The socio-economic impact of an AI-led revolution

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ABSTRACT: The development of artificial intelligence (AI) is advancing rapidly, creating new opportunities and challenges for governments and citizens. This paper examines the theoretical limitations of computation to which AI is subject, as well as its benefits and the ethical issues it raises. Furthermore, it discusses the key issues that need to be considered when analyzing the challenges and potential benefits of an AI-led revolution. Finally, the paper outlines possible solutions to transform AI into a unique revolutionary opportunity, reviewing current regulation and emphasizing the importance of specific regulation that is both effective and modern.

KEYWORDS: Artificial Intelligence; socio-economic impact of AI; AI revolution; Universal Basic Income; human-machine collaboration

1. Introduction

Artificial Intelligence (AI) stands at the epicenter of a transformative revolution that promises to reshape the very fabric of our society. Over the past two decades, the digital economy has experienced remarkable growth, laying the groundwork for an AI-driven industrial revolution that is now upon us. This momentous shift in history presents us with an incredible opportunity to unleash the full potential of humanity, but it also poses significant challenges that require careful consideration.

As explained by renowned psychologist Herbert Marcuse, the advent of automation raises the prospect of a profound reversal in the relationship between working time and free time. With the possibility of working hours becoming marginal and free time becoming all-encompassing, our society faces a radical reevaluation of values, challenging the very essence of our traditional culture[1]. While reducing working hours may seem like a pathway to liberation, we must recognize the potential undesirable consequences that could jeopardize the stability of our modern world.

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[1] J. RIFKIN, *The End of Work: The Decline of the Global Labor Force and the Dawn of the Post-Market Era*, New York, 1995.

The digital revolution has enabled the amplification of production with reduced human labor and lower costs, leading to tremendous advancements in economic efficiency. However, such progress comes with a caveat: the possibility of an apocalyptic outcome where AI dominates our society. Although the likelihood of such an extreme scenario is low, it is prudent to deeply analyze and understand its implications.

The AI-led industrial revolution is a potent force that, if harnessed responsibly, could elevate the living conditions of billions worldwide, as expounded in the following sections. Conversely, a misuse of these cutting-edge technologies could result in severe social and economic repercussions. Hence, the significance of carefully contemplating the deployment of AI cannot be overstated.

As we gaze into the future, it is evident that both central governments and the role of mass workers are destined to undergo significant transformations. This necessitates a proactive rethinking of our social contract to forge a society and economic market that can withstand the tides of change. The potential of AI to elevate humanity is unparalleled, but it also represents a double-edged sword that demands our utmost attention and comprehension.

In light of these momentous possibilities, the European AI Act emerges as a pivotal instrument in shaping the AI landscape within the region. This legislation provides a framework to maximize the benefits of AI while mitigating potential risks, serving as a beacon of foresight and prudence in the face of an uncertain future. By understanding and harnessing AI's potential, we embark on a journey towards a more equitable, prosperous, and future-proof society.

In this article, we delve into the depths of the European AI Act, exploring its multifaceted implications and its role in steering Europe toward a prosperous AI-powered era. With precision and clarity, we examine the foundations laid by the Act to ensure that it adheres to the principles of prudence and responsibility, providing a roadmap for society to make the most of this momentous technological revolution. As we embark on this journey, the quest for a future powered by AI must be accompanied by wisdom, understanding, and a collective determination to unleash its vast potential for the betterment of all humankind.

2. Theoretical Limitations of Artificial Intelligence

Artificial Intelligence is a sophisticated subfield of Computer Science which faces intrinsic limitations deeply rooted in the theoretical foundations of the discipline itself. These boundaries are elegantly described by the "Computability Theory", which originated in the 20th century through the collaborative efforts of the

brightest mathematicians, logicians, and computer scientists. Central to this theory is the concept of the Turing Machine, which serves as a fundamental model for all computers[2].

A Turing Machine is a theoretical device conceived by Alan Turing, a British mathematician and logician, in the 1930s. It is an abstract representation of a computer that operates on an infinite tape, capable of reading and writing symbols on it based on a set of rules. Despite its apparent simplicity, the Turing Machine is a powerful construct that can simulate any computational process.

To understand why all computers are Turing machines, we must recognize that any algorithm or computation performed by a computer can be expressed as a series of discrete steps or instructions. These instructions are analogous to the rules followed by a Turing Machine as it processes symbols on its infinite tape.

In essence, all computers can be thought of as being conceptually equivalent to a Turing Machine. Whether it is a supercomputer, a smartphone, or any other computing device, they all share the same fundamental principle of processing data through a sequence of well-defined steps. The Turing Machine provides a theoretical framework that demonstrates the universal computability of these devices. This universality is a fundamental cornerstone of modern computer science. It establishes that any computational problem that can be solved by one computer can be solved by another, given the appropriate algorithm and sufficient resources.

One critical insight from the Computability Theory is the "Halting Problem"[3]. This problem entails determining whether a given program will eventually halt or run indefinitely. It has been mathematically proven that no computer, no matter how powerful, can solve the Halting Problem for all possible programs. In simple terms, it is like driving on an infinite highway and trying to predict if there will ever be a pothole. The driver can only know if there is a pothole when they encounter it, and similarly, computers can only determine if a program halts by running it.

While this is true from a theoretical point of view - and thus sets insurmountable limits - it is possible to obtain good approximations that can give the correct answer most of the time. For example, it is possible to state that a given program will not halt in less than a certain amount of time. While this is a simple and imprecise approximation, it may be sufficient for different purposes in different contexts.

