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Artificial Intelligence as an Instrument of Discrimination in Workforce Recruitment

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Abstract. The purpose of this article is to reflect on the use of artificial intelligence in the process of hiring and on how biased algorithms can pose a great risk of discrimination to particular groups if artificial intelligence is not used properly with an emphasis on labour relations. Based on current research, we present the wide range of uses how AI technology can be deployed in the search for employees who satisfy the needs of employers on the labour market. The various manifestations of bias in AI implementations utilized in the field of human resources as well as their causes are presented. We conclude that in order to avoid discrimination due to either wilful programmer behaviour or implicit in the data used to train AI agents, the observance of legal and ethical norms, as outlined in tentative projects underway worldwide, is necessary.

Keywords: biased algorithms, discrimination in labour relations, artificial intelligence

1. Introduction

Discriminatory behaviours are part of the society for various reasons, many with historical origins. And when it comes to labour relations the risk of discrimination is very high due to the applicant's skin colour, sexual orientation, gender, or physical aspects in general, among others. This discrimination can occur both during the selection process for a certain job and the execution of the employment contract.

In entirely personal interviews, there is a greater risk of a candidate suffering from the prejudice any potential employer may have against them. However,

with the use of new technologies, such as artificial intelligence, the idea has been proposed that the selection process may become fairer and more objective, any analysis being limited only to the necessary features that a candidate has to conform to in order to fill the vacancy offered.

Technology has always been part of labour relations. From the 1st Industrial Revolution to the 4th and current one, technological innovations have completely changed the ways of working. Today, artificial intelligence – AI programmed by algorithms that enable the various circumstances to be analysed in seconds, and a huge amount of them to be considered at the same time – enables a greater degree of competition.

Decision-making algorithms are defined by the data the AI is initially provided, and if the content that feeds the AI responsible for the selection of a candidate is discriminatory, the result will also be discriminatory.

So, what are the impacts of a scenario when artificial intelligence is programmed with a biased algorithm to select which candidate to be hired and which not? Surely, this is a problem that the new technology has brought along and that must be analysed in order to understand how this happens and how to handle these situations.

Today, software tools exist that are able to identify the probability of a person suffering from depression or of a woman getting pregnant. Further examples are algorithms which, by using a photo, can identify if a person is gay or straight, algorithms which can tell if a person is black or white by the analysis of his or her name. These algorithms are biased and offer a very high risk of discrimination.

2. Artificial Intelligence, Algorithms, and Discrimination

The whole of society is undergoing a process of transformation in an accelerated manner, which has never been seen before. It is in the course of transforming into the information society, and knowledge provided by different technologies is increasing in ways vastly different than have been known before. This change is what is now being called the Fourth Industrial Revolution.[1]

An industrial revolution is characterized by abrupt and radical change and is associated with the emergence of new technologies that change the entirety of society, especially the political, economic, and social sectors.[2]

The First Industrial Revolution, which took place during the XVII–XVIII centuries, was the process of the mechanization of production by the use of water and steam power as sources of energy. In the late nineteenth century, the Second Industrial Revolution took place with large-scale, quick, and inexpensive

1 Schwab 2016. 160.
2 Novais 2018.

industrial output, having electricity as the main source of power.[3] However, in the 1960s, information and communication technologies marked the Third Industrial Revolution. This gave rise to the digital revolution, and with it came the computers and their continued use by society, such as the Internet and digital platforms.[4]

With the Fourth Industrial Revolution came a new era marked by an entire set of disruptive technologies such as robotics, augmented reality, big data, nanotechnology, the Internet of Things, artificial intelligence, and many others. In today's society, we have the convergence of digital, physical, and biological technologies that make this revolution and the advent of the digital era possible.[5]

2.1. Artificial Intelligence

Today, digital revolution is difficult to differentiate from the rise of artificial intelligence (AI), which is set to become part of all aspects of life. When thinking about artificial intelligence, it is almost impossible to prevent the first thing that comes to mind being a picture of a robot, like the ones any science fiction movie portrays. AI was functionally first described by Isaac Asimov, the Russian creator of the classic *I, Robot*, known as the father of robotics.[6] But AI can manifest itself in anything from weapons and autonomous cars to search algorithms.

Artificial intelligence is a growing technology in various aspects of life, and there is a certain definition of what it is. It can be said that: '[…] it is an umbrella term that includes a variety of computational techniques and associated processes dedicated to improving the ability of machines to do things requiring intelligence, such as pattern recognition, computer vision, and language processing'.[7] In other words, it is the science of mimicking some aspects of human intelligence by use of a machine.[8]

Among the many changes that the Fourth Industrial Revolution brought, there is no denying that the AI is changing the world the most. It is hard to think of something that does not involve the use of this technology or is not a result of it. Almost everyone carries in his pocket a mobile phone that uses or implements some form of AI; there are already intelligent and autonomous vehicles which drive themselves or smart homes that can perceive the lack of food in a refrigerator and make direct requests to supermarket websites, thereby shopping for/by themselves.[9]

3 Schwab 2016. 160.
4 Novais 2018.
5 Novais 2018.
6 Seiler 2019, Isaac Asimov Home Page.
7 Raso 2018. 63.
8 Borgesius 2018. 51.
9 Morgan 2014.

