

Outline of Automatic Employment Decision Technology Analysis with Focus on Bias Against Those with Disabilities

1. Abstract

- Hypothesis: Lack of accommodation and accessibility features in AI/ML in HCM/TA is causing screen-out harm to candidates with disabilities.
- Study summary: In this study we collected and explored data for 30 AI companies that offer HCM/TA products. Specifically, we looked at the information they made public regarding their accommodations and accessibility features related to their AI products. We also collected and categorized further information on the size of each company, the specific products being offered, if they conduct bias testing, and if the company has accessibility staff.
- Summary of results: We found a major of companies in our study do not offer accommodations in their AI products and are not actively addressing candidates with disabilities in the public eye which can lead to screen-out.

2. Intro

- Some overall stats on employment and why we should care
 - In 2021, 16 to 64 years old persons with a disability had over double the rate of unemployment of 10.8%
 - In 2020, the percentage of persons with a disability making \$75k or more a year was 40.01% less than those without a disability
- In general AI systems are marketed as being objective and helping with bias, but traditional bias testing often ignores those with disabilities and issues around screen-out, when companies even attempt to tackle these issues. Many don't as we'll see below.
- How these AI technologies(resume & video screening) work/ what algorithms do companies use?
 - Resume Screening: Natural Language Process algorithms are used for keywords and grammar extracting
 - AI Video screening: Convolutional Neural Networks (CNN) are used
 - Emotion recognition systems are particularly worrisome (optional)
 - "Developments in the biometrics and emotion AI market are immature. They may not work yet, or indeed ever."
 - Similar quotes from NIST: <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1270.pdf>, pg. 24/75

- Recommendation Systems: Simpler, transparent systems, based on <https://www.pnas.org/doi/10.1073/pnas.1915006117>

WARNING

99% of Fortune 500 companies had AI tools somewhere within their hiring plans

- What is screen-out in HCM/TA?
 - "Screen out because of a disability is unlawful if the individual who is screened out is able to perform the essential functions of the job, with a reasonable accommodation if one is legally required" - ADA
 - Examples: Gamification, AI video interview software, Chatbots and other algorithmic decision-making tools
- Impacts of these AI technologies on different disabilities
 - Some “gamified” tests maybe benefice for some neurodivergent candidates but not for candidates with other disabilities such as physical disabilities
 - AI video interview software negatively impacts both neurodivergent and physical disabilities candidates

3. Methodology of Study

- [Code implementation](#)
 - Explanation of how data was collected (4-5 sentence paragraph): First we created a 30 companies list of the top AI companies offering HCM/TA products including both well-know Fortune 500 companies and small start ups. Then we assessed what type of HCM/TA product(s) does the company offer such as video screening, resume/profile screening, and/or Chatbots. Further we invested if the company’s website marketed their product as "Bias-Free" or or used similar language which is very concerning. Also we looked if there is public evidence of accessibility staff on the company’s website or LinkedIn and has accommodations directly for the AI/ML software displays on their website.

Data Dictionary

Features	Values	Description
"Bias-Free"/No bias	1 = yes, 0 = no, 2=maybe	If yes, company’s website displays the term "Bias-Free" or similar language, such as eliminates bias, in relation to company’s AI/ML technology or AI/ML technology in general.
Video Screening	1 = yes, 0 = no, 2=maybe	If yes, company’s website displays that company integrates AI/ML screening algorithms in their TA/HR video software.
Resume/Profile Screening	1 = yes, 0 = no, 2=maybe	If yes, company’s website displays that company integrates AI/ML screening algorithms on candidates resumes or profiles in their TA/HR software.
Chatbots	1 = yes, 0 = no, 2=maybe	If yes, company’s website displays that company integrates Chatbots in their TA/HR software.