These theoretical limitations also pose a challenge for AI systems, which are, after all, programs that run on a computer and must therefore obey the same "rules". While computers can achieve excellent approximations for many problems, certain issues remain unsolvable in their entirety. Nevertheless, AI endeavors to find practical solutions by approximating generally undecidable problems. For example, it is not

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[2] A. Dovier, R. Giacobazzi, *Fondamenti dell'Informatica*, Torino, 2020.
[3] A. Bhatia, *The Questions That Computers Can Never Answer*, 5 February 2014, available at https://www.wired.com/2014/02/halting-problem/ (last accessed 23/09/2023).

possible to develop a piece of software capable of generating any other possible computer program given a high-level description. Despite this, several tools have emerged: ChatGPT[4] and GitHub Copilot[5] can help programmers write code faster and more efficiently. Nonetheless, they require a human expert instructing them and correcting their outputs, which can be faulty and hide semantic bugs due to misinterpretation.

In addition, and most importantly, AI systems can be used to solve problems that even we as humans cannot explain how to solve. AI is moving from the classic paradigm of writing a piece of code to solve a problem to a new paradigm of developing software that can learn the program itself - how to solve a problem - from the examples (the data).

Therefore, AI's strength lies in its capacity to handle repetitive tasks efficiently, leading to the automation of certain jobs. Jobs that primarily involve repetitive actions and minimal cognitive engagement are being replaced by AI-driven systems. However, professions that require creativity, critical thinking, and the ability to connect ideas remain relatively secure, as they demand uniquely human attributes and cultural knowledge.

Indeed, despite AI's remarkable advancements in replicating human-like capabilities, the question of whether AI possesses genuine creativity is still a subject of ongoing debate. Before settling this debate, defining the essence of creativity itself becomes imperative. As AI continues to evolve, there is a possibility that it may eventually encroach upon even these creativity-oriented roles, raising concerns about potential impacts on the job market.

In conclusion, AI's journey into the future is intrinsically tied to the boundaries set by the Computability Theory and the theoretical limitations imposed by the Turing Machine concept. While AI excels at approximating complex problems, certain issues remain inherently unsolvable. The delicate balance between the advancements and limitations of AI will determine the extent of its impact on our society and economy. As we move forward, understanding these theoretical foundations and engaging in thoughtful discussions will pave the way for a responsible and beneficial integration of AI into our lives.

3. Benefits and Ethical Issues

Theoretical limitations of AI serve as a crucial backdrop when delving into this subsequent section on benefits and ethical issues. As we navigate the landscape of AI advancements, it becomes evident that while AI systems have made remarkable strides, they are not without their constraints. Understanding the theoretical

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[4] OPENAI, *Introducing ChatGPT*, 2022, in https://openai.com/blog/chatgpt (last accessed 23/09/2023).
[5] MICROSOFT, *Introducing GitHub Copilot X - Your AI pair programmer is leveling up*, 2023, available at https://github.com/features/preview/copilot-x (last accessed 23/09/2023).

boundaries of AI helps us grasp the potential benefits it can bring while also highlighting the ethical considerations that arise from its implementation.

By acknowledging the current limitations, such as the inability to truly comprehend human emotions or consciousness, we can better assess the positive impact AI can have in various domains, such as education, healthcare, environment protection, and transportation. However, as we witness this increasing integration into our society, we must also address the ethical dilemmas surrounding privacy, bias, and job displacement. Striking a harmonious balance between harnessing AI's potential and mitigating its ethical risks is imperative to foster a future where AI complements and enhances human well-being rather than supplants it.

3.1. Benefits

AI is at the center of a new technological revolution that could change many industries. As AI-driven systems optimize processes and streamline operations, companies can achieve higher levels of productivity and efficiency. This enhanced productivity often translates into cost savings, enabling businesses to lower prices for their products and services. Consequently, more people can afford not only essential goods but also secondary goods, improving their overall quality of life. The potential for affordable and accessible healthcare, especially in regions where life-saving medications are prohibitively expensive, becomes an attainable reality through the application of AI in drug production and distribution. As a result, essential goods such as medicines, including life-saving drugs like insulin, could become more affordable and accessible to a wider segment of the population[6]. In addition, it could help diagnose as early as possible cancer, thus allowing to prevent it much more effectively[7].

One of the most profound contributions of AI lies in its ability to augment human capabilities and enhance accuracy in critical fields. Given clean, correct, and bias-free data, AI's unbiased and data-driven approach can mitigate the influence of human biases and shortcomings, for example in medical diagnosis and treatment planning. As an illustration, by analyzing vast amounts of patient data, AI systems can detect patterns and anomalies that might elude human observation, leading to earlier and more precise medical interventions.

The workforce landscape is also poised for significant change with the integration of AI. While there are concerns about job displacement due to automation, AI's transformative potential can simultaneously create new opportunities in the burgeoning field of AI development and related areas. In fact, the integration of AI

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[6] S. Mohanty, M. Harun Ai Rashid, M. Mridul, C. Mohanty, S. Swayamsiddha, *Application of Artificial Intelligence in COVID-19 drug repurposing,* in *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 5, 2020*,* pp. 1027-1031.

[7] V.A. Shruthi Hegde, *Artificial intelligence in early diagnosis and prevention of oral cancer,* in *Asia-Pacific Journal of Oncology Nursing*, 12, 2022, 1-6.

is set to create a wealth of new employment opportunities, particularly in the Computer Science field and related areas. Projections indicate that AI could displace around 7 million existing jobs and generate around 7.2 million jobs between 2017 and 2037 in the UK alone, thus giving a positive net result and fostering economic growth and ensuring the distribution of prosperity among a broader range of individuals[8, 9]. The rise of AI has fueled demand for skilled professionals to design, implement, and maintain these systems, fostering a new generation of tech-savvy job seekers.

