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Artificial Intelligence as a Factor for Technological Unemployment and Dehumanization of the Labor Market

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A B S T R A C T

This article examines the growing role of artificial intelligence as a potential driver of technological unemployment and dehumanization of the labor market. It explores how AI systems are gradually replacing human work in various industries and how this could impact workers in the future. It also discusses ethical issues related to the lack of transparency in complex algorithms such as "black box" algorithms and the need for accountability of AI developers. It raises the importance of maximizing the benefits of AI for society while minimizing potential negative consequences such as uneven job redistribution. It proposes ensuring human agency and democratic participation in decision-making about the development and use of AI. Finally, it concludes that regulatory frameworks and robust institutions are required to properly manage the transition to a more automated and technologized economy.

Keywords: Artificial intelligence; technological unemployment; automated decision-making; structural inequities.

Automation will not only reduce the number of workers required to produce a given product but also require less skilled workers to produce it.

P.S. Adler, 1993.

Introduction

Only now, by the end of the year 2023, when AI is present in numerous everyday devices, are we truly beginning to understand both the opportunities and risks that these tools create. While significant progress has been made in the ethical analysis of AI (Morandín-Ahuerma, 2023), there is a perceived need for philosophy to address this and many other global issues.

It is not clear if the current debates on equity and responsibility in the workplace are the appropriate starting point in a widespread manner. Perhaps "glocal solutions" may generate more effective ideas (Geddes, 1915). However, even under the most favorable circumstances, this debate relies on the designers and implementers of AI to disclose how these systems operate in order to improve attention to production chains and society, rather than solely pursuing economic gains.

Automotive assembly plants serve as a prominent example in this regard. On the one hand, there is a need to achieve high levels of productivity and meet established quantitative goals. On the other hand, it is crucial to comply with internationally recognized quality standards, which are achieved through the skill and dexterity of human labor in each component (Martinho-Truswell et al., 2018).

Currently, only a small fraction of society is engaged in designing and developing a set of technologies that are transforming the daily lives of almost everyone else (Hauer, 2022). Most of these individuals understand how artificial intelligence will replace humans in the future, and therefore, they must take responsibility for their actions and be held accountable for them. It is crucial to avoid the atomization and even disappearance of the chain of responsibility, which has been a trend thus far.

As artificial intelligence advances and enhances work efficiency, a future full of opportunities for creativity, productivity, and overall fulfillment emerges. Artificial intelligence has the potential to enable people to thrive in their lives and pursue paths they are passionate about, while also opening up new possibilities that were once unimaginable. Its broader application allows individuals to focus on what they love and lead more interesting and satisfying lives, freeing them from monotonous and repetitive tasks. However, for this transition to be positive for society as a whole, it is essential to manage it properly (O'Keefe et al., 2020).

If effectively designed, artificial intelligence systems can highlight and leverage the best of collective human capabilities while enabling strengths that go beyond what any individual could achieve alone. These systems have the potential to offer not only skills beyond current capacities but also a fairer and more efficient distribution of resources, promoting a sustainable approach to consumption and progress. This has been the promise of artificial intelligence developers.

Fig. 1.- Employment has experienced a relative decline in sectors such as manufacturing. Starting from the 1950s, automation and mechanization have allowed for greater efficiency and productivity in industrial production. This has led to a reduction in the number of workers needed in manufacturing, as machines and technology have replaced many tasks previously performed by workers. Additionally, globalization and international competition have led to the relocation of some manufacturing industries to countries with lower labor costs. (Source: Economics-help, 2020)

Until today, it has been considered a human characteristic to replace people with machines in work processes with adverse conditions and specific characteristics. For example, in hazardous jobs involving contact with harmful substances, physically exhausting tasks, work in extreme temperature environments, routines around fast-moving machinery that can cause injuries to those nearby, and jobs requiring intense concentration for long periods of time (Moradi & Levy, 2020).

The substitution of labor by machines has been a consistent trend for decades. As early as 1948, Norbert Wiener, considered the father of cybernetics, warned about the significant impact of technology on employment and how it could lead to conflicts (Wiener, 1948). It is easy to imagine, as it is happening today: people whose skills are degraded and who lose their jobs due to artificial intelligence. While some may not worry about having jobs that can be easily replaced by machines, others are genuinely concerned about finding a balance between creativity and the technologically and artificially intelligent world that has emerged, due to the threats it entails.

Making decisions about one's professional life can generate overwhelming stress, especially when there are many factors pulling in different directions. The stress of having to choose what to do with one's professional life in the face of the growing presence of machines can cause some individuals to lose sight of their identity, intrinsic value, and desires for the future in an increasingly robotized world.

It is necessary to recognize the potential of this new technological revolution for some people to unexpectedly lose their jobs or for the transition to a new type of work to generate significant financial problems for many. This entails the devaluation of unskilled labor and the end of the added value that the worker represented since machines can now generate the same output at a lower cost (Lee, 2021).