Features	Values	Description
Addresses Physical Disabilities	1 = yes, 0 = no, 2=maybe	If yes, company's website addresses ways to assist and/or the benefits of hiring candidates with physical disabilities.
Addresses Neurodiversity	1 = yes, 0 = no, 2=maybe	If yes, company's website addresses ways to assist and/or the benefits of hiring neurodivergent candidates.
Public Accessibility Staff	1 = yes, 0 = no, 2=maybe	If yes, there is public evidence of accessibility staff on the company's website or LinkedIn.
Offers Accommodations	1 = yes, 0 = no, 2=maybe	If yes, company has accommodations directly for the AI/ML software
Immediate/Timeframe for Accommodations	1 = yes, 0 = no, 2=maybe	If yes, company gives immediate or a timeframe for when accommodations would be to candidates for AI/ML software.
Reports Bias Testing	1 = yes, 0 = no, 2=maybe	If yes, company states on the its website the company preforms a third Party audits or its own audits for bias in their AI/ML models. Note: this might not include bias testing for disability
Number of Total Staff	Small < 100, Medium < 1000, Large > 1001	Estimate total employee count on LinkedIn or other website

- Explanation of analysis
 - Pivot tables (categorical descriptive stats, counts and frequencies)
 - Simple models
 - Jupyter, python, packages, colab, etc. re-link to code: [Code implementation](#)

4. Results and Discussion

- Layout major questions as bullets
 - Q1: How do smaller companies compare to the whole sample?

	'Bias-Free'/No bias	Video Screening	Chatbots	Resume/Profile Screening	Addresses Physical Disabilities	Addresses Neurodiversity	Public Accessibility Staff	Offers Accommodations	Reports Bias Testing
Yes	-8.34	5.00	-1.66	-5.0	-15.0	-18.33	-16.67	-16.67	-28.34

	'Bias-Free'/No bias	Video Screening	Chatbots	Resume/Profile Screening	Addresses Physical Disabilities	Addresses Neurodiversity	Public Accessability Staff	Offers Accommodations	Reports Bias Testing
No	11.67	-3.33	5	5	15	18.33	16.67	23.33	31.67
Maybe	-3.33	-1.67	nan	nan	nan	nan	nan	nan	-3.33

- In the pivot table above we can see in our dataset small companies which have less than 100 employees vary on performance. For example, smaller companies tended to market their products as “Bias-Free” less than larger companies, at a rate of 11.67% less. However, smaller companies performed worse on the majority of categories, including “offering accommodations,” “having accessibility staff,” “reporting bias testing.” This makes sense on its face, smaller companies with access to less resources would not prioritize these accommodations, however this does not excuse such behavior.
- Q2: Do companies that don’t offer accommodations perform poorly across other categories/features? -WIP
- Q3: Does a disparity exist between companies mentioning neurodiversity on their website versus physical disabilities? / Does a company addressing neurodiversity make them more likely to offer disability accommodations versus when a company addresses physical disability?

[1000] | <https://raw.githubusercontent.com/midiker/aedt-analysis/main/image/Q3.png>

- As shown in table 3, we can clearly observe that half of our companies in the sample do not address physical disabilities or neurodiversity and do not offer accommodations of any kind. However, we can also see that for the companies that do offer accommodations, they only address neurodiversity. There is only one company out of the sample that addresses both physical disabilities and neurodiversity. Another interesting observation is that four companies that do not offer accommodations address both physical disabilities and neurodiversity.
- Q4: If a company reports bias testing is it more likely that they offer accommodations?

	Offers Accommodations
Yes	27.27%
No	54.55%
Maybe	18.18%

- In table 4 we see an interesting trend in companies reporting bias testing and offering accommodations. Out of the companies that do bias testing, the majority of those (54.55%) do not offer accommodations.
- Q5: What percentage of companies offer AI/ML video screening, without any accommodations?

	Offers Accommodations
Yes	16.67%
No	83.33%
Maybe	0%

- In table 5, companies which offer AI/ML video screening 83.33% do not offer accommodations. This is particularly concerning because video screening is an AI technology that can severely impact candidates with disabilities. Relying so heavily on this one method can lead to screen outs.
- Q6: What percentage of companies that offer accommodations also offer them immediately or provide a timeframe? (leading to screen out)

	Immediate/Timeframe for Accommodations
Yes	40.00%
No	40.00%
Maybe	20.00%

- In table 6 we see that only 40% of companies that offer accommodations offer these accommodations immediately or provide a timetable. Immediately providing accommodations or offering a timeframe can significantly reduce the chance of screen outs because the candidate is less likely to get passed by candidates that do not required accommodations.
- Decision Tree

[DT] | <https://raw.githubusercontent.com/midiker/aedt-analysis/main/image/DT.jpg>

- Discuss "Line Leader" & "Problem Child"

5. Conclusions and Recommendations

- What can you say, exactly, about the hypothesis, based on the results presented here?

6. Ethical Statement

7. References

8. Appendix