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Abstract

As AI is evolving, there are still many inconsistencies and imperfections in its programming and execution. There is a common racial bias in AI image generation. We have conducted a study about racial and gender bias in AI to see how common this is and what could be influencing AI to have these biases. We have searched and found many articles that discussed AI bias in race and gender. We performed our own study by using an AI image generator, Microsoft Bing, to produce 300 images of 3 categories of human professions. We have recorded our results in 3 separate tables and displayed them in a pie chart to visually understand the results. Through our research, we came to the conclusion that there is, in fact, a racial and gender bias in AI image generation.

AI Bias in Image Generation

Our current AI is far from perfect. AI uses machine based learning which means it gets its information from humanity and what it sees. It has learned from humanity's racism and incorporated that into its AI. This is called 'Algorithmic Oppression'. It is an automatic system that reads laws, institutional rules, implicit biases, stereotypes and social norms. (*Marie-Therese Png, Shakir Mohamed, & William Isaac; 2020*). An example is an AI predicting which criminals are most likely to reoffend. This AI is called 'COMPAS'. Among a group of criminals, it predicted that black people were twice as likely to commit crimes after being charged than white people. This data ended up being untrue because the white people reoffended as often as the black people. (*Manjul Gupta, Carlos M. Parra, and Denis Dennehy; 2021*). Additionally, black and hispanic people are underrepresented in technological development. Black and hispanic people only make up 8.1% and 5.8% of the computer work force. (*Morgan Livston; 2020*). This can lead to a lack of regulation in AI to include diversity. It is clear that AI has bias based on its learning from humans and what it is being shown. This extends into Microsoft Bing's AI image generation. Prior to research, we have believed that user taught AI has generated a negative portrayal of stereotypes, in regards to race and gender.

Materials and Methods

We began this experiment with creating a hypothesis on the topic we were researching- AI bias in image generation that can be found in the introduction of this paper. We then began our research to learn about the studies and experiments that have been performed on AI bias. Each group member had found 2-3 articles which discussed the different kinds of bias AI generates and the effects AI had on society. We came across many articles that linked a negative

connotation of individuals to the information AI chose to generate. Some of the articles that we found have been discussed in the introduction of this study. After gathering this information, we began to perform our own study to determine whether or not AI bias exists and to what extreme.

Using the Microsoft Bing AI image generation software, we searched for 300 images in total. We chose 3 different professions and each person in our group chose one profession to search 100 images of. The 3 professions we chose were fast food workers, politicians and taxi drivers. We gathered the images in 3 separate Google Docs, one doc per profession, and we then created a Google Sheet to record the data we found. In our Google Sheet, we chose to categorize our data by gender and race. The genders we listed were male, female and non-binary. The races we listed were white, black, asian, hispanic and other. The data was accurate to what we had expected but it was still quite shocking to see the extreme skew in the results. We took this data and formatted 3 tables in Google Docs, one table per profession to show the data we retrieved. We also created three pie charts in Excel to present a visual image of our results so they are easier to understand for the reader. The pie charts are also a great way to show the extreme skew in our results.

The AI images that were generated per category had unique factors that correspond to a stereotype perceived by the AI generator. All the images of the taxi drivers were white males and a unique factor was that the lighting was dim which makes one perceive taxi drivers are only driving during the night. The images of the politicians were mostly white and varied in gender and they were all dressed in professional attire to make one perceive a politician only in a professional setting. The images generated of the fast food workers were mainly white males and the workers were wearing red and yellow colors which are associated with McDonalds which would mean that most people associate fast food with the McDonald's food chain.