Decision-Making Process

The use of artificial intelligence (AI) tools in university classrooms has been a topic of increasing interest and research. Jianxue (2020) and Dilmurod (2021) both highlight the potential of AI as an auxiliary tool in teaching and learning, with Dilmurod emphasizing its role in enhancing the educational process and individualizing learning strategies. Abbas (2023) further explores the impact of AI tools on students' educational performance, underscoring their potential to improve learning outcomes and engagement. However, Popenici (2017) raises important considerations, such as the need for effective implementation strategies, teacher training, and ethical considerations, as well as the potential challenges in the adoption of AI technologies in higher education.

The world has experienced significant changes with the increasing communication between computers and their ability to interact with users. This has led to a greater need to carefully consider goals when writing computer programs. One fundamental principle in this context is to ensure that machines do not unjustly, illegally, or unethically restrict or promote human freedom. Governments, companies, and corporations can all use powerful and opaque algorithms to both help and harm people. However, it is not just them— even small teams of programmers can develop astonishing programs like Google's AlphaGo and DeepMind's AlphaZero, which defeated the world's top players in games like chess and Go in a matter of weeks (Bory, 2019). These technologies are believed to have the potential to transform the world for the better, but it is also recognized that they can be compromised if not used properly. The problem lies in the fact that almost no one truly understands how they work or make decisions until the direct results are experienced.

We agree that artificial intelligence (AI) is much more complex than simply stating that it is neutral and its impact depends on how it is used. AI systems are complex and can learn on their own, and while they do not have their own will or agency, deep learning in artificial neural networks can emulate human cognitive abilities and even surpass them in speed in some cases.

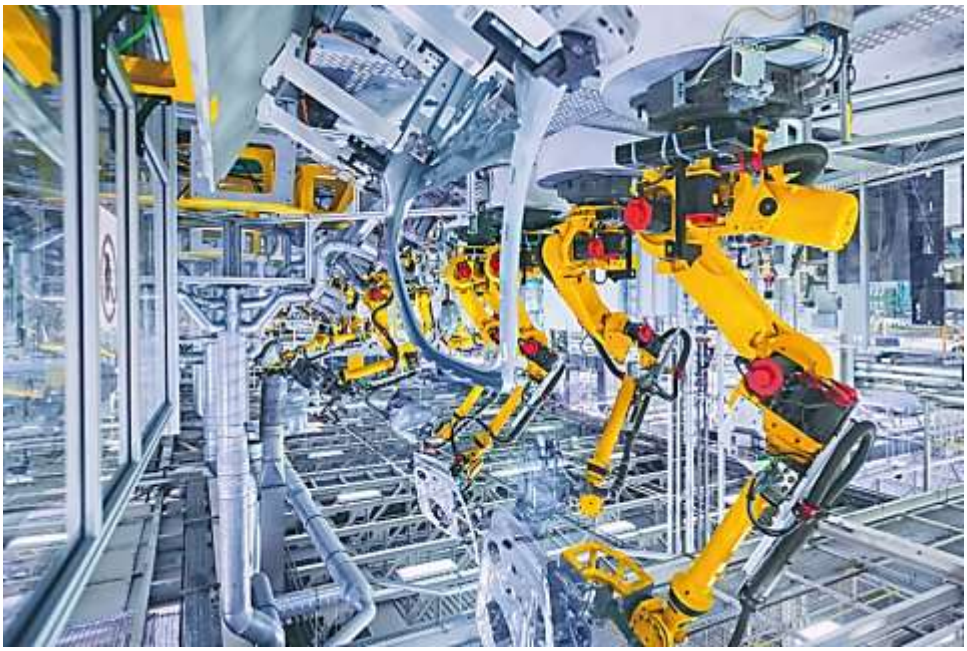

Fig. 2.- The automation of labor in factories has left a high percentage of the population at risk of losing their jobs in industrialized countries due to the increased efficiency and productivity it offers, as well as the reduction in labor costs it entails, which has led to a decrease in the demand for human workers in various sectors. (Source: EDAG Group, 2020)

It is crucial to ensure that AI systems maximize human agency and that machine agency does not replace it in critical decision-making. Effective coordination between humans and algorithms is a challenging task, so better ethical frameworks for AI are needed, where the meaning is clear and understandable to all parties involved.

While AI can help address many challenges, we cannot rely solely on technological solutions to solve social and labor problems. It is essential to have strong labor policies based on democratic participation and the equitable distribution of benefits generated by technology investments. Several studies have explored how AI advancement can facilitate social coordination to promote responsible technological change oriented towards the common good.

The principle of explainability in AI is truly important, although it can be controversial. The idea is to understand how and why computer technologies make decisions, especially in situations where they restrict human autonomy, such as in labor-replacing production chains. For technology to be fair, those who own and develop it must be held accountable for their creations, not only in immediate technical terms but also in relation to long-term consequences. Additionally, people affected by technological development must understand the threats and consequences of intensive use of new technologies and be prepared for them (Floridi et al., 2021).