In the realm of safety-critical industries, AI plays a pivotal role in minimizing human error and averting disastrous consequences. In nuclear power plants, transportation systems, and medical facilities, where precision and vigilance are paramount, AI-driven solutions can act as fail-safe mechanisms, reducing the likelihood of accidents and safeguarding human lives.

With environmental issues taking center stage, AI offers hope for sustainability and responsible resource management. By analyzing data on resource consumption and environmental impact, AI systems can identify opportunities for optimizing processes, reducing waste, and devising eco-friendly solutions. These efforts contribute to preserving the environment and mitigating the human impact on climate change, fostering a more sustainable and greener future[10].

The potential societal impact of AI goes beyond economic and environmental domains. As AI liberates individuals from repetitive tasks, people gain more leisure time, which can be channeled towards personal growth, self-realization, and pursuing creative endeavors. The pursuit of happiness, enriched by AI's assistance, can lead to a society that values well-being and self-fulfillment as much as material wealth.

Moreover, AI acts as a catalyst for enhancing human agency, allowing people to transition from arduous labor to strategic decision-making. As AI takes on routine tasks, individuals can focus on activities that require critical thinking, creativity, and emotional intelligence. This shift fosters a culture of innovation and ingenuity, where human creativity flourishes in harmony with AI-driven efficiency.

AI's capacity to facilitate cooperation and amplify collective capabilities is evident in its data-intensive problem-solving approaches. By analyzing vast datasets and uncovering valuable insights, AI can inform

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[8] PRICEWATERHOUSECOOPERS (PWC), *AI will create as many jobs as it displaces by boosting economic growth*, 16 July 2018, available at https://www.pwc.co.uk/press-room/press-releases/AI-will-create-as-many-jobs-as-it-displaces-by-boosting-economic-growth.html (last accessed 23/09/2023).

[9] NEWSCIENTIST, *Robots and AI will actually create more jobs than they take*, 18 July 2018, available at https://www.newscientist.com/article/mg23931873-700-robots-and-ai-will-actually-create-more-jobs-than-they-take/ (last accessed 23/09/2023).

[10] A. MASOOD, K. AHMAD, *A review on emerging artificial intelligence (AI) techniques for air pollution forecasting: Fundamentals, application and performance,* in *Journal of Cleaner Production*, 322, 2021, 1-22; Z. YE, J. YANG, N. ZHONG, X. TU, J. JIA, J. WANG, *Tackling environmental challenges in pollution controls using artificial intelligence: A review,* in *Science of The Total Environment*, 699, 2020, 1-28.

evidence-based policies and guide decision-making on a larger scale. Societies armed with such AI-driven intelligence are better equipped to address complex challenges and forge a more cohesive and inclusive future. This applies to businesses, too: those which will not employ AI-based technologies will not be competitive enough[11]. Artificial Intelligence and the usage of large-scale datasets can therefore foster competition, thus creating novel products and playing a key role in lowering the prices.

Moreover, Artificial Intelligence could be utilized to enable human self-realization, enhance human agency, increase social capabilities, and cultivate social cohesion[12]. While enabling human self-realization is achieved when people have more free time which they can spend on activities they find more valuable, thus seeking happiness and their values, enhancing human agency allows a shift in paradigm: from "working hard" to "working smartly", which means workers can do more and better in less time thanks to the support provided by the AI itself. In this scenario, AI is a tool and not a competitor to humans, as we shall discuss in later sections.

Simultaneously, the ability of human beings to cooperate at large scales is enhanced[13]: societies could be improved to reduce wastage, give equal opportunities to more people and eventually promote the development of what humans are collectively capable of. However, even though people can collaborate at such large scales with success, the modern world is hugely complex. To understand such complexities, businesses increasingly rely on Big Data. While they can provide great value to a company, playing a crucial role in decision-making processes, Big Data are by nature hard to analyze and to work with: AI can help extracting meaningful and useful information from huge pieces of data thanks to its algorithmic data-intensive solutions. This can in turn improve productivity and help reducing costs, thus allowing an increasing amount of people to afford secondary goods and improve their quality of life.

However, we must tread carefully and address the ethical implications of AI adoption. Ensuring fairness, transparency, and accountability in AI systems is imperative to prevent amplifying existing societal disparities. By prioritizing human values and ethical considerations in AI development, we can create a technology that complements the human experience, empowering individuals and promoting social cohesion.

The transformative potential of AI, therefore, offers a spectrum of benefits that span from economic growth and enhanced access to vital resources to personal empowerment and societal cohesion. As we embark on this journey of technological progress, a responsible and ethical approach to AI implementation becomes

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[11] S. MAKRIDAKIS, *The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms*, in *Futures*, 90, 2017, pp. 46-90.
[12] L. FLORIDI, J. COWLS, M. BELTRAMETTI, R. CHATILA, P. CHAZERAND, V. DIGNUM, E. VAYENA, *AI4People - An Ethical Framework for a Good AI Society: Opportunities, Risks, Principles, and Recommendations,* in *Minds and Machines*, 28, 2018, pp. 689-707.
[13] Y.N. HARARI, *Why humans run the world*, 24 July 2015, available at https://www.youtube.com/watch?v=nzj7Wg4DAbs (last accessed 23/09/2023).

paramount. Embracing AI as a powerful ally in shaping a better world, we can channel its immense potential to address real-world challenges and foster a society that thrives on innovation, cooperation, and collective prosperity.