Table 1

100 Pictures of Taxi Driver

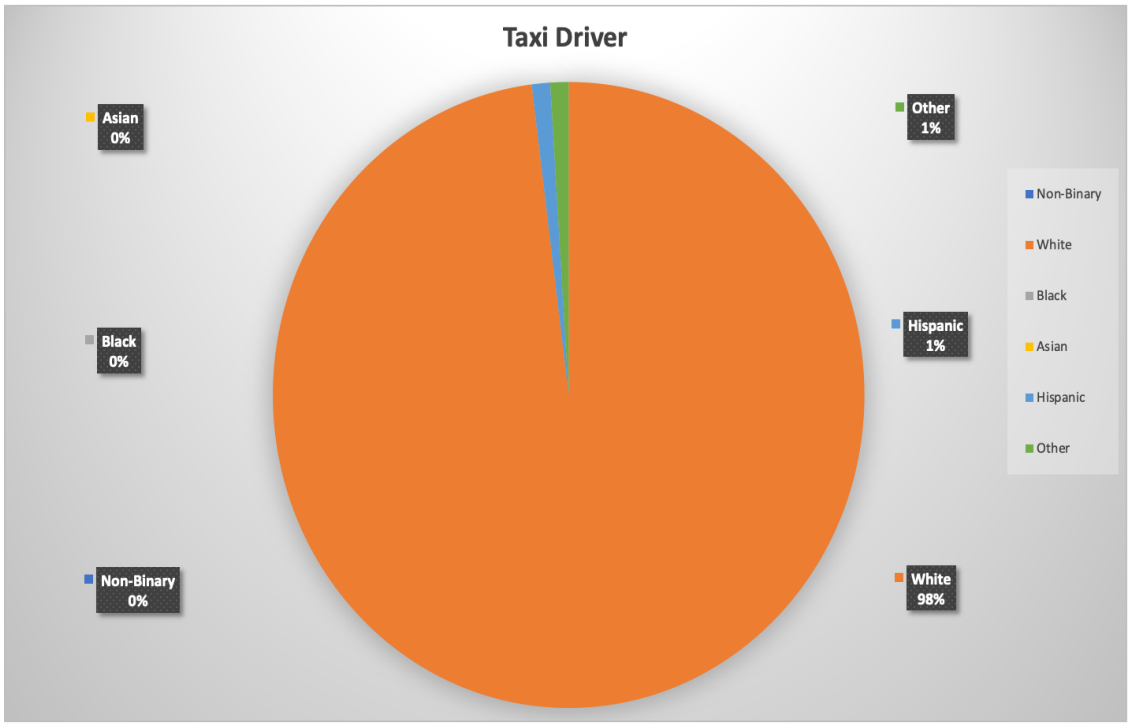
Taxi Driver	**100**
Male	100
Female	0
Non-Binary	0
White	98
Black	0
Asian	0
Hispanic	1
Other	1

Note: This is a table of 100 pictures of Taxi Drivers.

Margulis,S.,DeJesus,D.,Abouettahir,M., (2023). 100 Pictures of Taxi Driver.

