**Victoria**

**Slide 1**

Hi - we are team 4 and I am Victoria. My teammates are Kristian, Ruthwik, and Sagar

Our project is focused on reducing bias in Automated Resume Review System

Our case study will by Amazon’s AI Recruiting Tool.

**Slide 2**

Our project was inspired by three main articles.

* To your right, the National Bureau of Economic Research published a study on labor market discrimination.
  + In the experiment, they responded to more than 1,300 employment ads for administrative and customer services roles.
  + Sent out almost 5,000 fictitious resumes. The resumes were randomly assigned balck sounding names like LaKisha and Jamal - and White-sounding names like Emily and Greg.
  + The study revealed that White names receive 50 percent more callbacks for interviews than black sounding names.
  + a**pplicants who lived in a wealthier, or more educated, or white neighborhood, had higher chances of callbacks**
* To your right, is a study by Harvard university and it looked at the impact of white washing resumes.
  + For example, on the resume Manu could change his name to Manny. Manu likes basketball while manny like golf. Manny will have a higher chance to receive a call back than manu
  + Even though resumes could be identify, the study revealed that **Twenty-five percent of black candidates received callbacks from their whitened resumes, and for Asians, 21 percent received for whitening their resumes,**
* We came across th**e 2018 Amazon scandal which revealed that their AI resume and recruiting tool discriminated against women and mid-career applican**ts.

**Slide 3**

Our main research question was how could we make an AI recruiting engine less biased and more inclusive of diverse applicants?

Our secondary questions include:

* How does AI-based screening work in various settings? What are the various tools being used in large tech companies?
* What biases exist and where do biases come from?
* What are some of the main methods or best practices to reduce biases in Amazon’s AI resume system?

**Slide 4**

What is an AI recruiting engine?

It is the application of artificial intelligence to the talent acquisition process,where machine learning can learn to shortlist your ideal candidate, as well as automate manual tasks in the recruitment process.

The AI will produce a set of rules, algorithms, instructions that attempt to use past data to predict future applicant performance.

* For instance, the AI tool could use resume data from old and current employees to seek out similar applicants.
  + It will look for keywords and profile potential applicants that fit into the current employee pool. so if your company happens to attract and hire white male, the AI will reinforce that bias.
* It reviews and assess applicant’s profiles, skills and experiences.

**Slide 5**

AI recruiting tools are becoming increasingly popular.

The Global AI recruiting market is expected to reach a staggering market value by 2025 because it offers advanced applications for the recruitment process such as recruiter chatbox, intelligent screening and digitized interviews. It increases the quality and efficiency of the recruitment process.

* Roughly 55 percent of U.S. human resources managers said they use AI recruiting tool in their daily job.
* HireVue is arguably the best-known AI-powered hiring platform, deployed by 700+ companies
* AI tool includes various features listed on the slide

Benefits

* It reduces administrative tasks - helps HR to be more strategic
* It is less costly and time consuming.
* It has the ability to harness data from your internal database, job boards, and relevant professional sources to create meaningful insights and a deeper intelligence of each candidate.
* It brings objectivity to a previously subjective process by relying on relevant candidate and industry data to make better informed decisions

**Slide 6**

AI resume tools several challenges

* It can reinforce social bias
* A lot of developers are white males. So it’s important to have developers from diverse demographics who may be in a better position to ask questions about the sources of data and flag bias
* It limits the applicant pool for a specific audience
* Have used historically biased data set to train the AI model
* It’s less human centric and lacks emotional intelligence
* It may be unreliable - data learning may have numerous inconsistencies and flaws.

Because of these challenges, employers may lose out on interesting candidates.

**RUTHWIK**

**Slide 7 -**

There are a few types of biases that are common in AI-based hiring systems.

Similarity bias is when the system tends to give a preference to candidates that have very similar characteristics to the people whose resumes and data were used to build the AI system. If there are a lot of resumes where the word “Skiing Club” is mentioned, and these are used to train an AI resume hiring system, the system will pick out resumes from candidates with this word as being favorable.

