The future of work: how artificial intelligence will reshape the labor market

Technology, Artificial Intelligence

Over the past few years, there has been much excitement, anticipation, and fear surrounding the potentially transformative capabilities of Artificial Intelligence (AI). In this week's edition of Bloomberg Businessweek, we explore what the implementation of AI in an organizational setting will mean for the labor market at large, and how employees can successfully transition into the this new era of machine-based intelligence in the workplace.

What is Intelligence?

Over the course of the past few years, there has been much excitement, anticipation, and fear surrounding the potentially transformative capabilities of machine-based intelligence. Whether its reducing customer wait times for service-based firms, diagnosing patient ailments for medical practitioners, or improving operational efficiency for manufacturers, there is no shortage of benefits and practical use cases for machines that can display human-like cognition. However, despite the why case for AI receiving significant managerial attention, details surrounding the what and the how is relatively unknown. What is AI? How is it able to replicate the cognitive ability of human beings? If machines are able to think and reason like humans, what implications does this have on how business is conducted? These are questions pondered not only by managers, but also by the broader societal landscape. To effectively understand AI and its disruptive capabilities, the concept of the ' natural intelligence' displayed by humans must be re-examined. While intelligence can been defined in many ways, broadly speaking, it is known as the ability to manipulate one's environment through the application of logic, reasoning, and abstract thinking. Traditionally, the perception of intelligence was heavily linked to quantitative or mathematical

ability, since these domains involve extensive use of logical reasoning, and allow for ease of objective measurement. However, there are numerous classifications of intelligence that do not consider logical or mathematical ability, such as spatial, kinesthetic, existential, and musical intelligence, to name a few. As such, for machines to truly exhibit human-like levels of intellectual capacity, they must be trained in each of the different domains of intelligence, since solving complex real-world problems oftentimes mandates the consideration and application of knowledge drawn from an assortment of fields. Humans improve their ability to solve problems as they age due to their continued exposure to a diverse range of experiences, which serves as the primary input for cognitive growth. These experiences can be educational, recreational, sensational, psychological, among others.

Depending upon the type and range of experiences one is exposed to, an intellectual perspective is developed which can be leveraged by firms in addressing organizational challenges, which is the primary reason firms elect to hire candidates from a variety of academic or professional backgrounds. But what is the primary input of AI? How is it able to replicate the knowledge gathered by humans over thousands of years' worth of experiences? This forms the basis of our discussion in the section that follows. What is Artificial Intelligence?

Like ' natural' intelligence, the scope and understanding of artificial intelligence amongst researchers is a topic of rigorous debate, and is constantly evolving. The term artificial intelligence was first coined by computer scientist Alan Turing back in 1950, and was originally defined as a

machines ability to generate responses that are indistinguishable than those from a human. Fast forward to 2018, and the concept of artificial intelligence has evolved from the original definition proposed by Turing, to any computing system that can replicate higher-order human brain functions such as perception, logical deduction, and strategic planning to achieve a particular objective. Machine intelligence is developed through knowledge drawn from a variety of intellectual domains, such as philosophy, mathematics, neuroscience, psychology, computer engineering, among others. As such, the field of artificial intelligence represents the amalgamation of knowledge converged from other seemingly irrelated academic disciplines, as opposed to a fundamentally new domain of research or study. As such, the precise scope of AI is constantly being disputed, as technological innovations render existing machine capabilities to be seen as commonplace and ‘ unintelligent’. For instance, today the scope of AI research primarily resides in knowledge reasoning, natural language processing, machine learning, strategic planning, computer vision, and robotics. As these frameworks and technologies are developed further and deeply integrated within the fabric of enterprises around the world, new approaches will be sought and developed that will re-define the scope of AI in the process. This phenomenon is known as the ‘ AI effect’, and is the main point of contention amongst academics, managers, and observers as to the correct interpretation of machine intelligence. To effectively understand how machine intelligence will transform commerce, a solid foundation on the specific techniques and methodologies that enable the functionality of AI must be attained. While AI research is divided into numerous fields such as

robotics and natural language processing, a vast amount of recent business investment is concentrated in the interdisciplinary field of machine learning.