3.2. Ethical Issues

Artificial Intelligence has emerged as a transformative force, revolutionizing industries and redefining the future of work. With astounding advances in the automation of complex tasks, AI has surpassed expectations and brought previously unsolvable challenges within reach. For example, developing autonomous driving was once considered an insurmountable feat, yet AI-driven systems have now demonstrated impressive capabilities, with some companies achieving autonomous driving on highways and Tesla pioneering its «Full Self Driving» software that will eventually enable its cars to drive completely autonomously. At the time of this writing, their software is in beta, which means it is neither complete nor able to handle all situations. Nevertheless, it has proven to be quite good in several complex everyday situations.

Predicting the future trajectory of AI is a daunting task due to the rapid pace of its development. While past industrial revolutions laid the groundwork for the so-called «proletariat» and urban working classes, the current AI-led revolution brings with it the potential for a new phenomenon: it is the «useless class», a group composed of those unemployed and unemployable as AI replaces human labor[14]. As AI continues to outperform human counterparts in various activities, mass unemployment looms as a significant concern.

Should AI take over repetitive, mechanical tasks, jobs once held by humans could vanish. Many individuals rely on menial jobs for their livelihoods[15], which are precisely the type of tasks that are easiest to automate. This scenario paints a picture of potential widespread job displacement, raising ethical questions about the indiscriminate and unregulated use of AI and its impact on society.

For example, in the United States of America nearly half of all jobs revolve around administrative and clerical work, retail and sales, food-related services, truck driving, transportation, and manufacturing[16]. Interestingly, only 32% of Americans graduate from college, with the average worker holding a high school diploma and likely engaged in one of the aforementioned professions. However, technology has already begun to infiltrate these fields, potentially leading to sudden job displacement without adequate preparation for affected

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[14] Y.N. HARARI, *The Future of Humanity - with Yuval Noah Harari*, 28 September 2016, available at https://www.youtube.com/watch?v=XOmQqBX6Dn4 (last accessed 23/09/2023).

[15] D. CUMMINS, *The Real Reasons People Hate Their Jobs,* in *Psychology Today*, 9 June 2014, available at https://www.psychologytoday.com/us/blog/good-thinking/201406/the-real-reasons-people-hate-their-jobs (last accessed 23/09/2023).

[16] A. YANG, *Andrew Yang Makes the Case for Universal Basic Income on Joe Rogan*, 29 March 2019, available at https://www.youtube.com/watch?v=hS9wOdenEys (last accessed 23/09/2023).

workers. Retraining to acquire new skills can be a time-consuming and arduous process, and previous experiments in the USA have yielded limited success, with only 0% to 15% of participants securing more qualified jobs[17].

Navigating this shifting landscape requires a thoughtful and ethical approach. It is essential to question the societal benefits and ethical implications of AI implementation. Addressing the potential «useless class» phenomenon and the impact of AI on the workforce calls for proactive solutions to retrain and up-skill workers. Policymakers, educators, and industries must collaborate to develop comprehensive strategies that equip individuals with the necessary knowledge and expertise to thrive in an AI-driven world.

Amid these challenges, AI offers unparalleled opportunities for societal progress. As repetitive tasks are automated, humans can redirect their focus towards creative, cognitive, and emotionally complex endeavors. AI serves as an empowering tool, augmenting human capabilities and fostering a culture of innovation and intellectual growth.

To harness the potential of AI and maximize its benefits, a balanced approach is vital. Creating policies that ensure AI is applied ethically and responsibly while addressing job displacement through effective reskilling programs is essential. Embracing AI as a transformative ally can lead to a future where human ingenuity and AI-driven efficiency collaborate harmoniously, shaping a society that thrives on innovation, collaboration, and collective prosperity.

To summarize, the transformative power of AI holds immense promise for our world, offering unparalleled advancements across industries. The challenge lies in navigating the potential job displacements and ethical implications thoughtfully. By fostering proactive strategies and adopting AI responsibly, we can unlock its vast potential to uplift humanity, enhance societal progress, and pave the way for a future where human potential and AI ingenuity coalesce in a harmonious partnership.

3.3. Regulations

As the transformative power of AI rapidly reshapes the cultural, economic, workplace, and social landscapes, there arises a pressing need for regulations that safeguard our society from potential adverse effects. The profound impact of AI, particularly on the automation of jobs, necessitates the creation of comprehensive laws to govern its use and operation. We should also ensure that AI operates within ethical boundaries similar to those imposed on human workers. Only when AI-powered systems follow all these guidelines, respecting human labor and operating in a well-defined ethical framework, can we strive to strike this fundamental delicate balance between harnessing the benefits of AI and preserving the well-being of our workforce.

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[17] A. YANG, *op. cit.*

Proposals and initiatives for AI regulations have already been set in motion, with the European Union leading the way through its groundbreaking "Artificial Intelligence Act" (AI Act)[18,19,20]. Designed to establish standardized rules across EU member states, the AI Act could wield a profound influence beyond the European borders, thanks to the phenomenon known as the "Brussels effect"[21]. This effect could extend the regulatory impact of the AI Act to other countries worldwide, setting a global precedent for responsible AI deployment and making the European Union the leading player in this groundbreaking field.

The entities subject to the obligations of the AI Act will be primarily "providers" of systems who develop Artificial Intelligence systems with the aim of placing them on the European market or putting them into service under their own name or trademark (Article 3). Obligations, however, may also apply to the "users", defined as any natural or legal person "using an AI system under its authority" – for example, an employer running an automated hiring system. Hence, this definition is different than those of the "ultimate end user" or the "data subject" in the GDPR[22].