Figure 1

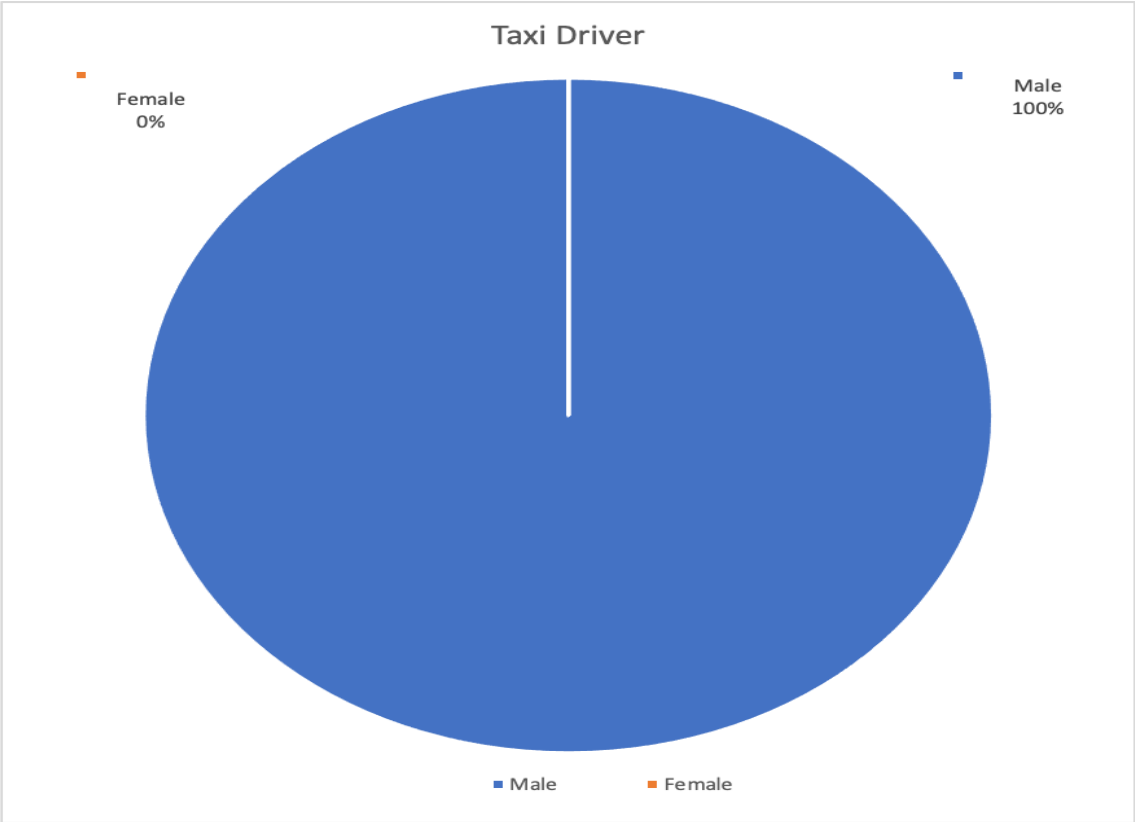
Taxi Drivers Ethnicity



Note: This pie chart shows the ethnicity percentage of taxi drivers.
Margulis,S.,DeJesus,D.,Abouettahir,M., (2023). Taxi driver' ethnicity.

Figure 2

Taxi Driver Gender



Note: this pie chart shows the gender percentage of taxi drivers.
Margulis,S.,DeJesus,D.,Abouettahir,M., (2023).Taxi driver' gender.

Table 2

100 Pictures of Fast Food Worker

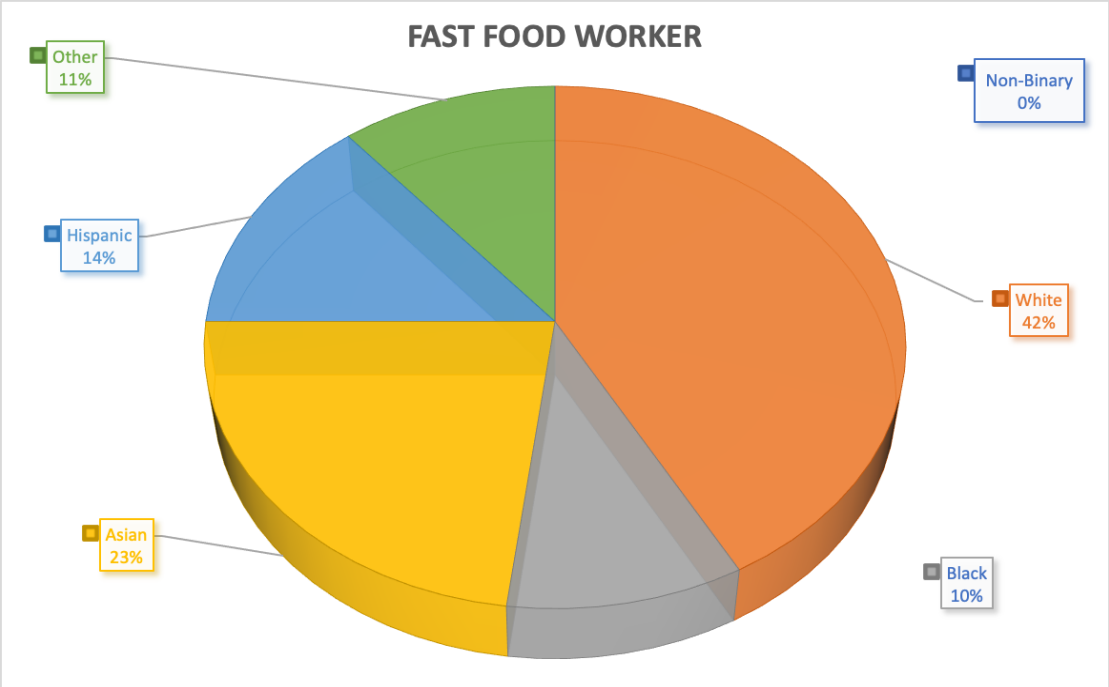
Fast Food Worker	**100**
Male	77
Female	23
Non-Binary	0
White	42
Black	10
Asian	23
Hispanic	14
Other	11