A disruptive technology, which causes changes in the way of living, revolutionizes the way of thinking or acting as it becomes necessary to daily life. In short, it can be said that this change comes from a phenomenon of radical transformation in the way data and information are being processed in various sectors and activities which were previously only able to utilize human labour.[10]

In this new society of information and knowledge, the word *data* is magic, assuming a central role in such a way that the control and management of data in the midst of this society confers great power upon any entity. Artificial intelligence is powered by data, information that enables it to run the task it has been given.[11] With such data, learning and discoveries can be automated by the frequent accomplishment of voluminous tasks in a computerized way; the use of this technology brings greater security.[12] AI is able to provide data analysis much faster and deeper than a human, reaching incredible precision, making it a very reliable tool.

AI provides intelligent tools, and the process of knowledge creation is improved by its use. However, for the implementation of this technology, human interference is still essential to configure the systems and give commands for performing tasks. All the commands that the AI receives, all the data that feeds the machine are made by a language called algorithms.

2.2 Algorithms and Discrimination

There are many benefits that the use of AI may provide, but, like any other technology, it is necessary to be aware of the negative aspects of its use. In this sense, many negative points can be highlighted by the use of AI, and some of them are directly linked to the language that defines the action of the machine, i.e. the algorithms themselves.

2.2.1. What Are Algorithms?

The concept of algorithms was formalized for the first time in 1936 by the definition of the 'Turing Machine' by Alan Turing, and it is regarded today as *a finite numerical sequence of executable actions which seeks a solution to a given problem by the use of accurate, efficient, and correct procedures.*[13] Algorithms now dominate daily life, providing communication, making it possible to search the Internet, identifying musical preferences, assisting in GPS location,[14] data encryption, and more;[15] there is no escape from algorithms.

10 Mendonça 2018.
11 Novais 2018.
12 Novais 2018.
13 Ziviani 2011.
14 GPS: Global Positioning System.
15 Gangadharan 2014.

First of all, an algorithm is a set of instructions or commands to perform a certain task. If this task corresponds to a simple query entered by a user in a search engine, it can be defined as an algorithm.[16] For the purposes of this study, the analysis will be based on algorithms that are computable, i.e. those that can be read and implemented by computers. Algorithms of this type are codes that a computer is able to 'read' and execute (run). In a simple way, algorithms are nothing more than 'recipes': a step-by-step showing of the procedures for solving a task. They use variables and a process to ensure the goal, and in this digital process, which involves software, decisions are taken automatically from the data that are fed to the program.

Algorithms are used by all digital services and programs and are part of everyday life for everyone. Algorithms have become an important subject in various fields of study in addition to computer science, such as law, economics, biology, and labour relations, among others, and for this reason Gillespie stated that the findings and results that are generated by an algorithm have a powerful legitimacy, equalling the statistical data that reinforces scientific claims.[17] Thus, it has been said that the results presented by algorithms present a particular type of legitimacy, and this happens in a way that often ends up being considered more reliable than decisions or conclusions made by humans, considered to be full of subjectivity.[18] In other words, the results of algorithms are expected to be cleaner, more objective and are therefore regularly perceived as more assertive. In this sense, algorithms would be synonymous with sophisticated and quasi-infallible decision making due to the strict procedures and objectivity in data analysis that they provide. However, the accuracy and reliability due to the objectivity that the use of algorithms theoretically implies cannot be the only deciding factor determining whether the decisions taken by the AI, fuelled by an algorithm, are good or bad. The statistical precision and the objectivity of search algorithms are certainly very important for decision making to be reliable, 'but it would be unwise to conclude that the subjective human knowledge is therefore useless or of less value in terms of understanding and knowledge'.[19]

Algorithms seek the results of their procedures in conditions of objectivity and clarity, something humans also tend towards. But still, it is necessary to understand how objective an algorithm can actually be – provided we can speak of the *total objectivity* of algorithms. Although algorithms have brought an immeasurable capacity in the analysis and processing of data with a swiftness never before seen in order to command compliance, the concern that everyone should have is whether biased data is provided to a machine thereby making the algorithm itself

16 Mattiuzzo 2019.
17 Gillspie 2016. 18–30.
18 Mattiuzzo 2019.
19 Mattiuzzo 2019.

biased. If used incorrectly, algorithms may be responsible for spreading prejudice and increasing inequality.