Halo effect is when the recruiting system tends to focus only on one positive aspect like the school they attended and ignores the remaining factors. This can leave out candidates from non-reputable universities, for example, who are equally or even better suited for the job

Negative Emphasis bias is the complete opposite of the halo effect. It is when the AI system emphasizes only one negative aspect of the applicant like their GPA and ignores the rest.

And finally, Illusory correlation is when the system believes that there is a relationship between two variables even when there is no such relationship. For example, candidates with certain non-western names might be deemed unfit for a job even if everyone knows that there is no such relationship between these two factors.

Ideally, an AI hiring system should mitigate these traditional biases prevalent during manual hiring practices, not propagate them.

**Slide 8**

There are different types of AI-based candidate screening systems like HireVue and Lever that are being utilized by companies across different industries. Most of these systems have a few things in common. They try to reduce bias by anonymizing candidate demographic information like their race and gender. These systems parse through resumes much quicker than any human can and give preference to candidates whose resumes have certain keywords. Some of these systems have AI chatbots that try to fetch more information from a candidate and even conduct some preliminary interviews. Some of the tech companies have a coding challenge as part of their recruitment process which is also evaluated by an AI system. A lot of companies also employ video interviews where a candidate answers pre-recorded questions without a human on the other side. Instead, the system’s algorithm will evaluate candidates based on characteristics like word choices, speech pattern, expressions, and body language.

However, there is always a human, typically someone from HR, at the end who ranks the candidates and finalizes the hiring decisions.

**Slide 9 -** Now, we will take a look at Amazon’s Automated Hiring System, that came under a lot of backlash and eventually had to be phased out.

**Slide 10**

But first of all, it is important to look at how Amazon approaches diversity and inclusion. Amazon has 13 affinity groups that aim to bring employees, community members, and other stakeholders belonging to various demographic groups together. These affinity groups advise the business units at Amazon, work on service projects, and interact with the local community. Some of the most popular groups include Glamazon, a group that educates and informs employees and other people about the LGBTQ community, Women@Amazon, the largest affinity group at Amazon, and Warriors@Amazon, that aims to help veterans transition into civilian life and provide opportunities for military spouses.

These three groups and many more clearly indicate how Amazon values having a diverse group of employees.

Then why was Amazon’s AI hiring system doing the complete opposite and prejudicing against women candidates?

**Slide 11**

Well, Amazon’s original Intent to develop AI that could rapidly parse through resumes and spot candidates worth recruiting. The team in Edinburgh, Scotland (home to Amazon Development Center) worked on this tool, but they soon found out that the tool was biased against female candidates because the previous 10 years’ data fed into the system had a pattern of subconscious/unconscious bias against females and Amazon was mainly hiring men anyway so the AI also thought that male candidates were better suited for the company. Of course this wasn’t intentional but it did have a lot of negative impacts that went against Amazon’s values. Aside from rejecting resumes that contained keywords pertaining to anything women-related, it also disadvantaged candidates from non-traditional backgrounds who were transitioning into the IT field.

**Slide 12**

Therefore, our goal is to improve Amazon’s AI resume review system so that any bias is minimized and every candidate gets an equal chance to be hired. Through the use of this system, Amazon and other companies that might want to use this shall be able to promote diversity and inclusion at their organizations.

The AI system that we propose only focuses on the sourcing and screening phases of recruitment for the purposes of this project.

**Sagar**

**Slide 13**

Based on the information we have gathered, we were able to create a DFD of Amazon’s recruiting process.