As more is discovered about AI's ability to mimic human cognition and even creativity, and to solve problems that were once considered unsolvable, it becomes clear that the potential role of machines in modern life goes beyond being simply "complex calculators." By including the principle of explainability, there is a quest to better understand how decision-making technology can be harnessed for the benefit of society, encompassing both intelligibility and accountability.

In a constantly changing world, people's ability to act freely is often limited by the control exerted by those making decisions at a macro level. An example of this is the social credit system implemented in the People's Republic of China, based on AI, which classifies the reputation of citizens through the collection of personal data. A similar system is also being implemented for companies, offering sanctions and incentives based on information gathered about their corporate behavior by government authorities. These systems can be perceived as embodiments of AI processes that promote control over people's destinies, but do not apply to the AI itself or those who extensively use it, despite being legally permissible but not necessarily moral.

It is not difficult to imagine a future where AI plays a profound role in the daily lives of almost everyone. In China, it is already the present. However, something is concerning: AI processes will increasingly become mostly invisible. People will feel increasingly frustrated by their lack of knowledge, and as a result, these technologies will perplex society. AI processes, especially those stemming from "black box algorithms," are described in many different ways: as invisible, opaque, and incomprehensible. These descriptions align with the issue of explainability. Through this principle and the accompanying ethics, there is a call for reflection on the type of AI that should be created. The so-called "black box algorithms" are those in which the user cannot observe how the information is being utilized. Their developers describe them as a system for security and privacy to prevent data leaks and unfair competition, but the secrecy and lack of transparency they contain make them a controversial system, to say the least (Doerr et al., 2015).

The Ethical Implications of AI: Balancing Potential Benefits and Risks

The ethos of AI is the lack of awareness of potential negative consequences on individuals and society. For example, some of these risks have been well-documented in the field of bioethics (Blasimme & Vayena, 2020; Morley et al., 2021). Hypothetical situations such as doctors leaving patients in the hands of computers or patients being treated based on big data analysis without their knowledge or consent (Morley et al., 2021; Oueida et al., 2018) have been discussed. However, in the face of uncertainty regarding what new technologies are capable of, the discourse focuses on situations of risk, but ultimately still hypothetical, regarding the advantages that full automation of processes may have (Morandín-Ahuerma, 2019). More research is needed to understand how AI will impact human lives, but it is also acknowledged that there is little to be done to stop the development, as the race for automation of decisions and jobs is almost predetermined to occupy a prominent place. This recognition reflects what seems to be a widespread perception among AI developers that as new technologies become more complex and powerful, it becomes increasingly difficult for laypeople to understand exactly what these technologies do and how they function, beyond the direct repercussions that may affect them (Ajunwa & Schlund, 2020).

As technologies and labor markets evolve, unskilled workers will face significant challenges. They will be pressured to be more flexible, work harder for less money, and in increasingly difficult working conditions. Additionally, the fragmented nature of the labor market will allow employers to have greater control over the lives and livelihoods of their workers (Sánchez, 2015). These frictions in the labor market can also make job-seeking more difficult for underrepresented groups such as women and people with disabilities.

However, it is important to note that these scenarios are not without defined challenges. Automation and globalization will contribute to an increased demand for more advanced skills and may require large-scale adjustments (Sánchez, 2015). The way these challenges are addressed will vary depending on the specific circumstances of each country.

It is commonly accepted that the benefits of artificial intelligence (AI) for human societies outweigh its risks, given the tremendous potential of AI to improve human life. It is the responsibility of the computing community to drive these advancements, and companies should be willing to allocate resources for this purpose (Boddington, 2020).

However, it is also recognized that, like any other technology, AI has costs and benefits. Some of these costs can be significant and worth limiting or preventing. It is especially important to address the dangers associated with the side effects of AI development, such as technological unemployment resulting from the substitution of human labor with AI-powered robots (Boddington, 2020).

In addition to establishing an infrastructure for the safe development of AI, it is a global responsibility to educate future generations on how they can benefit from this technology and contribute to its positive development. It is crucial to educate people about the challenges posed by AI, as well as its advantages. It is recognized that AI is not inherently good or bad in itself but depends on the applications and the regulatory framework that is established (Boddington, 2020).

Analysis and discussion

AI technologies have virtually limitless potential to generate opportunities, synergies, and cooperation among labor-dependent industries. However, it is crucial to exercise caution to avoid creating new problems at a global and local level. It is necessary to understand both the benefits and drawbacks of using AI as a platform for decision-making and personnel replacement. Additionally, cohesion must be ensured between individuals, AI architectures, and governance systems to address the consequences of errors and unexpected events generated by AI itself.

This poses a considerable challenge, given the complexity of the data sources that AI systems will need to integrate across new scales, ranging from nanoscale materials to macro-scale ecosystems, and from individual behaviors in closed systems to global and widespread collective behaviors. To address this situation appropriately, deep and interdisciplinary cooperation is required among researchers, philosophers, engineers, and professionals from various sectors, including AI research, computer science, social sciences, and various financial and labor markets. It is also essential to develop sustainable techniques and technologies (Boddington, 2020).