2.2.2. Discrimination

Article I, Item 1 of The International Convention on the Elimination of All Forms of Racial Discrimination says:

> The term 'racial discrimination' shall mean any distinction, exclusion, restriction or preference based on race, colour, descent, or national or ethnic origin which has the purpose or effect of nullifying or impairing the recognition, enjoyment or exercise, on an equal footing, of human rights and fundamental freedoms in the political, economic, social, cultural or any other field of public life.[20]

In a similar sense, the Canadian Human Rights Commission classifies discrimination as 'an action or a decision that treats a person or a group badly for reasons such as their race, age or disability'.[21] The Human Rights Code of Ontario, which is an anti-discrimination provincial law, defines discrimination as an unequal or different treatment or harassment that causes harm. Many are the concepts of discrimination, but all essentially translate to mean that discrimination is a way of treating people differently, taking into account their physical or personal characteristics; these differences are used as grounds to justify that different people should be treated unequally, that the same rights should not be granted to them in equal proportion. In the legal framework, a potentially discriminatory act of a positive value is lawful, i.e. treatment that is aimed at the improvement of conditions of a certain group that historically, economically, or socially suffered disadvantages and is in a vulnerable situation, when compared with other groups, is acceptable (such measures constitute *affirmative action*).[22] On the other hand, any discriminatory practice other than affirmative action is prohibited. They are considered illegitimate, arising from arbitrary treatment motivated by stigma or mainly the cultural belief that somehow people in the same situations should be treated unequally.[23]

There are several types of negative discrimination that can be listed such as discrimination based on race, nationality, colour, religion, age, sex, gender, criminal records, etc.; and that differential treatment can be given in various sectors of daily life such as in employment relationships – the object of this research.

20 United Nations. 1948. The Universal Declaration of Human Rights.
21 Canada – Canadian Human Rights Commission.
22 Moreira 2017.
23 Moreira 2017.

2.2.2.1 Discrimination in Labour Relations

Taking into account the different types of discrimination that a person can suffer and applying them to labour relations, this unequal treatment happens when people with different characteristics receive different and less favourable treatment for reasons that often have no link whatsoever to the merits or the requirements for their position.[24] Discrimination in employment relationships has always existed. Since the period of slavery, we have an unequal treatment based on racial prejudice. Inequality and the different forms of treatment of workers persisted even after the abolition of slavery, even if it has somewhat transformed after the First Industrial Revolution. Although overcoming various degrading working conditions and, in theory, overcoming various acts of discrimination in the field of the employment of workers has been a legislative priority for some time now, there are still countless discriminatory practices applied in hiring. The importance and the need to discuss discrimination in labour relations have been recognized.[25] No wonder that the International Labour Organization (ILO) created Convention 111 in 1958, defining the concept of discrimination in labour relations:

> 1. For the purpose of this Convention the term discrimination includes:
> (a) any distinction, exclusion or preference made on the basis of race, colour, sex, religion, political opinion, national extraction or social origin, which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation;
> (b) such other distinction, exclusion or preference which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation as may be determined by the Member concerned after consultation with representative employers' and workers' organisations, where such exist, and with other appropriate bodies.[26]

The discussion on the subject of discrimination in labour relationships remained a very important topic for the ILO, which in 1998 defined the elimination of all forms of discrimination in employment relationships as a fundamental principle of any decent work.[27] But still discrimination in this relationship is a reality – whether in the course of the employment contract or at a time prior to it, during hiring.

A great part of the hiring process that was previously done in person and was time-consuming gave way to the use of AI. In the Fourth Industrial Revolution, we no longer speak anymore of huge queues in front of companies or vacancy

24 International Labour Organization 2019.
25 Lima 2011. 18.
26 International Labour Organization 1960.
27 International Labour Organization 2016.

notices in newspapers; now we speak of digital recruitment through online platforms and selection made with AI tools. The machine being used as a selector of candidates has brought many benefits to the hiring system, but it also presents a very significant risk.

2.2.3. Biased Algorithms

As shown above, algorithms are a type of language translated into numbers, which allow a computer system to read the commands given by a programmer in order to accomplish a certain task or provide answers to a problem in an objective, clear, and timely manner. But AI can also be used to solve certain subjective issues such as deciding who should be hired for a particular company, which contract should be signed, the likelihood of recidivism of a criminal, etc.[28] On the issue of autonomous cars – as an extreme example – which are programmed with algorithms, it is the algorithm that will decide if a person will be hit or not in an imminent accident situation.[29]

The algorithms must be programmed, and to the extent that this programming is done by humans there is interference at the moment of transmitting the world's impressions to the programming.[30] And it is at that point where the algorithm suffers the interference of the programmer's moral beliefs and then rise to the term 'biased algorithms' or 'discriminatory algorithms'. When an algorithm is programmed to analyse the frequency of 'likes' from a person on the Internet and what her preferences, her musical tastes, political views are, the social events she attends, her network and more, it is possible that the data collected can end up bumping into 'sensitive' information.[31] The impacts of the use of AI can be manifold, especially when it comes to software programmed to do data analysis; and, generally, the risk of any negative results is added to the machine even before it starts to operate or even before the system being developed.[32]

