Essay

The algorithm of the Public Employment Service Austria (AMS): Technology as a retrograde step for gender equality in Austria

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"No country will reach its full potential if its female citizens do not enjoy full equality," said Helen Clark (2014), Administrator of the United Nations Development Program from 2009 to 2017, concerning the International Women's Day 2014. This statement is based on the International Bill of Human Rights (UN General Assembly, 1948), the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) (UN General Assembly, 1979), and the Discrimination (Employment and Occupation) Convention, 1958 (No. 111), Article 1(1)(a). The latter declares that discrimination includes "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" (ILO, 1958).

Even though Austria has ratified both the International Bill of Human Rights and the Discrimination (Employment and Occupation) Convention (NORMLEX, 2020; OHCHR, 2020), in 2020, the Austrian employment agency (AMS) will roll out a EUR 1.8 million (Futurezone, 2020) sorting algorithm which attributes a score to each job seeker based on several attributions (see next paragraph) and evaluate the chances of specific groups on the labor market. Depending on this score, job seekers will be categorized (A to C), which determines how much support this job seeker receives from the AMS. People who need no help in finding a new job will be categorized in group A. Group B is consistent with people who might benefit from retraining and support. People in group C are deemed unemployable (AlgorithmWatch, 2019). The algorithm is based on statistical models of past employment records and, according to Mr. Kopf (board member of AMS), increase efficiency, reduce the waste of financial resources, and is in line with the current legislation and the anti-discrimination law (AlgorithmWatch, 2019).

Holl, Kernbeiß, and Wagner-Pinter (2018) state, in their model description, that attributions like sex, age, nationality, education, care responsibilities, health-related restrictions, as well as previous profession, work hours, frequency and duration of prior

support of AMS, and activities on the regional labor market are included. Each attribution is weighted following unpublished scales. Furthermore, a reference group with the following attributions are used: male, degree of compulsory schooling, Austrian citizenship, and no care responsibility. However, due to published examples, it is clear that, for example, women with children, are negatively weighted while men with children are not because the responsibility to care for children will take into account exclusively for women (Algorithmwatch, 2019).

This situation inevitably leads to one complex question. *Can an algorithm be gender unbiased when past employment records and a male reference group serve as the basis?* And a further-reaching question. *Is such a reference group opportune for the future?*

In order to answer this complex question, the first sub-question, if an algorithm can be unbiased, needs to be answered. Furthermore, it is in question if this algorithm complies with the current national and international legislation.

A core component of algorithms is the ability to learn from presented and new data, and subsequently, the ability to compile the right choice to comply with the underlying patterns (Leavy, 2018; Turner Lee, 2018; Gates, Vandermeer, & Hartling, 2018; Thelwall, 2018). If the underlying data are distorted, for example, due to stereotypical concepts of gender, the algorithm will perpetuate this bias (Leavy, 2018; Thelwall, 2018). Especially, job matching algorithms and the digital economy perpetuating gender bias and inequality (ILO, 2019). A programmer needs to be aware of this bias and counteract by adapting the algorithm so that a distortion in the underlying data are not taken into account (Alvi, Zisserman, & Nellåker, 2019) One way to overcome bias within the algorithm is synthetic data. Synthetic data are additionally generated datasets of the underrepresented group (Watson, 2020) to counteract the inequality. This adaption is necessary not just to reduce bias in the algorithm but also to comply with different national and international legislation and regulations which prohibit discrimination.

In the case of the AMS algorithm, the legislations of different levels need to be considered. At a national level, the Federal Law on the Act of Equal Treatment, BGBI I Nr. 66/2004 §3, which states that no person shall be directly or indirectly discriminated against in connection with an employment relationship due to gender (Federal Law Gazette for the Republic of Austria, 2004), and the Federal Act on the Labor Market Service, AMSG Nr. 313/1994 §31(3), which states that the AMS staff have to counteract discrimination against women in the labor market (Federal Law Gazette for the Republic of Austria, 1994), need to be considered, among others.

At the European level, among others, the Charter of Fundamental Rights of the European Union (2010/C 83/02) Article 21(1) states that any discrimination based on sex shall be prohibited (European Parliament., & Office for Official Publications of the European Communities, 2010). Directive 2006/54/EC, Title II, Chapter 1, Article 4 goes one step further and prohibits direct and indirect discrimination on the grounds of sex concerning all aspects and conditions of remuneration (European Community, 2006). Furthermore, Council Directive 76/207/EEC, Article 1, paragraph 1 (European Community, 1976), and Council Directive 2000/78/EC, paragraph 3, instate principles to promote equality between men and women (European Community, 2000).