It is difficult to halt the progress of technical and technological advancements. In fact, when workers engage in marches and strikes in response to the arrival of new technologies in their sectors, this often serves as an argument for further implementing technology and reducing the workforce. However, there is the possibility of creating areas of coherence by identifying priority sectors and specific niches where actors who would otherwise be separate are compelled to come together due to their shared interests in a long-term solution. In addition to this "bottom-up" approach, a small-scale sectoral analysis can also be used to create coherence among actors who do not share the interests of managers and investors. This approach involves identifying minimally disruptive solutions that meet the key interests of all involved actors. Micro-level solutions can serve as a starting point for joint learning about

the best approach to address macro challenges in the present and future. Resolving the issue of increasing layoffs of workers whose tasks can be replaced by machines is not easy (De Backer & DeStefano, 2021).

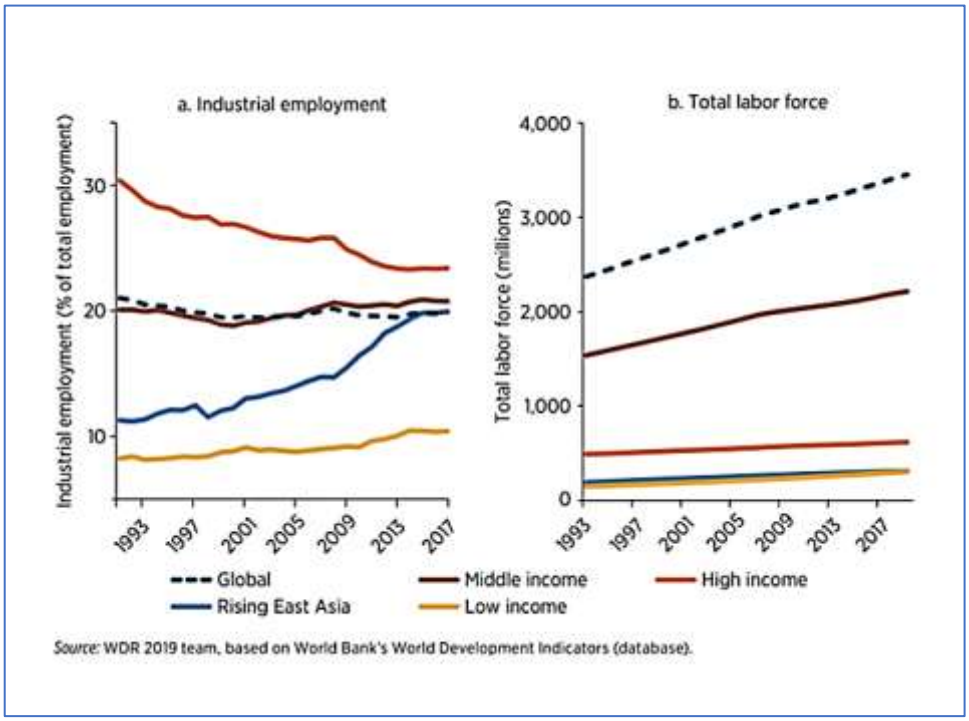

Fig. 3.- The automation of work has historically sparked concerns about its impact on employment. However, over the past 200 years, despite the introduction of machines and technology in production processes, the number of people entering the labor market has continued to grow, and jobs destroyed have been reallocated to other sectors. This phenomenon can be described as a process of "Creative Destruction.". (Source: WDR, 2019)

It is relevant to mention the phenomenon of Luddism in the context of labor substitution by technology. The Luddites were a social movement that emerged during the Industrial Revolution in the 19th century, primarily composed of textile workers who opposed the introduction of machinery that threatened their jobs. They argued that technology was causing unemployment and worsening working conditions. Although their movement was largely suppressed, their struggle raised legitimate concerns about the impact of technology on employment and the well-being of workers. Today, similar concerns resurface with the increasing adoption of artificial intelligence and automation (Boddington, 2020).

It is essential for society to establish regulatory frameworks that foster collaboration and promote effective solutions to address the challenges affecting a wide sector of the labor market. However, it is also important to ensure that these laws do not undermine the productivity and economic development of the countries involved in the process, nor provoke industry flight.

While protectionist approaches may provide short-term relief for industries and businesses, they can also generate additional problems due to a lack of competitiveness in a globalized market. Therefore, it is necessary to find a balance that allows for the protection of local interests while fostering openness and competitiveness in the global economy.

Technological progress can help address this challenge, but relying solely on technological solutions is not enough. It is crucial to have strong social institutions based on democratic participation that enable countries to harness the benefits of global investments and make informed decisions about the use of AI technologies.

Navigating the Complexities of AI in the Labor Market

Various approaches have been proposed and used to assess the potential impact of using AI technologies in the labor market. These include the use of data-intensive and "black-box" algorithm-based solutions such as machine learning, which can reduce the amount of time and interactions needed to make decisions and make these solutions accessible to a broader group of decision-makers. However, care must be taken to ensure transparency and fairness in the use of these technologies, as well as to address possible biases and discrimination that may arise (Groß, 2021; Richardson, 2020).