There are two aspects that influence decision making made by an AI: *the quality of the data* that feeds it and *the design of the system* being used. If the data used to train an AI system is biased, the consequence of this is that the system will eventually reflect and often leverage these trends. Still, system designs using AI are created by humans who may, for example, prioritize certain characteristics or certain variables, depending on how they want the machine to behave.[33] The phrase 'garbage in, garbage out' translates this problem quite well. The term is widely used in the field of programming and means that if the data that is inserted

28 Jota 2019.
29 Jota 2019.
30 Mattiuzzo 2019.
31 Mattiuzzo 2019.
32 Raso 2018.
33 Raso 2018.

into the machine is poor, the results are equally poor.[34] In other words, feeding an AI with biased information generates biased results because the problem is at the origin of the data being used. Any trends and biases that end up being incorporated into systems operated by AI through their algorithms can be the gateway to various forms of discrimination.

As Marcelo Chiavassa[35] puts it, AI is not that different from a five-year-old child: a child is not born racist, sexist, or homophobic, but if they grow up hearing racist, sexist, and homophobic comments, there is a high probability of them reflecting the prejudices which they grew up with. The AI is not that different from a child in the sense that if this AI does not have any prejudice by itself but is still powered by algorithms that reflect the opinion of a racist, homophobic, or sexist, the consequence will be a machine reproducing these prejudices and discriminations based on the information that fed it. An algorithm does not have biases by itself, this is a characteristically human trait; so, if the software operates to discriminate against a certain group, it discriminates based on the data input received. There are numerous areas in which AI can be used, among them criminal justice, the financial sector (ranking systems), healthcare (diagnostics), the education sector, and human resources (recruitment and hiring).[36]

3. The Recruitment System

Before the advent of artificial intelligence, methods of recruitment for job openings were more personal and therefore more time-consuming because there was no other way for this process to unfold. According to Idalberto Chiavenato, recruitment is a process of locating, identifying, and attracting candidates for the organization.[37] Recruitment can be both internal and external. Internal recruitment implies filling vacancies within the company either by promotion or by intra-company transfer. External recruitment is through the search for candidates in the human resources market.[38]

Such forms of recruitment require various techniques which may involve the presentation of candidates by company employees, posters in the lobby of the company, candidate pools, visiting schools and universities, advertisements in newspapers or magazines, agencies or recruitment firms, or virtual recruitment, among others.[39] This kind of personal selection could take weeks, even months until the vacancy is filled. Over time, the labour market has become increasingly

34 Neff-Mallon 2019
35 Chiavassa 2019, Podcast – Distopia.
36 Raso 2018.
37 Chiavenato 2010.
38 Chiavenato 2010.
39 Chiavenato 2010.

competitive, and this delay in hiring a candidate was no longer an option. Competition has made this system intolerably bureaucratic and time-consuming if done manually and in person, thereby promoting automation. Now, all the time spent on endless résumés and interview analyses would no longer be necessary. Besides being time-consuming, the process of hiring people was quite likely to fail, allowing for a selection which is totally arbitrary and full of demands that reflect the personal interests of the interviewer and not the company's interests.[40] Globalization and the emergence of AI have made the whole recruitment process change. With the Fourth Industrial Revolution at a fast pace, an interface between the real world and the digital world forms, and the recruitment system cannot avoid this change. (Most recruitment is made digitally, using software, social networking, and recruitment companies that use data analysis to select candidates who best fit the company's profile, among others).[41]

At first, virtual recruitment differed little from the current one because, despite using virtual means to receive information from candidates, such as e-mails, websites, or social networks, the screening process was conducted by people. Today, AI is able to perform the selection independently, without a person analysing each résumé in turn. One of the concepts behind the development of AI in the selection of candidates, besides speed, is bringing a higher standard to these selection processes, without the ideas and beliefs of interviewers affecting the choice of candidates. With this technological advance, the selections have become impersonal and based only on data shared with companies and on the existing data on the Internet. In their recruitment, companies utilize software algorithms that define the ideal candidate for the company, with the skills and characteristics needed to fill the vacancy offered. The purpose behind these procedures, besides the possibility of analysing a large volume of applicants, is also to be able to do this much faster and with lower costs because everything is done through the analysis of CVs stored in the database and of existing résumés on the online platforms.[42] The low cost, agility, and large volume of candidates who can be analysed are a great advantage provided by AI. However, there are worrying disadvantages to this technology. The first phase of the selection process is orchestrated by an AI which is entirely impersonal because the selection is made based on algorithms which have been fed into the machine. At first, it may seem that this is an advantage because the machine would make a selection aiming to meet the relevant requirements for the vacancy to be occupied.