The AI Act focuses on categorizing AI systems based on their level of risk, ranging from unacceptable risk to minimal risk. The AI Act takes a proactive approach to assessing and managing the varying degrees of risk associated with AI systems. This risk-based categorization allows for a nuanced understanding of the potential impacts of AI deployment and guides policymakers in formulating appropriate regulations for each category.

At the forefront of the AI Act are "unacceptable risk" systems, where the potential for harm or misuse is serious and unacceptable. In order to protect individuals from intrusive applications that could threaten their privacy, autonomy, or fundamental rights, these systems are explicitly prohibited. An example of such a system is one which aims at the placing on the market, putting into service or use of AI systems by public authorities or on their behalf for the evaluation or classification of the trustworthiness of natural persons over a certain period of time based on their social behavior or known or predicted personal or personality

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[18] Proposal for a Regulation of the European Parliament and the Council laying down harmonized rules on artificial intelligence (Artificial intelligence act) and amending certain union legislative acts, COM/2021/206 final.

[19] L. EDWARDS, *The EU AI Act: a summary of its significance and scope*, 8 April 2022 available at https://www.adalovelaceinstitute.org/wp-content/uploads/2022/04/Expert-explainer-The-EU-AI-Act-11-April-2022.pdf (last accessed 6/10/2023).

[20] B. MUELLER, *The Artificial Intelligence Act: A Quick Explainer,* 4 May 2021, available at https://datainnovation.org/2021/05/the-artificial-intelligence-act-a-quick-explainer/ (last accessed 23/09/2023).

[21] A. BRADFORD, *The Brussels Effect: How the European Union Rules the World*, New York, 2020.

[22] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and re-pealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119.

characteristics (AI Act, Title II, Article 5)[23]. Thus, the AI Act provides a robust safeguard against abusive practices that could lead to discrimination or profiling by explicitly prohibiting the use of AI to evaluate individuals based on social behavior or personality traits.

While "high risk" AI systems are not banned outright, they are subject to rigorous scrutiny through conformity assessments. This rigorous evaluation process will ensure that such systems are held to a high standard of safety and ethics. The focus on safety is particularly important in areas where AI has a significant impact on human lives, such as healthcare or transportation. By subjecting high-risk systems to thorough evaluations, the AI Act aims to promote trust and accountability in the use of AI technologies.

"Limited risk" AI systems operate with a lower degree of potential harm, but transparency remains a key principle in their deployment. The AI Act mandates that these systems be transparent in their operations. This promotes openness and understanding among users and stakeholders. This transparency encourages responsible use and accountability, while empowering individuals to make informed decisions about AI applications that affect them.

"Minimal risk" AI systems are not exempt from ethical considerations, even if they pose little or no direct harm. Even in cases where risks are minimal, adherence to a code of conduct ensures ethical practices in all AI deployments. Adhering to ethical standards in all AI applications fosters a culture of responsible innovation and helps build public trust in AI technologies.

Therefore, the AI Act's risk-based categorization reflects a comprehensive approach to effectively regulating AI systems. By explicitly prohibiting unacceptable risk applications, rigorously evaluating high risk systems, and prioritizing transparency and ethics in limited and minimal risk systems, the AI Act seeks to strike a fine balance between fostering AI innovation and protecting human values. As AI continues to transform our society, these regulations play a critical role in fostering an environment of trust, fairness, and accountability in the responsible development and deployment of AI technologies.

While the prohibition of certain unacceptable-risk AI systems protects against the most intrusive applications, it alone is insufficient to address the large-scale job displacement caused by AI automation. The requirement for human oversight in high-risk systems may generate new job opportunities, but it remains inadequate to mitigate the potential loss of millions of existing jobs. Thus, a multifaceted approach to regulation is indispensable to manage the broader societal ramifications of AI advancement.

Navigating the complexities of AI regulation requires continuous adaptation to the evolving technology landscape. The regulatory framework must be agile and responsive to the rapidly changing nature of AI,

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[23] Proposal for a Regulation of the European Parliament and the Council laying down harmonized rules on artificial intelligence (Artificial intelligence act) and amending certain union legislative acts, COM/2021/206 final.

ensuring that it remains relevant and effective in the face of unforeseen developments. For this reason, the AI Act is designed with a "modular" structure which can be easily extended by updating the definitions in the Annexes. The "core" of the regulation is based on several Annexes that exemplify and unambiguously define many concepts. While changing the AI Act itself requires lengthy procedures, adapting these Annexes is much easier. This makes the AI Act flexible and able to quickly adapt and respond to sudden and possibly abrupt changes in the development of Artificial Intelligence systems.

Moreover, AI regulations must emphasize inclusivity and equitable access to AI-driven opportunities. By promoting diversity in AI development and deployment, we can mitigate biases and ensure that AI technologies cater to the needs of diverse populations. Additionally, investing in education and training programs to upskill workers is crucial to prepare them for the evolving job market and create a workforce equipped to thrive alongside AI systems.

Collaboration between governments, industry leaders, and AI experts is paramount to formulate comprehensive regulations that foster innovation while protecting societal interests. Transparent communication between stakeholders and the public will build trust in AI technologies and facilitate responsible implementation, thus benefitting both businesses and people.

There is both immense promise and potential challenge in the advent of AI. To harness its transformative power for the greater good, we must implement regulations that strike a delicate balance between innovation and protection. The European Union's AI Act sets a laudable precedent, but global cooperation and adaptability are essential to address the myriad complexities of AI's impact on our society. By nurturing an ethical and inclusive AI ecosystem, we can empower humanity to embrace AI-driven advances while ensuring the well-being and prosperity of our workforce in the ever-evolving digital age.