Our focused attention will be on 1.0 “Parsing resume to be analyzed by the algorithm” through 2.0 “ Ranking the candidates”

**Slide 14**

So we researched Amazon’s top competitors to see their diversity and inclusion efforts

Amazon top’s competitors

* In terms of retail store rivalry are: **Target, Walmar**t, Best Buy, and Costco
* subscription services competitors are ,**Netflix** Apple, and Google
* web services competitors are Oracle, **Microsoft**, and IBM

We highlighted Target, Walmart, Netflx, and MS because they are listed as companies with high diversity numbers and best places to work for people of color according to DiversityInc, Fortune 500, and Forbes 2021. These companies, with the exception of Amazon, have internationally invested resources to maximize their DEI efforts.

**Slide 15**

Amazon currently has an estimated 1.3 million employees globally

* The Diversity numbers at amazon is debatable but it is very likely that the percentage of women were probably much lower than 31 percent in 2018.
* Diversity goals is that By 2021, Double the number of Black directors and vice presidents
* By 2021, Increase the number of women in senior technical jobs by 30%

Currently Microsoft is ranked #1 for diversity rank and best place to work for people of color.

They have invested lots of money into their DEI programs.

* By 2025, they hope to double the number of Black and African American managers and senior employees. They have higher than average rate of people of color in leadership positions.For example, women make up 20 % of their leadership while Asians make up 31%

**Slide 16**

Target has reach out 50/50 percentage for male and female employees. There are lot of women and people of color in leadership roles.They have a diversity and racial equity committee. By 2023, they hope to increase Black representation across the company by 20%.

Walmart’s employee numbers are similar to amazon’s but they have done a great job in diversity recruitment. They do a lot of campus recruitment, referrals, and community outreach. By 2026, they hope to contribute $100 million to boost diversity

Netflix does a moderate job in its recruitment of diverse candidates in marketing

**Slide 17** - Solutions.. How we plan to reduce bias in Amazon’s AI system

**Slide 18**

Our Setting is a Professional Hiring Platforms

We are looking at Amazon’s AI Recruiting & Resume Tool

Our solution is to do the following:

* Phase I is to established a balanced datasets with diverse candidates (which can be used by developers to develop better rules for a fairer process for future candidates)
  + A diverse dataset is only possible by sourcing candidates from diverse platforms (including applying traditional, human to human sourcing methods)
* Phase II - Quickly and efficiently analyze a prospective employee’s resume and minimum unconscious bias through a process called masked recruiting which hide personal information/ demographic status such as evidence of disability status, gender, race, age, ethnicity on the resume
* Phase III - Develop a point based system and rank DEI values and other important metrics

**Slide 19**

In order to develop a diverse dataset, we needed to apply various sourcing techniques and add the human element.

* Source candidate from popular job boards and network
* Partner with Asian alliance associations, veteran associations, historically black colleges, community centers
* Engage in human to human contact by going to recruit from campuses, meetups, social events and conferences ( this was a major ingredient in Microsoft/Target/ and Walmart’s diversity)
* Utilize referrals and reach out to previous applicants

**Slide 20**

This is an example of Fred Jones. A typical white male with computer science background.

We see elements of similarity bias---> Ex: Under Leadership and Activities, you will sailing, snowboarding, and glee club ---> which may indicate some social bias of white male activities

An example of Negative emphasis bias is under Education -- fred graduated Summa Cum Laude which means he has a very high GPA

On the other hand, there are some positive bias that reflects Amazon’s Diversity values and could benefit Fred in the long run and they are being a member of the LGBT community, a veteran and volunteers for girls for code,

**Slide 21**

This is a continuation of phase II of resume parsing.

Masked recruiting is a common technique to remove bias. It hide or masks personal information such as evidence of gender and ethnicity on the resume

Our AI is entering a point system. It will look for keywords that match the job description and responsibilities.

Words that align with amazon’s diversity and inclusion values for veteran, women engineer, and so forth. Our AI tool is also looking for relevant job skills and years of experience.

Each Job description is worth two points.. There are four highlighted job responsibilities so it’s 2pts \* 4 = 8 points

Years of experience is worth 3 points… This person has 8 years of relevant experience so it’s 3 \*8 = 24 points

Each highlighted skill is worth 2 points ...and There are four highlighted skills so it’s 2 \* 4 = 8 points

Each highlighted diversity value is worth 1 points so it’s 3 points

The total number of points for this resume is 45 points.