However, these algorithms need to be created by a person, which carries with them a number of inherent beliefs and preconceptions. Could these personal convictions and ideas be transmitted to the machine? Is it possible that AI reflects the biases of its programmer?

40 Baia 2019.
41 Baia 2019.
42 Baia 2019.

3.1 The Use of Artificial Intelligence in the Selection of Candidates

3.1.1. Positive Aspects

Companies need employees, and it is known that the whole process of recruitment and selection of candidates made by HR can be hard work. For this reason, the use of AI is much appreciated at this stage. Public and private companies have made good use of AI in the process of selection for at least two reasons: first, the ability of data analysis and the analysis of candidates and, second, that there is a growing awareness that the recruitment processes are full of implicit prejudice and discrimination, and companies believe that the use of AI would reduce much of this problem, due to the objective decisions that it would take.[43]

The revolution that the use of AI caused in hiring systems is unquestionable. As mentioned earlier, one of the most favourable points is that with this technology it is possible to analyse a large number of CVs in an infinitely shorter time than was previously expended. AI brought agility and a capacity of recruitment that fulfil the requirements set out by companies as never before. The use of AI enables the identification of the profiles of people through the data published by them on social networks, such as Facebook, LinkedIn, and others, through a system of algorithms.[44] From these profiles and the processing of such data, HR companies can more rapidly and cost-effectively identify candidates that best meet the profile of the company.

Those responsible for HR believe that the use of such software would make the hiring process more objective, less partial, and would give women and minorities a better chance, something they would not have if they were interviewed by biased human managers.[45]

AI technology with the ability to decide for itself is already used in this field for hiring employees.[46] As much as the positive aspects are attractive, attention must be paid to the problems that may arise, and the fact that these technologies are already in use facilitates the discussion.

3.1.2. Artificial Intelligence as a Tool for Discrimination

AI being used as a tool for selection of candidates is already a reality. There are several technological tools that allow the employer to have a greater control and to monitor their employees from the moment of admission, permitting

43 Raso 2018.
44 Mendonça 2018.
45 Tufekci 2017.
46 Raso 2018.

constant supervision during the term of the employment contract.[47] The use of AI to analyse the information about candidates for the vacancy, an analysis which takes place before the contractual employment relationship can be harmful to the applicant depending on how the machine has been programmed.

Outsourced HR companies, or even the internal HR from a certain company, are still responsible for the recruitment, selection, and hiring of employees. It is not relevant whether recruitment is undertaken personally or through AI implementations.[48] Regardless of the manner in which this selection of candidates is made, every business has an image of the ideal employee, and it consequently ends up creating a profile of the candidates to be considered. Is it possible for the people to whom the responsibility of hiring is trusted to objectively take the desired characteristics and skills of their candidates into consideration or do their personal opinions end up 'compromising' the search results?

Analysing HR professionals' actions based on their beliefs and opinions at the time of hiring, an application called Picture Test made by Master Communications (in partnership with the Paraná state government – Brazil) can illustrate how discrimination can take place.[49] In the framework of this research, the company responsible for the test invited professionals who work in HR. They were divided into two groups, and one of them was shown pictures of white people making daily routine activities, while for the second group the same images were shown, but with black people. As a result of this test, the majority of the responses from the people who were in the second group put the white people in a position of superiority over black people. A simple image of a white person mowing the lawn leads to the deduction of this person being the owner of the house, taking care of the garden; the same image with a black person is understood as a gardener who works for the owner.[50] This is just one example of discrimination that happens in the moment prior to hiring candidates. Companies make this kind of prejudice all the time through their representatives. Now, thinking that these same people who have these preconceptions induced by just an image are the ones responsible for defining the criteria that must be taken into consideration in formulating an algorithm that will feed a machine, the impact of such biases on the selection of candidates may be noticeable. AI carries a great risk of reflecting or even expanding existing prejudices and social biases, which would infringe one of the universal principles, that of equality.[51] It turns out that the AI systems are trained to reproduce the behaviour patterns of society in decision making, such as prejudices and human beliefs.[52] The result is a machine trained to discriminate – a machine

47 Costa 2017.
48 Kenoby 2019.
49 Brazil 2017.
50 Brazil 2017.
51 Brazil 2017.
52 Raso 2018.

that reflects social patterns of prejudice and tends to perpetuate these mistakes in every decision that is submitted until new data are inserted into it, with updates on how to make decisions (i.e. updates on new social understandings). Although the ability to change their moral perspective over time is a virtue of human beings, AI does not have this possibility.[53]

Hiring employees is in itself biased, and there is a risk that this bias can be transferred to machines. Hiring free of discrimination would certainly be a dream, and even with the use of programs that seek greater objectivity it is complicated to expect such a result. Computer systems can access a variety of information about people, including the most intimate information (religion, belief, gender, sexuality, political views, etc.), which are known as sensitive data. These programs can access this information without even revealing it and with a high degree of assertiveness.[54] The algorithms can be programmed to seek information and profile job applicants for a job. The algorithms can obtain information on social networks such as data regarding political views, religion, sexual orientation, and many other aspects that are part of the intimacy of the human being.[55] And with that information obtained, a system can be programmed to discard candidates with certain physical characteristics such as skin colour; or not even to consider them for the position.