It is true that technology-based approaches like AI can be useful in fostering social cohesion and collaboration by making collective action more efficient. In the context of global problems such as technological unemployment, these approaches can play an important role in enhancing organizational capabilities to effectively implement collective actions.

However, caution must be exercised when using new technologies, such as AI, as a platform for decision-making. It is important to understand the positive and negative aspects of their use and carefully consider the social, ethical, and economic implications. Additionally, it is essential to ensure that

individuals, AI architectures, and the value systems behind the algorithms are not "black boxes" and that the consequences of errors and unexpected events in machine autonomy can be understood and controlled.

Facing this challenge is enormously complex, as it involves integrating data sources ranging from nanoscale to macro-scale, and from individual behaviors to collective actions in global environments. It is important to note that AI is not conscious in the strict sense and that there is room for contingent and even stochastic decisions, meaning influenced by chance.

It is true that technologies like artificial intelligence can have the effect of increasing segregation between groups and undermining social autonomy. There is a persistent conflict due to the complexity of decisions and the difficult trade-offs between the interests of workers and investors.

Fig. 4.- The strike for labor automation at Fiat in 1969 was a significant event in the history of labor movements. It took place in Turin, Italy, and was led by workers who were concerned about the increasing use of automation in the workplace. The workers feared that automation would lead to job losses and worsen working conditions. The strike lasted for several weeks and resulted in clashes between the workers and the police. Eventually, the strike ended with some concessions from the company, including guarantees of job security and improved worker representation. The Fiat strike of 1969 highlighted the tensions between workers and management regarding the adoption of automation and its potential impact on employment and workers' rights. (Source: Iron Curtain Projec, 2023)

Artificial intelligence has the potential to contribute to the design of new social labor frameworks, but there is also a risk of undermining self-determination and sources of employment. To promote self-determination, it is necessary to actively seek the ability to make decisions based on the values, goals, and preferences specific to each industry, in consensus with workers. Mechanisms are also required that allow for the planning, execution, and review of a country's future decisions. Flexible systems are needed that allow for collectively agreeing on a set of principles that guide the development of AI technology in any labor field that can be automated (Moradi & Levy, 2020).

It is important to keep in mind that artificial intelligence can enhance human skills in many situations, even in relation to the challenges that arise from regulatory change and the natural resistance of workers to be exploited. Although the implications of artificial intelligence are often exaggerated, it is necessary to carefully examine the role it will play in society and what is expected of it. It should not be seen as a substitute for the worker but as an ally.

As the world becomes more interconnected, coordinating global responses to sensitive and often imperceptible problems becomes increasingly difficult. The size and diversity of labor problems faced can seem overwhelming, with no clear means to resolve them at a national or global level. As AI technologies facilitate collaborative solutions, they can also undermine human agency and values by reducing the role of individuals or restricting access to certain services inherent to labor rights. Therefore, it is necessary to strike a balance between allowing AI technologies to support coordination in problem-solving and ensuring that humans remain the primary decision-makers (Taddeo & Floridi, 2016).

AI, with its algorithm-based solutions and intensive use of data, can greatly help increase the complexity of coordination to address the global challenges faced by the labor market, such as illegal migration, human trafficking, or exploitation (Burr et al., 2020). As mentioned earlier, the conditions under which the substitution of humans by machines is feasible include specific needs, such as dangerous work that exposes the body to toxic substances, physically demanding work, working in extreme temperatures, routines involving high-speed machinery that could injure nearby individuals, long periods of time with intense focus, and so on.

Although these issues do not have easy solutions, they can be addressed through increased human-machine coordination to promote cohesion, collaboration, and to prevent the erosion of human dignity and the pursuit of better conditions globally.

To effectively tackle labor challenges, AI must be developed in a way that does not undermine the qualities and worth of humans. As such, research on AI aims to understand how it can enhance and improve human qualities such as reasoning and empathy to achieve more favorable and productive coexistence with humans, rather than replacing them (Archer, 2021). The complexity of problems in work environments has increased, as has the number of people who need to be employed. There is a risk that these efforts may deviate from designing better regulatory frameworks to combat the global

threats we face, such as the proliferation of labor markets that force people into illegal migration, human trafficking, and exploitation in slave-like working conditions.

When designing AI algorithms to address these problems, it is not solely relying on technology to mitigate these global threats, as they require coordinated efforts by governments. There is a paradox between the problems that intensive use of AI can cause and the problems that can be mitigated by AI itself (Cole et al., 2022). Once again, the global threats faced by the labor market, such as illegal migration, human trafficking, or exploitation, necessitate the joint design of new and more effective solutions with other stakeholders, especially employers in other nations seeking more lenient regulatory frameworks to establish their domains. AI can be useful in overcoming the coordination challenges involved in many tasks and helping to respond to these threats more quickly.