Due to the automated processing, the EU general data protection regulation (GDPR) 2016/679 need be considered as well, since Article 22 (1) state, that "the data subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her" (European Commission, 2016, p. 46).

The relevant legislation at the International level is, among others, the International Bill of Human Rights (UN General Assembly, 1948), the CEDAW, 1979 (UN General Assembly, 1979), the ICESCR, 1966, Part 2, Article 3, which ensures equal rights of men and women (UN General Assembly, 1966). As well as the Discrimination (Employment and

Occupation) Convention, 1958, (No. 111), Article 2, which states that "Each Member … is in force undertakes to declare and pursue a national policy designed to promote … equality of opportunity and treatment in respect of employment and occupation, with a view to eliminating any discrimination in respect thereof" (ILO, 1958).

As a result, the answer to the first sub-question, if an algorithm can be unbiased, is yes. It is possible if the algorithm learns from undistorted data or if the algorithm is adapted (by creating synthetic data) so it can counteract the distorted pattern of the underlying data and, as a result, comply with the relevant legislation and regulations. However, the AMS algorithm would need to treat men and women equally, which is not the case, due to the male reference group and the different calculation when the responsibility to care for children is included. Therefore, this algorithm would continue the systemic discrimination of women.

An example of an application of an algorithm can be found at the Belgian-Flemish Public Employment Service (VDAB). The VDAB uses an algorithm, in collaboration with the job seeker and the guidance of the VDAB staff, to decide how much and which support the job seeker needs to be integrated into the labor market again. This algorithm is used as another tool of the VDAB to offer the job seeker vacancies based on various data points. For example, the algorithm considers the personal history of click behavior on online jobs, automatic matching assessing client profiles against the existing vacancies of employers, as well as what the job seeker is looking for. If a vacancy matches the profile, the algorithm takes criteria like willingness to commute into account (Finn & Peromingo, 2019).

Like the VDAB algorithm, could the AMS algorithm be used as another tool to help the AMS staff and job seekers to take the right decision what kind of support is appropriate to enter the labor market again.

Another sub-question is if the data from past employment records, especially concerning women at the labor market, should be used without any adaption as a reference for the algorithm.

These past employment records should be examined more closely to answer this question. During the period 2004-2018, the past employment records of Austria show that the overall employment rate was between 54 and 58 percent. However, this rate differs when gender is included considerably. During the same period were between 62 and 64 percent of men but only between 47 and 53 percent of women employed. Additionally, the data reveals that about half of the employed women but only less than one-sixth of employed men were working part-time (up to 35 hours per week). This means that three to five times more women than men were part-time employed and twice as many men as women were full-time (36 hours and more per week) employed during the period 2004-2018 (Statistic Austria, 2020).

If the data from past employment records are used as a reference for the AMS algorithm, gender equality of employment will not happen. After all, one aim of this algorithm, due to ratified Conventions and legislation, should be gender equality, not the long-term establishment of inequality and state-supported systemic discrimination.

One option would be adapting the algorithm so that it corrects the underlying bias completely. A second option is synthetic datasets, which create additional datasets to counteract the distortion of the underlying data (Watson, 2020). In this case, it would include further datasets of full-time employed women and part-time employed men. Another option would be a gradual but rapid adaption of the employment ratio in the underlying data, so the employment rate is moving in the right direction if the negative consequences for the economy of Austria would be too severe to achieving full gender equality at once, which is unlikely.

This attitude, to include women in the labor market, is recommended by the ILO (2019) since society cannot change if we insist on concepts of past decades, in which the

world of work is “shaped by men for men” (p. 34). Furthermore, this retrograde step would only be an option if any other alternative has been considered (UN General Assembly, 1966). This answer leads to the last sub-question if a male reference group is opportune for the future.

A study from the European Institute for Gender Equality (EIGE) (2017) depicts how striking the impact of gender equality on the EU economy as well for each country would be (Klasen & Lamanna 2009; Mitra et al. 2015; Cuberes & Teignier 2016; Loko & Diouf 2009; Morais Maceira, 2017). The estimated growth of the EU employment rate would be 0.5-0.8 percentage points by 2030 and 2.1-3.5 percentage points by 2050. By 2050 and the rapid improvement of gender equality, the employment rate for both men and women would reach almost 80 percent in the EU and would create 10.5 million jobs (for men 2.9 and 7.6 million for women). Notably, the reduction of gender inequality in STEM (science, technology, engineering, and mathematics) would have a substantial effect (EIGE, 2017). Due to an increased employment rate, the wage gap would shrink significantly, and more women would be attracted to the labor force. The EU GDP per capita would rise by 6.1-9.6 percent, which amounts to EUR 1.95-3.15 trillion by 2050. In 2030, the first benefit would be apparent with a 2 percent increase in GDP per capita, which would be the increase of EU GDP by 2050 if gender equality develops at the current rate. Depending on the current situation of gender equality in each country, could some of them, such as Poland, Italy, Greece, Bulgarian, to name a few, their GDP increase of about 12 percent. Countries that have already achieved an adequate level of gender equality, for example, Sweden, Denmark, The Republic of Ireland, Finland, and Austria, would still achieve an improvement of about 4 percent, by 2050 (Morais Maceira, 2017).