Fundamentally, the study of machine learning leverages concepts in computer science and statistics to allow computing systems to progressively learn how to perform a given task without the need for manual programming. While this appears to be something of science-fiction, it already manifests itself in routine interactions with technology; online product recommendation systems, email spam filters, search engines, and digital voice assistants all leverage machine learning techniques to deliver enhanced value to the end-user. As a supplement to the information provided in this section, n overview of machine learning is attached in the appendix, which provides a brief summary of the 3 major machine learning techniques, along with their practical application in an organizational context. While the promise of artificial intelligence seems immense today, there have been periods throughout the past four decades of pessimism surrounding the plausibility of the technology that were caused by underwhelming research findings and limitations in computing power, which often led to retracted investments from venture capitalists and federal research agencies. However, the resurgence of AI in the 21st century is well justified due to rapid advances in computing capabilities, abundance of data sources, and improvements in the theoretical understanding of AI methodologies.

Perhaps the most significant contributor to the resurgence of AI research and investment is the plethora of data-collection mechanisms that are holistically

integrated within touchpoints between the organization and the end customer. Having access to a high volume of data is of paramount importance when developing an AI-based system, since data is the central input in machine-learning techniques that allow computers to progressively learn without being explicitly programmed. Due to this, the strategic focus for firms has progressively pivoted from maximizing physical assets that can be leveraged throughout the value chain, to maximizing digital data points that can later be analyzed and modeled to make more informed tactical and strategic decisions. How will artificial intelligence impact the labor market? Organizations around the world are continuously exploring avenues to digitize their business models, and are increasingly making the implementation of cutting-edge cognitive technologies a core pillar of their long-term value-generation strategy. In 2016, global enterprise spending on AI technology encompassing robotics, computer vision, natural language processing, intelligent agents, and machine learning ranged between $26-$39 billion. Moreover, approximately 80% of enterprises around the world are leveraging AI in some form today, with 30% of these enterprises having plans to expand their current investments over the next 36 months. In aggregate, the utilization of AI technology has the potential to generate annual economic value between $3. 5-$5. 8 trillion for organizations across 19 sectors worldwide. With that being stated, due to the nature of operating in certain industries, organizations are likely to experience varying levels of monetary value through the adoption of AI technologies, with firms in the retail, transport, and healthcare sectors slated to realize the greatest returns. While the benefits of implementing AI technology at an

organizational level are endless, its sheer efficiency and effectiveness in completing tasks may negate the need for humans to perform those same tasks, posing similar challenges for labor in the modern age as those faced by workers during the first, second, and third industrial revolution.

To put this into perspective, a recent study conducted by the McKinsey Global Institute revealed that at least 30% of work duties and responsibilities associated with occupations in the United States can be fully automated using technologies available today, a figure which includes activities that require critical thinking, logical deduction, and other forms of cognitive exertion. Considering that the true capabilities of AI technology has hardly been explored or implemented, that figure will surely increase over time. Moreover, given that approximately 45% of the working-age population around the world is already unemployed, inactive, or underemployed, the proposition of the mass-implementation of AI leading to the ‘ death of jobs’ is not as ludicrous as it may have seemed in Sci-Fi movies of the 1990s and early 2000’s. Similar to how the first three industrial revolutions transformed the labor market by mandating workers to expand their skillset beyond physical strength, this new era, or ‘ Fourth Industrial Revolution’, demands a new kind of professional that is well-informed on the capabilities of the technologies being employed to accomplish work activities. However, unlike previous revolutions, the underlying foundation of the fourth industrial revolution is marked not only by the advancement of technology for productivity purposes, but also by the increased reliance on machines to make decisions that would traditionally be made by humans. Evidently, it is

estimated that by 2021 total enterprise spending on technology capable of mimicking human thought processes will reach over $11 billion in the United States, and is poised to maintain its position as the leading AI investment category well into the future.

