Documentation DSIA Project Group

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INTRODUCTION

The impact of technology on our lives is growing rapidly. Artificial Intelligence algorithms are applied on a daily basis in different fields: in the medical field, in self-driving vehicles, to determine if we are worthy of a mortgage or to determine if we deserve a certain job position. An error in an algorithm might not seem very pleasant to us, but not even that serious: if Netflix recommends a film we don't like or if Siri sets the alarm clock at the wrong time, we are faced with trifles that we could turn a blind eye to, given the countless facilities they offer us. But what if the error concerned an autonomous driving algorithm? Or if we were rejected at a job interview because of our gender, religion or race?

The mistake that has probably caused the most stir in recent years is related to the recruitment software algorithm used by Amazon starting in 2014. This software was believed to analyze candidates' resumes and automate the selection process. However, it emerged how it penalized women, especially for positions related to more technological roles. The error was due to the data with which the model was trained: real data, containing the resumes received by the company in the previous 10 years; purely male resumes, given the majority of men in the technology sector. The model automatically recognized a pattern that delineated the best candidates, incorporating male gender among the ideal characteristics, and thus incurring a bias. A bias is a systematic error in judgment or interpretation, which can lead to a misjudgment or to making an unobjective judgment. It is a form of cognitive bias caused by prejudice and can influence ideologies, opinions, and behaviors. In computer science, algorithmic bias is an error due to incorrect assumptions in the machine learning process. This error, forced Amazon to decommission the software.

The previously reported errors occur because by training AI models through the massive amounts of data available to us, AI incorporates values and biases inherent in society. Although the common imagination leads us to consider an algorithm as a perfect decision-making process, superior to human reasoning (considered instead as biased and not objective), because it can process a multiplicity of data in an unbiased way, in reality this is not the case.

Algorithmic fairness is a growing field of research that aims to mitigate the effects of bias and unjustified discrimination on individuals in machine learning, primarily focused on mathematical formalism and finding solutions for these formalisms. It is an interdisciplinary research area that aims to create learning models capable of making fair predictions from the perspective of equity and justice.

From this premise, our work seeks to analyze whether there is a difference in applying for a job position between men and women based on how well their preparation coincides with that required.

You’ve probably heard the following statistic: Men apply for a job when they meet only 60% of the qualifications, but women apply only if they meet 100% of them.

Our goal is to test whether this assumption is actually true. If it turns out to be true, any algorithm influenced by this bias would produce a biased system, which with a large database would simply automate the error and standardize it by favoring the assumptions of one sex over the other.

The finding comes from a Hewlett Packard internal report, and has been quoted in Lean In, The Confidence Code and dozens of articles. It’s usually invoked as evidence that women need more confidence. As one Forbes article put it, “Men are confident about their ability at 60%, but women don’t feel confident until they’ve checked off each item on the list.”

METHODS

For data collection, we created a Google Form survey divided into 2 main sections. We surveyed over our colleagues of Data Science and Management Course, predominantly Italian students.

1) The first section aimed to identify the gender of each individual and to collect the level of preparation regarding a list of hard and soft skills that we then used in the second phase.

This step allows us to get feedback on how prepared individuals feel from "Zero" to "Expert" on the various skills so we can plot each value between 1 and 4. Each skill level will allow us to compare each individual's preparation with the preparation required in the various job postings, from phase 2 of our survey, and get feedback on the different propensity to apply to job postings between men and women.

Immagine che contiene tavolo

Descrizione generata automaticamente

2) In the second section, we submitted 5 job position advertisements to individuals for the role of "Junior Data Scientist" in a 6-month internship. Immagine che contiene testo

Descrizione generata automaticamente

Each advertisement consists of the title, a brief description of the vacant position, the general characteristics that the role requires and the requirements A and B that correspond to Soft and Hard Skills respectively.

The 5 advertisements differ mainly in the requirements where different skills and levels required by the position are indicated that correspond to the same ones analyzed in section 1 of our survey.

After the individual has analyzed an advertisement, they are asked to answer whether or not they would apply for the position in question.



Once we have ascertained whether or not the individual is intent on applying, the following questions are designed to identify: the level each individual feels he or she holds with respect to: advertisements in the overall and with respect to requirements A and B.

Immagine che contiene testo

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