4. Possible Solutions

The resolution of the complex ethical issues surrounding AI will require a concerted effort on the part of intellectuals and policymakers around the world. Eminent individuals like Raymond Dalio, Yuval Noah Harari, Andrew Yang, and Elon Musk have waded into these complicated waters and offered diverse perspectives on potential solutions. While there is no one-size-fits-all solution, countries need to be diligent in exploring and considering different options in order to forge their own unique paths toward responsible AI governance. The proactive engagement of intellectuals and thought leaders plays a critical role in raising awareness and fostering dialogue about the ethical implications of AI. Ray Dalio, a prominent American investor and hedge

fund manager, explores the problems brought by automation and the possible solution of Universal Basic Income (UBI)[24].

Yuval Noah Harari, an eminent Israeli historian and public intellectual, draws attention to the profound societal changes that AI will bring[25]. Harari emphasizes the importance of balancing technological advances with a strong ethical foundation. His work underscores the importance of developing policies that put human values, the protection of privacy, and fairness at the forefront of AI applications.

Andrew Yang, an American businessman and former political candidate, champions the concept of Universal Basic Income as a potential solution to mitigate job displacement caused by AI automation[26]. By providing citizens with a guaranteed basic income, UBI could buffer the impact of widespread job loss and empower individuals to adapt to the evolving job market.

Elon Musk, the visionary business magnate and investor, advocates for proactive regulation to ensure AI's responsible development. Musk's stance underscores the necessity for governments and legislators to possess foresight in anticipating AI's far-reaching effects and devising regulatory frameworks that foster innovation while safeguarding societal well-being, for example through UBI[27].

While prominent figures offer valuable insights, the formulation of AI policies remains a complex interplay of domestic considerations, historical context, and cultural values. Different countries will inevitably chart unique paths in addressing ethical AI issues. Tailor-made policies will be essential to reconcile the distinct socio-economic realities and technological landscapes of individual nations.

In seeking high-level approaches to ethical AI governance, transparency, collaboration, and international cooperation are paramount. Intellectuals, policymakers, and industry leaders must engage in cross-border exchanges to share best practices and develop universal principles that guide AI development globally. By fostering a collaborative ecosystem, nations can collectively work towards responsible AI deployment and effectively tackle the challenges posed by the AI-driven revolution.

Some general high-level approaches are discussed below.

4.1. Universal Basic Income

Among the myriad proposals to tackle, UBI offers an unconditional financial lifeline to all citizens, regardless of age or socioeconomic status, providing a steady stream of income directly from the government budget.

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[24] R. DALIO, *Ray Dalio: Automation and Universal Basic Income | AI Podcast Clips*, 7 December 2019, available at https://www.youtube.com/watch?v=bCtOFZoCvBE (last accessed 23/09/2023).

[25] Y.N. HARARI, *Homo Deus: A Brief History of Tomorrow*, London, 2016.

[26] A. YANG, *op. cit*.

[27] E.R. MUSK, *Elon Musk says Universal Basic Income is "going to be necessary"*, 15 Februray 2017, available at https://www.youtube.com/watch?v=e6HPdNBicM8 (last accessed 23/09/2023).

By serving as a comprehensive replacement for other publicly funded support programs, UBI aims to lift recipients above the poverty line, making it an ambitious and transformative social policy[28].

At its core, UBI seeks to secure the basic needs of individuals by ensuring that the cost of living is covered. UBI envisions a society where no citizen has to worry about subsistence, allowing them to focus on personal growth, self-realization, and broader contributions to society through the provision of a "Minimum Basic Income"[29]. With no eligibility criteria other than citizenship, UBI establishes a universal safety net that promotes equality and social cohesion.

The potential impact of UBI on society stretches far beyond mere financial support. As AI-driven automation begins to replace traditional jobs, UBI could emerge as a key enabler of a future in which people are freed from repetitive tasks. With this newfound freedom, individuals will be empowered to pursue creative endeavors, engage in lifelong learning, and take part in activities that enhance social skills and promote collective prosperity. UBI, in conjunction with AI, could unlock a world in which the human race realizes its full potential, fostering a culture of innovation and purposeful contribution.

Economically, UBI offers an effective approach to the challenges of globalization, aging populations, and ongoing technological advances. By narrowing the wealth gap between capital holders and low-skilled workers, UBI can mitigate the growing polarization within society and promote a sense of economic security and dignity for all. Moreover, UBI serves as a buffer against the potential job displacement caused by AI automation, providing individuals with the financial stability to adapt to changing labor markets and explore new opportunities.

While the benefits of UBI are considerable, some critics raise concerns about its potential drawbacks[30]. A key argument centers on the lack of control over how UBI funds are spent. Critics fear that some recipients may spend the income unwisely, leading to financial instability rather than genuine poverty alleviation. Discussions of UBI implementation must therefore also address financial literacy and education to ensure that individuals make prudent financial decisions.

Another complex consideration is how to finance UBI. One proposal suggests taxing companies that use AI systems to replace human workers. The revenue generated by this tax could be channeled into the financing of UBI, thus ensuring that the benefits of AI-driven efficiency are reinvested back into society in order to promote the collective well-being.

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[28] T. STRAUBHAAR, *On the Economics of a Universal Basic Income,* in *Intereconomics*, 52, 2017*,* pp. 74-80*.*

[29] KURZGESAGT - IN A NUTSHELL, *Universal Basic Income Explained – Free Money for Everybody? UBI*, 7 December 2017, available at https://www.youtube.com/watch?v=kl39KHS07Xc (last accessed 23/09/2023).

[30] A. FLOWERS, *What Would Happen If We Just Gave People Money?*, 25 April 2016, available at https://fivethirtyeight.com/features/universal-basic-income/ (last accessed 23/09/2023).