Gone are the days of machines being utilized as a means to produce output, or facilitate the production of output; Instead, machines are being called upon to analyze workflows, identify efficiencies, and recommend optimal courses of action, responsibilities that are not too distant to what modern-day managers must fulfill. As a result of this rapid advancement in machine intelligence, workers today must constantly find ways to keep their skillsets relevant, even if it means pursuing an entirely different career path. Specifically, it is estimated that as much as 14 percent of the global workforce will be required to switch occupational categories by 2030, with demand for occupations requiring considerable levels of physical exertion or manual data processing seeing the greatest declines. The decrease in labor in highly-automatable fields is expected to be offset by an increase in demand for workers that possess the requisite skillsets to perform unpredictable and dynamic tasks, such as those done by lawyers, teachers, medical practitioners, and other service-based professionals. While the prospect of machines supplanting humans in the workplace is not as absurd as it may have seemed as soon as a decade ago, it is subject to a certain degree of ‘ irrational exuberance’. While the potential use cases for machine intelligence in an organizational setting is ever-expanding, they often require extensive human oversight to successfully administer, thereby alleviating

concerns of computers superseding human labor in the near term. Moreover, just as how self-checkout machines are opening up positions for checkout assistants, the proliferation of cognitive technology in the workplace will lead to a parallel increase in the amount of human labor whose purpose is to facilitate safe human-machine interaction, opening up entirely new career paths for individuals to pursue. These ‘ new collar’ fields will come with entirely new skill and educational requirements, and will likely lead to shorter work days as the underlying development techniques of the technology becomes more sophisticated. While the advent of the AI age signals a decreased need for labor to perform physical or manual activities, soft skills such as communication, creativity, and emotional consciousness will become increasingly in-demand since they are not easily replicable by machines. Due to this, the setting of the strategic vision of a firm, along with the corresponding managerial decisions and actions required to realize this vision, will almost certainly always be conducted by humans. The setting of tactical decisions and the execution of activities assigned by upper management is where machine intelligence will make its name, particularly in the business functions of marketing, supply chain management, and manufacturing.

Since modern marketing efforts revolve around optimizing digital touchpoints between the organization and the end-customer, AI techniques would be incredibly useful because of their ability to offer personalized product recommendations and quickly execute targeted communications. Supply chain management activities also stand to benefit from the

implementation of AI, as empirical evidence has demonstrated how inventory costs can substantially be reduced through the adoption of forecasting techniques that holistically assesses the underlying drivers of product demand as opposed to simply considering historical data to make input-purchase decisions. Lastly, manufacturing activities can be made immensely more efficient through intelligent and robotic process automation technology that assists in production, workflow design, and transportation of raw materials. The aforementioned use cases of machine intelligence certainly involve the elimination of certain jobs done by humans, however, they do not completely remove humans from the equation. Instead, they make peoples jobs easier. For instance, now that a marketer is able to quickly receive dynamic insights into what products a group of consumers prefer, they are able to spend less time actually generating this data and more time formulating campaigns and promotions that effectively resonate with their target audience. Now that a supply-chain manager is able to quickly and accurately predict product demand for upcoming periods, they can spend less time performing these calculations and more time searching for suppliers that provide inputs necessary in the production process. Now that an operations manager has automated and optimized workflows, they can spend less time on the facility floor ensuring productivity and more time crafting continuous improvement initiatives.

In essence, the use of AI technology will augment the capabilities of an organizations human capital by eliminating the mundane activities of their occupations, allowing them to focus on what human-beings are

fundamentally better than machines at, which is assessing strategic and tactical priorities, and making decisions based on ‘ gut-feel’ intuition that is difficult to quantify.