Note: This is a table of 100 pictures of fast food workers.

Margulis,S.,DeJesus,D.,Abouettahir,M., (2023). 100 Pictures of Fast Food Workers.

Figure 3

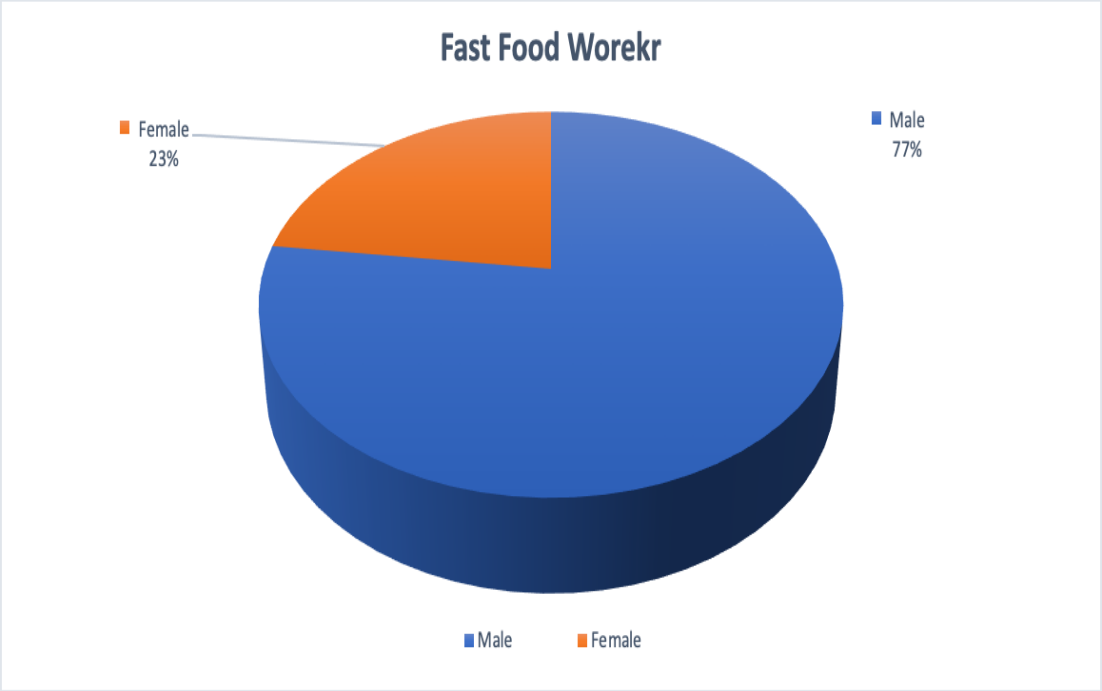
Fast Food Workers Ethnicity



Note: This pie chart shows the ethnicity percentage of fast food workers.
Margulis,S.,DeJesus,D.,Abouettahir,M., (2023). Fast food workers' ethnicity.

