TSCs are a set of talents that are regarded as required or desirable for accomplishing activities well in any setting, whether it be at work, in school, or in day-to-day life. This category of activity includes things like gaining knowledge, making a living, and simply being in the world. They are referred described as "transversal" due to the fact that their application is not restricted to the applicability of any one area. This adaptability, along with the transferability that it involves, is considered as more crucial in a

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world where technological advancement and cultural shifts are occurring at a dizzying rate. This group of experts has come to the conclusion that transversality may be connected to "deeper learning," which they describe as the information and abilities that supplement and make it feasible to perform the more specialized skills that are required in certain contexts, such as the job. The idea of transversality can be linked to "deeper learning" in a number of different contexts and contexts. Figure 1 presents a breakdown of the TSC model into its six fundamental components, which are as follows: core competencies, cognitive competencies, self-management competencies, social and communication competencies, physical and manual competencies, and life skills. Each of these components can be broken down further into subcomponents. A summary of these six primary points is provided below. These then create a number of separate groupings, each of which has the potential to be utilized to further map out each ability. The concept is applicable to a diverse group of applications, and its utility may be appreciated by users working in a variety of industries. It makes it easier to recognize important concepts as well as the connections that exist between them. Because thinking skills, self-management skills, and social and communication skills are predominantly comprised of ‘soft' or transferable skills, they are important to the industry in organizational contexts that are defined by the use of AI systems. The other three of the six categories of TSCs are comprised of 'hard' skills. Thinking, self-management, and social and communication skills are examples of abilities that fall under these three categories. Workforce 4.0

X. AI FOR TRAINING AND DEVELOPMENT

In addition, AI has the potential to be utilized to improve the quality of employee training and development through the customization of employees' learning experiences and the provision of immediate feedback. Virtual training is being provided to employees of certain firms nowadays by means of systems that are driven by AI. This sort of coaching may encompass a number of different things, some of which include providing performance feedback in real time and customizing objectives for professional development. These are just two examples. It is also possible for AI systems to provide on-demand training and challenges to employees. This would enable people to continue their professional growth and gain new abilities. Employees may benefit from having greater understanding of their strengths and areas for growth, as well as their learning and development activities, thanks to the use of systems powered by artificial intelligence (AI) that give automated feedback and evaluations. It is feasible to provide successful and effective skill development for employees through the utilization of AI to give individualized learning experiences and real-time feedback to the employee.

1. **Worker Mobility across Jobs:** Because AI does not complement human work but rather replaces it, there will inevitably be job losses in some areas as a result. This might be due to employees lacking the requisite abilities to carry out their professions, or it could be due to artificial intelligence automating the tasks that were previously performed by humans. Both the potential for disruption in the labor market and the financial repercussions for people whose jobs are eliminated as a result of displacement are very real possibilities. The expenses and disruptions that are involved with adapting to new technologies are illustrated by the fact that the function of the telephone operator has been automated, as was stated in box 5. Nonetheless, due to the dizzying pace at which AI is developing, these costs may all of a sudden be incredibly significant; nonetheless, studies documenting the migration of displaced people to new employment (or not) as a

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result of AI are relatively rare. They look at what happens to workers in the event that a company employs artificial intelligence to automate its manufacturing process and those personnel are rendered redundant as a result. For this reason, the data from the Dutch administrative system is used. They have calculated that after 52.2 years, all workers will have lost an average of 9 percent of a year's revenues owing to the usage of AI. This loss will occur globally. They further demonstrate that this yearly income loss is driven by periods of unemployed within a year (as opposed to, say, swiftly switching into lower-paid jobs), and that unemployment benefits only partially offset this loss. Furthermore, they show that this loss is driven by periods of unemployment within a year. This loss of annual revenue is further exacerbated by the problem of unemployment. The negative consequences of artificial intelligence and automation are exacerbated for those who are older or have a lower level of education, as well as for organizations that employ fewer people. As a conclusion, their study reveals that workers who are laid off incur large expenses associated to adjusting to their new circumstances. However, unemployment benefits only cover a portion of these costs. In a manner analogous to this, the case study that is discussed in section IV sheds light on the relevance of AI in the process of hiring new employees. Artificial intelligence (AI) has the ability to promote interactions between businesses and job-seekers, which can make the process of switching jobs easier. This is true despite the worries that have been expressed regarding possible downsides.