As previously mentioned, despite all its opportunities to improve lives and society, AI also poses risks that must be addressed in order to successfully mitigate global risks. Increasingly, it may be necessary to consider whether a global labor regulatory framework should be designed to enable effective collaboration in addressing global challenges of migration, trafficking, and exploitation. If AI algorithms, which are being used by commercial companies and governments, are to be employed, it must be ensured that these systems are subject to some form of control, supervision, and explainability that goes beyond the "black box" (Diakopoulos, 2020).

The more complex and global the challenge, the more difficult it is to mobilize and coordinate actions. In the case of finding sustainable solutions to social problems, this challenge is exacerbated by selfish interests that undermine current models of collaboration (Slee, 2020). Efforts to address fundamental labor problems have highlighted the difficulty of creating a cohesive response both within and between societies, given the scale of the problems. Faced with interdependent crises, businesses may be compelled to decide whether they want to design their own labor ecosystems to facilitate certain responses without losing global competitiveness (Stahl, 2021).

However, relying too heavily on the use of AI technologies to quickly increase profits can lead to delegating important tasks and decisions to autonomous systems that should be subject, in part, to human supervision and choice. This can reduce the ability to monitor the performance of these systems, as well as prevent or rectify errors or damages that may arise.

Coordinating AI solutions to address complex global problems, such as social challenges in many specific labor fields, may require further research to ensure that attention is given to human self-determination without undermining global competitiveness. As AI advances, new challenges arise in ensuring that individuals and societies can achieve their own goals while maintaining their self-determination, freedom, and ensuring that AI becomes an ally.

An epistemic proposal in the face of the challenges that lie ahead

The upward march of technology should not be allowed to become the master of people's lives, but rather their servant. AI should be a powerful force for the common good. AI offers a variety of benefits that impact many aspects of life: it can help reduce greenhouse gas emissions, combat crime, provide greater accuracy, efficiency, comprehensiveness, and coverage to decision-making processes, offer new forms of entertainment and leisure, improve healthcare, and expand capabilities in scientific research. Therefore, it is important to learn the best way to reap the benefits of AI while avoiding the potential dangers of dehumanization. This section provides some practical examples of how to maximize the benefits and avoid potential dangers, with a view to achieving sustainable development (Floridi, 2021).

AI can help develop more effective methods within labor automation and reduce the need for working in the previously described adverse environments with unnecessary risks to the workforce, however, it must be regulated. There is a risk of using AI-based work methods that, even though they give people false hopes that they will not be replaced, ultimately result in their dismissal with or without fair severance in jobs that may not necessarily be replaceable. It is important to address this complex challenge in a balanced manner, resulting in a global response that avoids an escalation of man-machine conflicts predicted by Norbert Wiener. Otherwise, the growing problem of negative social impacts could jeopardize the social stability of some nations.

The world is changing rapidly and must be prepared to meet the changing demands of the economy and the workforce. As more people find employment outside the workplace, there will be new opportunities for young people seeking to start their careers and drive new businesses to thrive. However, just as the industrial revolution made life much harder for those who worked in its workshops, this change is likely to be felt most strongly by those who are already structurally disadvantaged by their education (Morandín-Ahuerma, 2022), background, or location. Wage workers in the manufacturing industry, those without education, the very young and the elderly, and other individuals with reduced agency are likely to be affected. Therefore, it is necessary to ensure their incorporation into the new economy so that they have the opportunity to contribute from wherever they are and not be left behind in development (Gómez et al., 2019).

Students should be prepared from a young age to face technological environments that require basic and specialized digital literacy. Regulatory frameworks should be created to defend the inalienable rights of workers, such as a minimum wage, non-exhaustive working hours, occupational hygiene, and appropriate conditions for material or intellectual production.

Conclusion

Original solutions are needed to employ replaceable workforce in a fair and productive manner, particularly those currently engaged in dangerous, menial, or repetitive jobs. Daily interactions with AI are quickly becoming a new way of life for a growing number of people. AI, as the common saying goes, is here to stay. However, at this moment, we do not fully understand how "black box algorithms" of AI, those produced by developers and exploited by the

private sector, will interact with human beings, especially the most vulnerable ones: wage workers in the manufacturing industry, those without education, the very young and the elderly, and other individuals with reduced agency.

This leads to other questions that should not remain unanswered: Should the designers of "black box algorithms" be held accountable for their creations? The answer is yes. The designers of "black box algorithms" must be held accountable for their creations. Since these algorithms can have a significant impact on people's lives and society as a whole, it is crucial for designers to take responsibility for ensuring transparency, fairness, and ethics in the design and operation of such algorithms. Furthermore, they should be willing to be subject to accountability if negative or unjust consequences arise as a result of their creations. Accountability is essential to ensure trust and responsibility in the development and application of artificial intelligence.

The responsibility to ensure transparency and accountability in the development and use of technology should not solely rest on consumers but also on those who develop it. Designers, developers, and technology providers have a responsibility to design and offer products and services that are ethical, safe, and responsible. This involves providing clear information on how data is collected, used, and protected, as well as ensuring fairness and avoiding bias in algorithms. Consumers also have an important role in demanding transparency and accountability from technology providers, but it is the responsibility of the latter to comply with ethical and legal standards in the design and development of their products.