However, this is a challenging and idyllic solution: while it could work well from a conceptual point of view, there are many caveats that need to be addressed if a country decides to go down this path. Proper asset allocation to ensure a continuous and guaranteed flow of money from the government to the citizens is crucial: even one wrong, abrupt decision can potentially crash the entire system, leaving millions of people without any means of sustaining themselves.

In the age of AI, however, Universal Basic Income is emerging as a transformative and forward-looking solution. By providing an unconditional financial lifeline to all citizens, it seeks to elevate humanity beyond mere survival, fostering an environment where self-actualization and societal contribution take center stage. As we embrace the possibilities of AI, UBI stands as a powerful mechanism for empowering individuals, bridging socio-economic gaps, and creating a society that thrives through the harmony of technology and human potential. Policymakers, intellectuals, and communities must engage in a robust dialogue to navigate the complexities of effectively implementing UBI, capitalizing on its promise while addressing concerns, and forging a future that thrives in the AI era.

4.2. Human-Machine Cooperation

Among the various proposals to address the challenges posed by AI-driven automation, Universal Basic Income has emerged as a potential solution to the problem of mass unemployment, often referred to as the "useless class" by experts like Dr. Harari[31]. However, while UBI can provide financial support to individuals, it does not fully address the ethical concerns that surround the relationship between the human being and the labor force. For many, working is not just an economic endeavor; it carries a deep sense of purpose and self-realization. People find meaning and fulfillment in their work because it allows them to use their strengths, pursue their interests, and pursue life projects that contribute to personal growth and societal progress.

The profound interdependence between the individual and the work he or she performs goes beyond mere economic considerations. In fact, the value of work is so significant that it finds its place at the very heart of constitutions, as exemplified by the Italian Constitution, even in its Fundamental Principles. Article 1 of the Italian Constitution firmly declares that «Italy is a Democratic Republic founded on labor»[32], emphasizing the intrinsic link between people and the work they perform. This sentiment is further reinforced by Article 4: «The Republic acknowledges the right of all citizens to work and shall promote conditions which will make this right effective. Every citizen has the duty, in accordance with their capability and choice, to perform an activity or function that contributes to the material or spiritual progress of society»[33]. Therefore, Article 4

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[31] Y.N. HARARI, *The Future of Humanity - with Yuval Noah Harari,* cit*.*
[32] Art. 1 Cost.
[33] Art. 4 Cost.

recognizes the right of all citizens to work and emphasizes the duty of individuals to engage in activities that contribute to the material and spiritual progress of society. Such constitutional recognition highlights the essential role of work in shaping modern societies and underscores the ethical imperative of preserving the dignity and meaning of work.

As the march of AI-driven automation progresses, societies must grapple with the profound implications it poses for the workforce. While UBI offers a financial safety net, it does not fully address the underlying human need for meaningful engagement in productive endeavors. To tackle this challenge, an alternative approach emerges in the form of "human-machine cooperation". Rather than setting humans against machines, this approach seeks to forge a collaborative partnership between human ingenuity and AI-driven automation.

Human-machine cooperation envisions a future where AI augments human capabilities, rather than replacing them. It involves leveraging AI's efficiency and automation to handle repetitive and alienating tasks, freeing humans to focus on higher-order decision-making and creative processes. By aligning the strengths of both humans and machines, this approach has the potential to revolutionize the nature of work and ensure a symbiotic relationship between human labor and technological advancements.

Expanding on the concept of human-machine cooperation, it becomes evident that this approach not only addresses the ethical concerns surrounding AI-driven automation but also offers potential solutions to the challenges posed by the displacement of low-qualified workers. While regulations may protect existing jobs, they may not suffice in the long run to accommodate the millions of workers who have been displaced due to the integration of AI. As AI seeks to lower costs and streamline processes, it is crucial to devise strategies that facilitate the integration of AI systems with human labor rather than solely replacing it.

This concept of cooperation aligns with the idea of empowering individuals to fulfill their potential and derive satisfaction from their contributions to society. In this cooperative paradigm, AI becomes a tool to enhance human decision-making, problem-solving, and creativity, rather than a substitute for human labor.

In pursuit of this goal, one potential avenue lies in enhancing the integration between AI systems and human workers to leverage the unique strengths of both. In the legal system, for example, AI could be utilized to assist judges in seeking the "truth" and analyzing vast legal databases, providing objective insights while preserving the judges' autonomy in making final decisions. This cooperative approach fosters a more efficient and informed justice system, where AI serves as a valuable tool rather than a substitute for human judgment. Similarly, in law enforcement, AI-powered robots can be deployed to assist police officers in dangerous situations, such as bank robberies or apprehending armed criminals. By working hand in hand with human

officers, AI systems can help ensure public safety while allowing human judgment and decision-making to remain paramount, especially in complex and unpredictable scenarios.

Truck drivers, particularly long-distance lorry drivers, may benefit from AI assistance to enhance their efficiency and safety on the roads. Instead of replacing human drivers, AI can assist in navigating routes, optimizing fuel consumption, and even providing real-time information on traffic and road conditions. This collaborative model empowers drivers to make informed decisions, retain control over their vehicles, and maintain their moral responsibility while benefiting from AI-driven efficiency gains.

In the medical field, AI can play a transformative role in healthcare while preserving the human-to-human connection between physicians and patients. AI systems can analyze vast medical data, assist in diagnosing complex conditions, and suggest personalized treatment plans. However, the compassionate and empathetic care that only human healthcare providers can offer remains indispensable. Patients often find comfort and emotional support in the presence of a real person, and human physicians play a pivotal role in fostering trust and facilitating the healing process. Therefore, human-machine cooperation recognizes the irreplaceable value of human empathy and emotional intelligence.