**Slide 22**

**KRISTIAN**

**Slide 23**

Phase III combines the score generated from an applicant’s resume with potential diversity factors that are collected during the application process.

Here the AI can compare an applicant’s gender, ethnicity/race, region applied from,

university affiliation, level of education and other factors that could be determined by the hiring manager of the position depending on what they desire.

In the key on this slide we have assigned each of these factors a point value to maximize a diverse candidate for Amazon.

**Slide 24**

Here are the combined scores from the application details and resume parsing for the fictional Fred Jones. If all candidates are scored in this way the AI could then select only the top scoring candidates of the bunch to proceed to the next round of the hiring process.

**Slide 25**

Our system eliminates some of the biases that were described earlier in the presentation. For example, during phase 2 of the system, we hide irrelevant information about the candidate like the types of sports they played which helps us avoid similarity bias. Our points based system, which takes into account multiple factors helps us mitigate the Halo and Negative Emphasis bias. Finally, by hiding the candidate’s picture, name, and other demographic information that might lead to bias, our system can help remove a manager’s illusory correlation and emphasize candidates based primarily on their aptitude for the position.

**Slide 26**

There is no one size fits all solution for reducing bias and increasing diversity in a company, especially through an AI recruiting system.

These are policy recommendations that can be tailored to a company’s specific diversity goals.

Company could decide to do …

1. A Blind review process
   1. Utilize masked recruiting which removes every personal identifiable information from a person’s resume and just focuses solely on relevant skills of the candidate for the job. Doing this could be good enough for a company where diversity may not necessarily be a pressing issue
2. They could also utilize Selective diversity factor prioritization

* Which includes some form of affirmative action to a degree if the company needs to improve their diversity in some aspect. It may mean valuing certain diversity factors over others which may be relevant to the mission of the organization. For instance, if you are an organization that serves veterans, it is possible that the company wants to have a staff that mostly consists of veterans.
* Lastly is the most aggressive form of affirmative action which we applied in our solution. Our strategy was an example of aggressive diversity, equality and inclusion efforts for the AI system for Amazon. Which we valued based on a point system which ranked different diversity factors

**Slide 27**

The system we have devised has many strengths however it is not without its limitations

* Companies who take aggressive efforts into diversity and recruiting have to consider they could be forming a **positive bias**. For instance, a company can prioritize more females than males and consider this to be a positive factor because the company is looking for more female engineers. The limitation is that it is still a bias in that they are excluding male candidates.
* Companies who seek to use this method to increase diversity can still come across times where they simply do not have a diverse pool of applicants. This system can only help a company identify and prioritize types of applicants but it cannot achieve that if they do not apply
* Prejudice, stereotypes, and unconscious bias are still societal issues. It may be hard to change a company's work culture if people do not feel valued. It’s not enough to just hire people of color. It is important to have an inviting and supportive work culture for them to stay in the company. Improving diversity is a multifaceted process.

**Slide 28**

In order to build a fair AI resume recruiting tool and a diverse pipeline for a company, it is important to...

* Build a dataset with diverse candidates. Using sourcing tools to seek out people from diverse backgrounds to build a pipeline of diverse candidates.
* Increase transparency with applicants about how decisions are made
  + For example, Explainable machine learning, gives users a way to vet how an algorithm arrived at its recommendation

Utilize Masked recruiting. Hide personal information such as evidence of gender and ethnicity on the resume

* Audit the performance data that is being used to train the model. Companies can actively look for any bias in the input that can lead to a biased output.
  + Carefully test for the presence of adverse impact in the predictions of the model.
* Measure your results -- Track efforts with diversity survey and reports, using demographic data and diversity metrics to adjust your DEI strategy

**Slide 29**

Thank you for listening.