Figure 4

Fast Food Workers Gender



Note: This pie chart shows the gender percentage of fast food workers.
Margulis,S.,DeJesus,D.,Abouettahir,M., (2023). Fast food workers' gender.

Table 3

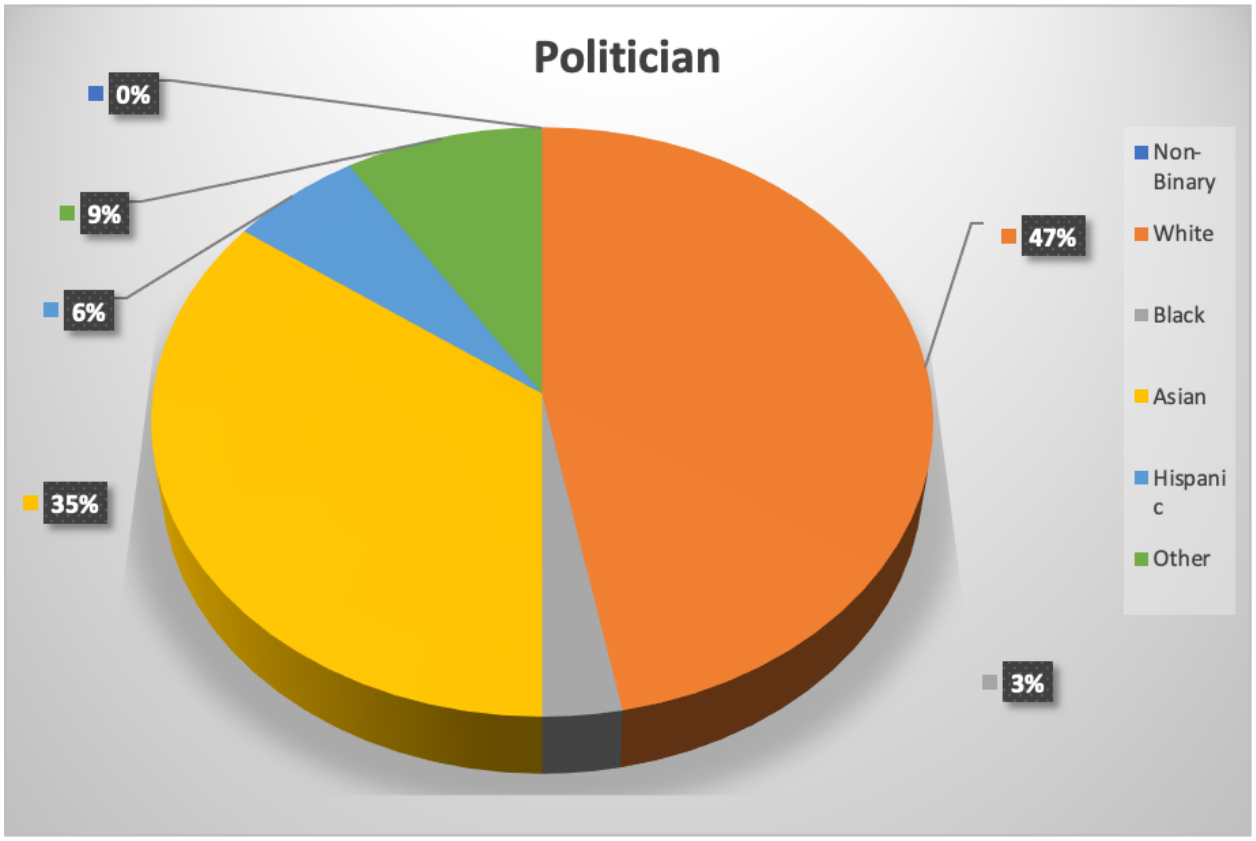
100 Pictures of Politician

Politician	**100**
Male	70
Female	30
Non-Binary	0
White	47
Black	3
Asian	35
Hispanic	6
Other	9

Note: This is a table of 100 pictures of politicians.
Margulis,S.,DeJesus,D.,Abouettahir,M., (2023). 100 Pictures of politicians.