XI. CONCLUSION

India is now in motion and making quick progress to satisfy the needs of a flourishing India as well as a global economy that is in a state of upheaval. The revolution that is being ignited by advances in AI is being referred to by experts as the Fourth Industrial transformation. This transition is expected to be beneficial to both the service and manufacturing industries. The majority of employment in a variety of industries may soon be put at danger as a direct result of the changes brought about by artificial intelligence (AI) in such industries. The transition will result in the loss of employment opportunities; but, on the bright side, urban areas will become more technologically advanced and will be equipped with all contemporary amenities. Experts are split on the question of whether or not robots would one day be able to replace the work of humans entirely, but they can agree that even if this were to happen, only a very small percentage of employment would be lost. The number of employment requiring a level of competence that is somewhere between moderate and high will decrease, while the number of highly skilled positions that need substantial judgment will increase. When it comes to activities that need a high degree of intelligence and judgment, machines will never be able to fully replace people. According to the findings of our analysis, AI and ML specialists need to have a toolkit that contains 35 different abilities that may be categorized in 10 different ways. Despite the fact that there have been insightful studies done in the past on AI, the primary focus of this in-depth investigation will be on actual data. Researching the job openings from the point of view of the firm that will be doing the hiring allows us to have a better understanding of the situation.

REFERENCES

[1] Agrawal A, Gans JS and Goldfarb A (2019) Artificial intelligence: the ambiguous labor market impact of automating prediction. Journal of Economic Perspectives 33(2): 31–50.
[2] Aiken RM (1991) The new hurrah: creating a fundamental role for artificial intelligence in the computing science curriculum. Education and Computing 7(1–2): 119–124.

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[3] Anton E, Behne A and Teuteberg F (2020) The humans behind artificial intelligence – an operationalization of AI competencies. In: Proceeding of the 28th European conference on information systems (ECIS), Marrakeh, Morocco, 15–17 June.
[4] Balan C (2019) Potential influence of artificial intelligence on the managerial skills of supply chain executives. Calitatea 20(S3): 17–24.
[5] Baldwin-Morgan AA (1995) Integrating artificial intelligence into the accounting curriculum. Accounting Education 4(3): 217–229.
[6] Bawack RE, Wamba SF and Carillo K (2019) Artificial intelligence in practice: implications for IS research. In:Twenty-fifth Americas conference on information systems, Cancun, Mexico, 15–17 August, p. 11.
[7] Brynjolfsson E and Mitchell T (2017) what can machine learning do? Workforce implications. Science 6370(358): 8.
[8] Chassignol M, Khoroshavin A, Klimova A, et al. (2018) Artificial intelligence trends in education: a narrative overview. Procedia Computer Science 136: 16–24.
[9] Chedrawi C and Howayeck P (2019) Artificial intelligence a disruptive innovation in higher education accreditation programs: expert systems and AACSB. In: Harfouche A and Baghdadi Y (eds) ICT for a Better Life and a Better World. Cham: Springer, pp. 115–129.
[10] Debortoli S, Mu¨ller O and vom Brocke J (2014) Comparing business intelligence and big data skills. Business & Information Systems Engineering 6(5): 289–300.
[11] Fareri S, Fantoni G, Chiarello F, et al. (2020) Estimating Industry 4.0 impact on job profiles and skills using text mining. Computers in Industry 118: 103222.
[12] Gardiner A, Aasheim C, Rutner P, et al. (2018) Skill requirements in big data: a content analysis of job advertisements. Journal of Computer Information Systems 58(4): 374–384.
[13] Goksel N and Bozkurt A (2019) Artificial intelligence in education: current insights and future perspectives. In: Sisman-Ugur S and Eby G (eds) Handbook of Research on Learning in the Age of Transhumanism. Pennsylvania, PA: IGI Global, pp. 224–236.
[14] Holder LB and Cook DJ (2001) A client-server computational tool for integrated artificial intelligence curriculum. Journal of Computing in Higher Education 12(2): 52–69.
[15] Jakhar D and Kaur I (2020) Artificial intelligence, machine learning and deep learning: definitions and differences. Clinical and Experimental Dermatology 45(1): 131–132.
[16] Lovaglio PG, Cesarini M, Mercorio F, et al. (2018) Skills in demand for ICT and statistical occupations: evidence from web-based job vacancies. Statistical Analysis and Data Mining: The ASA Data Science Journal 11(2): 78–91.
[17] Lu Y (2019) Artificial intelligence: a survey on evolution, models, applications and future trends. Journal of Management Analytics 6(1): 1–29.
[18] McArthur D, Lewis M and Bishary M (2005) The roles of artificial intelligence in education: current progress and future prospects. Journal of Educational Technology 1(4): 42–80. Meulen R and Petty C (2017, December 13)
[19] Gartner says by 2020, artificial intelligence will create more jobs than it eliminates. Available at: https://www.gartner.com/en/news room/press-releases/2017-12-13-gartner-says-by-2020-artifi cial-intelligence-will-create-more-jobs-than-it-eliminates (accessed 15 May 2020).

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