The axiological domains related to the development and use of technology should be transparent. Transparency in this context implies that the values, ethical principles, and moral considerations that guide the design and operation of technology should be clear and accessible to all stakeholders, including users, regulators, and society as a whole. This allows for a proper understanding of the ethical and moral implications of technology, as well as the ability to evaluate and question the decisions made in its development. Transparency in axiological domains fosters trust, accountability, and informed participation of stakeholders, which is essential to ensure that technology is used ethically and responsibly.

The principle of explainability should be applied to policy and design processes in order to understand how and when human autonomy is restricted in advance. It is only through this understanding that autonomy can be effectively promoted rather than prohibited. Such application requires learning to design algorithms that work in the service of the majority and not solely for the benefit of a few economic interests.

We must be able to understand how AI will act in the future starting from now. The situation is inherently unequal: the rest of those affected by the actions of AI must accept the decisions of a few on how they should live their lives in the face of this technology. For this to be true, humanity must be able to understand how AI functions as a replacement for humans and how this affects the creativity, self-esteem, and self-concept of workers.

Finally, it is clear that the current debates on equity and responsibility in a labor market threatened by AI are the best place to start discussing the great opportunities and prospects for a more humane technological world.

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References

Adler, P.S. (1993). Technology and the future of work. Contemporary Sociology, 22, 585.

Ajunwa, I., & Schlund, R. (2020). Algorithms and the Social Organization of Work. In M. Dubber, F. Pasquale, & S. Das (Eds.), The Oxford Handbook of Ethics of AI (pp. 804-822). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190067397.013.52

Archer, M. (2021). Friendship Between Human Beings and AI Robots? In J. VonBraun, M. Archer, G. Reichberg, & M. Sánchez (Eds.), Robotics, AI, and Humanity: Science, Ethics, and Policy (pp. 177-189). Springer International Publishing. https://doi.org/10.1007/978-3-030-54173-6_15

Blasimme, A., & Vayena, E. (2020). The Ethics of AI in Biomedical Research, Patient Care, and Public Health. In M. Dubber, F. Pasquale, & S. Das (Eds.), The Oxford Handbook of Ethics of AI (pp. 703–718). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190067397.013.45

Boddington, P. (2020). Normative Modes: Codes and Standards. In M. Dubber, F. Pasquale, & S. Das (Eds.), The Oxford Handbook of Ethics of AI (pp. 124-140). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190067397.013.7

Bory, P. (2019). Deep new: The shifting narratives of artificial intelligence from Deep Blue to AlphaGo. Convergence, 25(4), 627-642. https://doi.org/10.1177/1354856519829679

Burr, C., Taddeo, M., & Floridi, L. (2020). The Ethics of Digital Well-Being: A Thematic Review. Science and Engineering Ethics, 26(4), 2313-2343. https://doi.org/10.1007/s11948-020-00175-8

Cole, M., Cant, C., Ustek Spilda, F., & Graham, M. (2022). Politics by Automatic Means? A Critique of Artificial Intelligence Ethics at Work [Original Research]. Frontiers in Artificial Intelligence, 5.

De Backer, K., & DeStefano, T. (2021). Robotics and the Global Organisation of Production. In J. von Braun, M. S. Archer, G. M. Reichberg, & M. Sánchez Sorondo (Eds.), Robotics, AI, and Humanity: Science, Ethics, and Policy (pp. 71-84). Springer International Publishing. https://doi.org/10.1007/978-3-030-54173-6_6

Diakopoulos, N. (2020). Transparency. Accountability, Transparency, and Algorithms. In M. Dubber, F. Pasquale, & S. Das (Eds.), The Oxford Handbook of Ethics of AI (pp. 197-213). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190067397.013.11

Doerr, B., Doerr, C., & Ebel, F. (2015). From black-box complexity to designing new genetic algorithms. Theoretical Computer Science, 567, 87-104. https://doi.org/https://doi.org/10.1016/j.tcs.2014.11.028

Floridi, L. (2021). Establishing the Rules for Building Trustworthy AI. In L. Floridi (Ed.), Ethics, Governance, and Policies in Artificial Intelligence (pp. 41-45). Springer International Publishing. https://doi.org/10.1007/978-3-030-81907-1_4

Floridi, L., Cowls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., . . . Vayena, E. (2021). An Ethical Framework for a Good AI Society: Opportunities, Risks, Principles, and Recommendations. In L. Floridi (Ed.), Ethics, Governance, and Policies in Artificial Intelligence (pp. 19-39). Springer International Publishing. https://doi.org/10.1007/978-3-030-81907-1_3

Geddes, P. (1915). Cities in Evolution. Williams and Norgate.

Ghys, T., Cools, J. P., Acedo, B. E. I., & Wright, C. (2021). Confronting robotization in Mexico. Tla-melaua: revista de ciencias sociales, 14(49), 7.