Given this study and the findings, a male reference group is not opportune for this age and even less for the future since half of the employable population of Europe is only partially involved.

The ILO (2019) suggests policies to promote equally shared care and domestic responsibilities between men and women, such as an increase of paternity leave and simultaneous reduction of maternity leave. This change will require substantial investments in public care services because women perform three-quarters of all unpaid care work (ILO, 2019). Furthermore, young women have to see and learn about the full spectrum of their occupation options in the future; this includes STEM topics (EIGE, 2017). However, the economic benefits would more than just compensating for the resulting costs in each country, which can be observed in the development of Iceland during the last twenty years.

This essay points out several aspects that need to be considered so that the AMS algorithm would be a valuable tool for gender equality, a source of sustainable economic growth for Austria, and help for job seekers to enter the labor market.

While technology is a powerful tool in achieving gender equality, job matching algorithms perpetuate gender bias, inequality (ILO, 2019), and support systemic discrimination. Therefore, any algorithm for an employment agency must be based on undistorted data so that existing stereotypes will not be maintained. This adaption can be done by an adjustment of the desired employment rate within the algorithm or by using synthetic data. Furthermore, the reference group needs to represent the whole population and not just the male part of the population. This full representation of the population can be achieved, like before, by adjusting the reference group or the algorithm.

The improvement of the Austrian GDP (Morais Maceira, 2017) and the additional profit of private organizations due to gender equality would more than just cover rising costs of (public and private) care services as well as emerging costs due to, for example, equally shared accountability for the care and domestic responsibilities between men and women.

As early as 1948, equality between men and women was anchored in the Universal Declaration of Human Rights, and since then, this fundamental issue has reappeared in numerous conventions, legislations, and regulations. Without the will of politics, economy, and every single person, gender equality will continue to be a lip service for another 72 years or even longer. Everyone has to make his or her contributions. Relying on others to make the necessary decisions and take the next steps will not work. Equality begins with every individual and is a conscious decision that needs to be done and proven in everyday actions.

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Appendix

Table 1

Employment rate 2004 - 2018

	Male		Female	
Year	Part-time (<35 hours)	Full-time (>36 hours)	Part-time (<35 hours)	Full-time (>36 hours)
2004	117	1857	669	959
2005	141	1868	695	981
2006	151	1913	725	998
2007	167	1957	759	1015
2008	193	1958	789	1031
2009	206	1919	820	1020
2010	214	1926	846	1015
2011	210	1947	861	1025
2012	215	1951	887	1020
2013	242	1934	906	1015
2014	255	1914	941	992
2015	264	1923	959	990
2016	284	1945	982	999
2017	291	1959	994	1009
2018	281	2008	1004	1014

Note. Persons in Thousands (Statistic Austria, 2020)

Table 2

Employment rate 2004 - 2018

	Male		Female	
Year	Part-time (<35 hours)	Full-time (>36 hours)	Part-time (<35 hours)	Full-time (>36 hours)
2004	3,25%	51,56%	18,57%	26,62%
2005	3,81%	50,70%	18,85%	26,63%
2006	3,98%	50,53%	19,14%	26,36%
2007	4,30%	50,21%	19,46%	26,03%
2008	4,85%	49,30%	19,88%	25,97%
2009	5,19%	48,39%	20,68%	25,73%
2010	5,36%	48,13%	21,14%	25,37%
2011	5,19%	48,16%	21,29%	25,36%
2012	5,28%	47,89%	21,77%	25,05%
2013	5,91%	47,21%	22,12%	24,77%
2014	6,22%	46,65%	22,94%	24,19%
2015	6,38%	46,49%	23,19%	23,94%
2016	6,75%	46,19%	23,33%	23,73%
2017	6,85%	46,06%	23,37%	23,72%
2018	6,52%	46,62%	23,31%	23,55%

Note. Persons in Percentage (Statistic Austria, 2020)