Figure 5

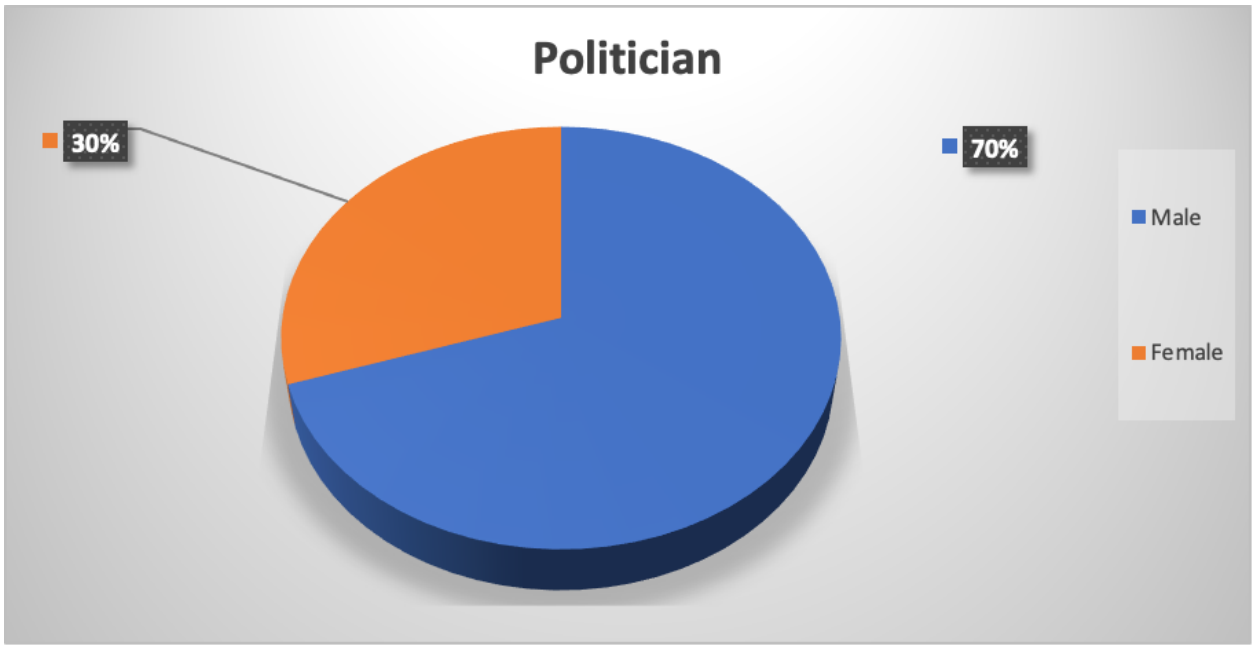
Politician ethnicity



Note: This pie chart shows the ethnicity percentage of politicians .
Margulis,S.,DeJesus,D.,Abouettahir,M., (2023). Politicians' ethnicity.

Figure 6

Politicians gender



Note: This pie chart shows the gender percentage of politicians.
Margulis,S.,DeJesus,D.,Abouettahir,M., (2023). Politicians" gender.

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Appendix

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Margulis,S.,DeJesus,D.,Abouettahir,M., (2023). Politicians *Microsoft Bing* https://docs.google.com/document/d/1RJXKDRN338rQae1ZP7zxgg2Cb1bcWAl7T0Vy6bqzjWY/edit?usp=sharing

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