Groß, M. (2021). Yes, AI Can: The Artificial Intelligence Gold Rush Between Optimistic HR Software Providers, Skeptical HR Managers, and Corporate Ethical Virtues. In S. H. Vieweg (Ed.), AI for the Good: Artificial Intelligence and Ethics (pp. 191-225). Springer International Publishing. https://doi.org/10.1007/978-3-030-66913-3_10

Gómez, J. G., Morillón, O. C., & Aguilar-Pérez, M. (2019). Trabajo doméstico remunerado y mujeres migrantes en México: desafíos en los cambios en materia laboral actual y en derechos humanos. Tla-melaua: revista de ciencias sociales, 13(1), 78-96.

Hauer, T. (2022). Incompleteness of moral choice and evolution towards fully autonomous AI. Humanities and Social Sciences Communications, 9(1), 38. https://doi.org/10.1057/s41599-022-01060-4

Lee, K. (2021). A Human Blueprint for AI Coexistence. In J. von Braun, M. S. Archer, G. M. Reichberg, & M. Sánchez Sorondo (Eds.), Robotics, AI, and Humanity: Science, Ethics, and Policy (pp. 261-269). Springer International Publishing. https://doi.org/10.1007/978-3-030-54173-6_22

Martinho-Truswell, E., Miller, H., Asare, I. N., Petheram, A., Stirling, R., Mont, C. G., & Martinez, C. (2018). Towards an AI strategy in Mexico: Harnessing the AI Revolution. White Paper, 23.

Moradi, P., & Levy, K. (2020). The Future of Work in the Age of AI: Displacement or Risk-Shifting? In M. Dubber, F. Pasquale, & S. Das (Eds.), The Oxford Handbook of Ethics of AI (pp. 270-288). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190067397.013.17

Morandín-Ahuerma, F. (2019). ¿Quién mató a Elaine? Autos robot y toma de decisiones. Elementos, 115, 33-38.

Morandín-Ahuerma, F. (2021). Neuroética fundamental y teoría de las decisiones. Consejo de Ciencia y Tecnología del Estado de Puebla (CONCYTEP).

Morandín-Ahuerma, F. (2022). Neuroeducación como herramienta epistemológica. Consejo de Ciencia y Tecnología del Estado de Puebla (CONCYTEP).

Morandín-Ahuerma, F. (2023). Principios normativos para una ética de la inteligencia artificial. Consejo de Ciencia y Tecnología del Estado de Puebla (CONCYTEP).

Morley, J., Machado, C. C. V., Burr, C., Cowls, J., Joshi, I., Taddeo, M., & Floridi, L. (2021). The Ethics of AI in Health Care: A Mapping Review. In L. Floridi (Ed.), Ethics, Governance, and Policies in Artificial Intelligence (pp. 313-346). Springer International Publishing. https://doi.org/10.1007/978-3-030-81907-1_18

O'Keefe, C., Cihon, P., Garfinkel, B., Flynn, C., Leung, J., & Dafoe, A. (2020). The windfall clause: Distributing the benefits of AI for the common good.

Oueida, S., Kotb, Y., Aloqaily, M., Jararweh, Y., & Baker, T. (2018). An edge computing based smart healthcare framework for resource management. Sensors, 18(12), 4307.

Richardson, K. (2020). The Complexity of Otherness: Anthropological Contributions to Robots and AI. In M. Dubber, F. Pasquale, & S. Das (Eds.), The Oxford Handbook of Ethics of AI (pp. 554–569). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190067397.013.36

Roberts, H., Cowls, J., Morley, J., Taddeo, M., Wang, V., & Floridi, L. (2021). The Chinese Approach to Artificial Intelligence: An Analysis of Policy, Ethics, and Regulation. In L. Floridi (Ed.), Ethics, Governance, and Policies in Artificial Intelligence (pp. 47-79). Springer International Publishing. https://doi.org/10.1007/978-3-030-81907-1_5

Slee, T. (2020). The Incompatible Incentives of Private-Sector AI. In M. Dubber, F. Pasquale, & S. Das (Eds.), The Oxford Handbook of Ethics of AI (pp. 107–123). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190067397.013.6

Stahl, B. C. (2021). Perspectives on Artificial Intelligence. In B. C. Stahl (Ed.), Artificial Intelligence for a Better Future: An Ecosystem Perspective on the Ethics of AI and Emerging Digital Technologies (pp. 7-17). Springer International Publishing. https://doi.org/10.1007/978-3-030-69978-9_2

Sánchez, J. R. V. (2015). Análisis de recursividad estructural con trabajo especializado en la teoría de la inexistencia del mercado de trabajo. Nóesis: Revista de Ciencias Sociales y Humanidades, 24(47), 115-136.

Taddeo, M., & Floridi, L. (2016). The Debate on the Moral Responsibilities of Online Service Providers. Science and Engineering Ethics, 22(6), 1575-1603. https://doi.org/10.1007/s11948-015-9734-1

Wiener, N. (1948). Cybernetics: Or Control and Communication in the Animal and the Machine. Hermann & Cie.