In 2018, the Cambridge Analytica company, responsible for collecting and processing data, was accused of extracting large amounts of private information from large numbers of users of Facebook, and this data was used for political purposes. Once having access to this information, companies could create political and ideological profiles that are able to influence political views.[56] Much of the data obtained in this operation was extracted, retained, and exploited, and even though this data was 'available' to the public, the idea of an ideological profile of someone is scary. The risk that this represents is high, and when it comes to work, the vulnerability of a candidate is further accentuated by the possibility of an employer having access to a person's profile that contains all of their political views, ideology, sexual orientation, or even religious affiliation. The chance of discrimination is almost inevitable.

A study from Stanford University, the United States of America, showed that AI can deduce sexual orientation based on photographs of people's faces. An algorithm developed for this purpose was the experiment done on a dating website and showed an accuracy of 91%.[57] If a company responsible for selecting candidates has an algorithm for this purpose, by analysing images of their

53 Raso 2018.
54 Tufekci 2017.
55 Mattiuzzo 2019.
56 Wong 2019.
57 Levin 2017.

candidates, this tool can be used for anti-LGBTQ purposes. Thus, it would induce a discriminatory conduct, an algorithm being used to discriminate candidates based on a characteristic that is not related to the function that will be fulfilled.

In a lecture at TED Global, programmer Zeynep Tufekci mentioned a computer system that was developed by a friend, being able to measure the probability of postpartum depression.[58] The speaker adds that 'the results are impressive. The system provides the probability of depression months before the onset of any symptoms'. It is inevitable not to think about the positive impact that this type of innovation has on medicine. This technology would cause a revolution in the prevention of such diseases. However, the speaker herself criticizes the use of this program in the context of hiring. A company would not hire an employee if they knew they had a high probability of having depression within the next two years. There are many risks and many forms of disqualification of a candidate. 'Our artificial intelligence can fail in ways that do not fit the standards of human errors, in ways that we do not expect and for which we are not prepared. It would be terrible not get a job for which you are qualified […]'.[59]

In 2012, the Target company came under the spotlight due to an ongoing problem of using AI to identify which of their clients were pregnant, from their shopping and research habits. It was a marketing move that aimed to boost sales. The company has mapped out its clients, those who were very likely to be pregnant, and with this data collection they managed to advertise based on current and future needs. The case became known for the fact that a teenager did a search due to which the Target's system identified her as pregnant, and she received an advertisement at home with offers for pregnant women. The teenager's father did not like it and sought satisfaction from her local store in Missouri, claiming the store was encouraging his teenage daughter to get pregnant. Later, the father discovered that his daughter was really pregnant.[60]

The case mentioned may not be related to the topic in question (hiring using AI), but using the same reflexive line adopted by the programmer Zeynep Tufekci in her lecture, it is possible to perceive the risk that this type of technology brings. This same program, used to assess people's behaviours through their online activities, could identify women who intend to become pregnant in the upcoming years. The companies would not hire a woman who is likely to need maternity leave within the next 1 or 2 years.[61]

AI is already here, it is part of the daily routine, making life a lot easier but also making mistakes. Companies make use of these tools, and they know the risks that these systems may be discriminatory depending on how the programs are fed. In

58 Tufekci 2017.
59 Tufekci 2017.
60 Agostini 2012.
61 Welchering 2014.

2014, Amazon began using a computer program to hire its engineers. After a while, they realized a big problem: 'their new recruiting engine did not like women'.[62] The system used data analysis through AI to rank the best candidates. But in 2015 Amazon realized that the new system did not classify candidates for employment in a neutral way in terms of gender.

That is because Amazon's computer models were trained to vet applicants by observing patterns in résumés submitted to the company over a 10-year period. Most came from men, a reflection of male dominance across the tech industry.'[63]

In our example, the Amazon system understood that male candidates were preferable over female candidates, and this made AI discriminate against women – not based on their ability but based on gender. Later, Amazon edited the program, so it has become more neutral and no longer exhibits this conduct of discrimination between men and women;[64] but there is no guarantee that certain features will not be prioritized over others.

Discrimination in the labour market due to a résumé can start even with a simple picture. It is through the picture that an employer can get information about the physical aspects that might interest them; in the case of a racist person, black people will certainly be discarded from the selection; the same would happen if the person was sexist, discarding female candidates.[65] It was very common for companies to demand photos in the curriculum in order to have an idea about the appearance of their candidates and to see whether they 'fit' in the company's standards. Today, it is difficult to find a company that requires a photo in the curriculum because now this type of requirement is no longer appropriate[66] (although there are companies that understand that the requirement of a photo is not a discriminatory conduct).