The desire for both efficiency and human connection is deeply ingrained in human nature. While AI can undoubtedly deliver unprecedented efficiency and precision, it lacks the ability to form genuine emotional connections and understand the intricacies of human emotions fully. AI's strengths lie in its capacity to process vast amounts of data and make data-driven decisions, while human strengths encompass emotional intelligence, creativity, and empathy.

The potential for AI to bridge the gap between efficiency and human connection holds profound implications for various industries. In education, AI-powered systems can offer personalized learning experiences, leveraging data analytics to tailor educational content to individual needs and learning styles. However, the role of educators extends beyond the mere dissemination of information: they inspire and motivate students, instilling a love for learning and critical thinking skills.

Furthermore, in customer service, AI-driven chatbots can handle routine inquiries and streamline customer interactions, but human agents remain essential for addressing complex issues, handling emotional situations, and providing a personalized touch that customers appreciate. By integrating AI into customer service processes, companies can enhance efficiency and responsiveness while still preserving the human element in customer interactions.

As such, human-machine collaboration represents a transformative approach to the challenges of AI-driven automation. By integrating AI systems with human work rather than replacing it, this collaborative model can leverage the unique strengths of both, resulting in more informed decisions, increased efficiency, and enhanced human experiences. The regulatory landscape must adapt to foster this collaboration, while

ethically deploying AI and protecting human dignity and purpose. As societies embrace this paradigm, they can navigate the future with confidence, harnessing the potential of AI to enhance human potential and build a more inclusive and prosperous world.

But this is not without its challenges. Ethical considerations must be at the forefront of the implementation of AI technologies, to ensure that they are in line with human values and societal norms. Ongoing research, public discourse, and strong regulatory frameworks are needed to strike the right balance between AI capabilities and human involvement. Through the promotion of a culture of cooperation and understanding, societies can embrace the potential of AI without undermining the value and dignity of human work.

5. Conclusion

In conclusion, the rise of Artificial Intelligence presents both opportunities and challenges for the future of work and society as a whole. While many concerns about job displacement are valid, it is essential to recognize that AI has the potential to liberate individuals from mundane and unfulfilling tasks. Studies have shown that many people are dissatisfied with their jobs, often feeling undervalued and confined to repetitive roles for extended periods. Thus, embracing AI as a means to free humanity from such drudgeries could lead to a more meaningful and rewarding existence.

Achieving this positive vision, however, requires a paradigm shift from viewing AI as a mere "job destroyer" to viewing it as an unlocking human potential. Alongside the concept of Universal Basic Income, cooperation between humans and machines is emerging as a viable solution. Through AI's assistance in automating alienating tasks, individuals can focus on more meaningful activities, such as spending time with loved ones, pursuing cultural interests, and engaging in personal growth and learning. In this way, AI can be a complement to human capabilities rather than a replacement for them, fostering a harmonious relationship between technology and society.

That said, it is critical to acknowledge that the integration of AI into the workforce will require a large-scale restructuring of organizations. Effectively implementing AI systems requires not only adapting workplaces, but also reskilling the workforce to take full advantage of these technologies. It is essential that this transition is managed properly in order to minimize disruption and ensure a smooth path into the future.

Considering AI's potential for both positive and apocalyptic scenarios, it is vital to strike a balance between innovation and responsible governance. Encouraging transparent and future-proof regulations can safeguard human rights, mitigate negative impacts, and guide the ethical development and deployment of AI technologies. By encouraging open dialogue and awareness, the society can make informed decisions and harness AI's potential to uplift the well-being of humanity.

The ongoing AI-led revolution also demands a forward-looking approach. As AI continues to evolve, the intersection of different ideas and measures will be crucial. It is difficult to predict with certainty what the future holds, making adaptability and flexibility paramount in addressing the challenges that may arise.

In order to shape the trajectory of AI development, it is essential to take a proactive approach. By collaborating with government, industry, and academia, a collective effort can be made to ensure that AI innovation serves the collective interest. Education and lifelong learning initiatives can empower individuals to confidently navigate the changing workplace, ensuring they remain relevant and valuable contributors to the evolving workforce.

Ultimately, AI's potential goes beyond technological advancement; it can revolutionize the quality of life for individuals and communities. But to fully realize its benefits, we must remain committed to aligning AI with human values, ethical principles, and the needs of society. In doing so, we can create a future in which AI serves as a powerful tool for social progress and human flourishing.

As we pursue this goal, ethical considerations should be the bedrock of the development of AI. An emphasis on transparency, accountability, and fairness will be paramount to ensuring that AI systems are not only effective, but also trustworthy and responsible. Building AI technologies on an ethical foundation will increase public trust and alleviate concerns about potential negative consequences.

In addition, it is essential to address the potential biases embedded in AI algorithms. Left unchecked, these biases can amplify existing inequalities and contribute to systematic discrimination. By actively working to identify and correct biases in AI systems, we can promote inclusivity and equality, and ensure that AI contributes to a more just and equitable society.

In conclusion, while concerns about the displacement of jobs by AI are valid and critical to the creation of a legislative foundation, we can approach the AI revolution with optimism, recognizing its potential to enhance human lives rather than threaten them. Embracing the cooperation between humans and machines, along with policies such as Universal Basic Income, can open up new opportunities for the entire population. It is vital that we understand how AI can threaten our entire society, so that we can proactively work to prevent it. With precautionary and future-proof regulations, AI can be well balanced with human rights, duties and needs. Artificial intelligence may be the best candidate ever for the advancement of the interests of human society, combining high-tech innovation and research with human needs.