Despite it no longer being customary to require photos, 'limiting' the ability of companies to do a preliminary analysis of the appearance of their candidates, some companies have found another way to identify some characteristics of their candidates such as skin colour. A study in the United States of America in 2004 analysing résumés showed that companies can find out the colour of the skin of their candidates through the name that appears in the résumés. Names that 'sound white' receive 50% more callbacks than candidates who have names that 'sound African American'.[67] The research brought as examples some names that exemplify what they call names that 'sound white' and names that 'sound African American': Brian and Emily are names that refer to white people, while names like Jamal and Lakisha are names that refer to African descendants.[68]

62 The Guardian 2018.
63 The Guardian 2018.
64 The Guardian 2018.
65 G1 2018.
66 G1 2018.
67 Bertrand 2004. 991–1013.
68 Bertrand 2004. 991–1013.

But for this to happen we need someone to tell the AI responsible for this analysis which names it should consider as 'good' and which it should categorize as 'bad' so as the machine can understand what curriculum vitae it should discard. The system needs objective characteristics that will make it select one or another person; furthermore, the programs responsible for making this screening are fed with algorithms that identify a number of names that, according to the person who feeds the machine, are understood as 'good names' and 'bad names' in order to dismiss all those who fall into 'bad names'.[69] The problem with this is in the algorithms that feed this AI, which are created to discriminate on the basis of training that their developers have given to these tools.

However, such discrimination does not always take place in a purposeful way. Often, at the time of programming an algorithm, the programmer may end up promoting some discrimination without realizing it. If an employer wants to hire a good employee using AI, at the time of feeding this technology they need to tell it what they see as 'good' and what they see as 'bad' to characterize their candidate. For example, if that employer understands that 'a good employee is one who is never late' and tells that to the AI, without realizing, they can discriminate against people who live in remote areas based on their addresses or people who depend on public transport. The algorithm that makes the analysis of the résumés can understand, with this information, that these people are highly possible to be delayed by their circumstances.[70] The fact that a person relies on public transport is not a delay guarantee and has no direct link with the function that the person was hired to fulfil. Even if it was not the intention of the employer or company responsible for selecting candidates to discriminate, it can happen without them noticing.[71]

Defining certain objective characteristics can be sufficient to induce discriminatory behaviour. If an employer believes that a good employee is one who is available to work on different schedules, AI can understand that people who have children do not meet the job requirements, deducing that people with children require a certain routine, a fixed timetable.[72]

AI as a hiring tool can pose risks of discrimination in many forms, and this has become of major concern to many companies that realize the damage this can cause not only to the programmers who develop the algorithm but especially to the candidates for job openings that are in an even more vulnerable situation. There needs to be concern for how algorithms are used and the purposes they have. The risks to discriminate are too high when the algorithms are biased.

69 Bertrand 2004. 991–1013.
70 Council of Europe 2019.
71 Council of Europe 2019.
72 Council of Europe 2019.

For this reason, the European Commission created the *Ethics Guidelines for Trustworthy AI* in 2019. One of the things it brings is a simple checklist that serves as a guide for creating an algorithm in order to leave it as objective as possible and free of discrimination.[73]

Certainly, the concern with the way the algorithms are created is essential, and the person of the programmer at that time is important when the intention is to keep the algorithms without discriminatory biases.

4. Ethical Concerns of Developers

As the person responsible for creating the algorithm, the figure of the programmer has great significance, especially when there is a search for an algorithm that will work as objectively as possible. Often creating a biased algorithm cannot happen on purpose or with the intention of 'hurting' someone; but even if its creation is full of good intentions, the programmer has to be aware that their algorithm can be distorted and used for other purposes. So, there are a number of ethical issues surrounding the figure of the programmer.

A former member of the American military, Chelsea Manning, also a programmer, was jailed for seven years after being responsible for one of the biggest leaks of classified information in the history of the United States of America. Even after her arrest she remained a reference in programming. In a panel at SXSW[74] 2018, the programmer showed her concerns about the creation of a code of ethics for programmers because the power that an algorithm can wield. She said it is pure deception that some tools are created with algorithms free of bias.[75] In the words of the programmer: 'the systems are biased, yes. Be it in the way the algorithms are written, either in the way they are fed with data'.[76] Chelsea then completed her statement by saying that programmers are obliged to think of the consequences of the algorithms that they create and that the same way doctors have an ethical code programmers must also have one due to the amount of power they give to algorithms and to those who control them.

Nevertheless, this concern about the ethics of programmers is not restricted to her person. Some universities in the United States as well as the European Union began to worry about the lack of a code of ethics for programmers.[77] Universities began to worry about some ethical issues behind the use of AI and have offered courses in order to warn the next generation of experts in technology about the

73 European Commission 2019.
74 South by Southwest, a.k.a. SXSW, is a festival considered one of the world's innovation events.
75 Manning 2018.
76 Manning 2018.
77 Estadão 2018.

dark side of the innovations.[78] The idea is to show students that technology is not neutral and these biases it carries generate social impacts. Professor of Computer Science at Stanford University, Mehram Sahami, points out that students should be prepared for the challenges they encounter in the future of technology, knowing how to handle it, so it does not generate negative impacts.[79]

Since new technologies can bring great changes in society, universities in the United States rushed to make students understand the risks of technology misused or used in a distorted manner. And due to the risk of these consequences being so big, the discussion about the creation of an ethical system for programmers is presented as a solution.[80] Medical professionals have a code of ethics, and likewise these universities argue that a 'unique' code of ethics should be created for programmers.

Because of the concern that programmers may (even inadvertently) transmit their ideologies, beliefs, and morals to the algorithm that is created, the guide created by the European Commission suggests that when creating an algorithm the programmer should answer some questions in order to ensure that the AI will work in a way which avoids biases without risk of discrimination.[81] The 'guide' to avoiding discrimination and to having no biased algorithms consists of four main groups of questions that developers should answer to be sure about the objectivity of their algorithms. They are questions like: 'Did you establish a strategy or a set of procedures to avoid creating or reinforcing unfair bias in the AI system, both regarding the use of input data as well as for the algorithm design?' or 'Did you consider diversity and representativeness of users in the data? Did you test for specific populations or problematic use cases?[82]

The use of biased algorithms that have a high risk of discrimination is dangerous, and when discrimination takes place there must be accountability. Nonetheless, because of the difficulty of defining who is 'guilty' for the act and due to the fact that this is a recent issue in the world, there is still no definition of who should be blamed for this. Furthermore, the intention of the European Union to create the ethical guidelines and checklist for programmers was to minimize these problems and the negative impacts that the misuse of an AI fuelled by biased algorithms can cause. This is a small solution – until a more efficient method to 'control' these technologies does not arise –, but it can have a positive impact on the use of these technologies.

78 Estadão 2018.
79 Estadão 2018.
80 Estadão 2018.
81 European Commission 2019.
82 European Commission 2019.

5. Conclusions

There are many benefits brought by the use of AI. So many that it is hard to think of any day-to-day activity that is not controlled by an algorithm or that does not have a technology behind it. While the software used by companies has brought more agility to the recruitment process and enabled greater competition among the candidates, the use of AI in the process ended up opening a door for discrimination.

When talking about an entirely personal selection process, i.e. without any manifestation of technology, it is hard to imagine that this choice of 'perfect candidate for the job' is free of discrimination. When it comes to making that choice with AI, the discrimination of candidates still happens.

Although a machine is responsible for selecting the résumés, there is programming behind it, there are a number of guidelines that the programmer gave to the AI to be able to decide which candidate is the best. As much as the intention with the use of this technology is to select candidates based on their ability to fulfil the job, we cannot ignore the fact that those who do the programming or who decide the form in which this algorithm will be programmed is done by a person.

The risks of discrimination with the use of AI are many, and the main reason for this is the fact that behind an algorithm there is the possibility of a person with prejudices that will reflect the machine's decisions.

A homophobic employer would not hire a person who is not straight to work in their company; the same goes for sexist or racist employers. And with technological advances, the possibility of obtaining such personal information of their candidates is becoming easier. With algorithms being created in order to identify LGBTQ people from pictures, programs that can identify if a person is black or white from the name, or even software developed to predict whether a woman plans to become pregnant, the risk of some groups of people being discriminated against increases.

Taking into account the vulnerability of a worker in the position of a candidate for a job vacancy, it is possible to see the benefits of a bias-free algorithm that does not present risks of discrimination. But this is not the reality – since algorithms cannot be neutral, there must be a concern with the use of these technologies.

The negative impacts from the inappropriate use of an algorithm are manifold. The programmers should care about the quality of the algorithms they create, the purpose of their programs, and the intentions behind their use.

Discrimination followed by accountability at this point of the relationship is a very sensitive issue since there is still no contractual relationship, and the AI used as an instrument of candidate selection as well as the determination of accountability have become even more obscure. There is not yet any standard that assigns responsibility for this act, which is why the discussion on the impacts of using biased algorithms for this purpose becomes increasingly necessary.

Companies need to raise awareness about the risks of discrimination and how these technologies can be dangerous for certain groups. And while there is no type of agreement or rules that determine how AI should be used in order not to discriminate and how accountability for discrimination occurs, it is important that the subject be debated repeatedly and that a number of tests be made to ensure that AI will not be discriminatory in any way. More than ever, there is a need for debate on the subject and for research to be done to consider both legal and technical issues surrounding technology. If the discussions and tests are made as soon as possible, AI can be best enjoyed, while the risks of unfair discrimination are minimized.

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