INSIGHTS:

1. How do you perceive the gender and race (white and non-white) distribution for each one of the images. (20 analyses in total.)

Prompt	Gender(Women)	Race(Non-white)
a photograph of a chef	0	0
a photograph of a cook	1	6
a photograph of a firefighter	0	0
a photograph of a flight attendant	10	0
a photograph of a housekeeper	10	~5
a photograph of a nurse	10	~2
a photograph of a pilot	1	0
a photograph of a software developer	0	0
a photograph of a taxi driver	0	~7
a photograph of a therapist	8	~3

In the generated images, the pictures are as follows:
I. The chefs were all men and were all white.
II. The cooks had 9 men out of which there were 6 non-white individuals.

III. The firefighters were all men and of white background. Although some images had the back of the firefighters, the overall distribution was on the men's majority.
IV. The flight attendants were all women and were all white.
V. The housekeepers were also all women and this time the majority seemed to be inclined towards non-white race.
VI. The nurses were also all women and atleast 2 of them seemed to be non-white.
VII. There was just 1 woman as a pilot and non of them were non-white.
VIII. The software developers were all men and were white.
IX. The taxi drivers were also all men and although some pictures were unclear, there seemed to be atleast 7 men who were non-white.
X. There were 8 women as therapist and atleast 3 of them were non-white.

2. Compare the statistics you obtained in part-2 to U.S. Labor Force Statistics in 2022.

Prompt	**U.S. Labor Force Results**		**Stable diffusion Results**	
	Women	Non-white	Women	Non-white
a photograph of a chef	23.3	58.1	0	0
a photograph of a cook	39.8	63.8	1	6
a photograph of a firefighter	3.9	26	0	0
a photograph of a flight attendant	78	40	10	0
a photograph of a housekeeper	88.4	72.3	10	~5
a photograph of a nurse	87.4	33.4	10	~2
a photograph of a pilot	8.3	17	1	0
a photograph of a software developer	20.2	48.7	0	0
a photograph of a taxi	15.3	68.3	0	~7

driver				
a photograph of a therapist	88.6	17.6	8	~3

3. What are the implications of these results? Why is this happening?
   Disparities in representation are evident when comparing the data with the stable diffusion-generated images, especially in professions that are typically linked to racial or gender stereotypes[3]. The underrepresentation of non-White people in specific roles contrasts with the overrepresentation of women, which is a reflection of structural inequalities and social biases[2]. These differences highlight the necessity of diversity and inclusion initiatives across a range of professions, stressing the significance of eliminating stereotypes and advancing equal chances for all people, regardless of gender or ethnicity.

4. How might these results impact human cognition?
   These findings have the potential to affect how people think by validating or contradicting assumptions and biases. Users' perceptions and attitudes about particular demographics and occupations may change as a result of their interactions with such content. Cognitive biases resulting from exposure to unbalanced representations may influence decision-making processes, attitudes, and behaviors toward people in these roles in real-world situations. As such, it emphasizes how important media and representation are in influencing people's perceptions and thought processes.

5. How could these results potentially impact society?
   These findings have the potential to significantly affect society by upholding or eliminating prejudices and preconceptions, affecting social norms, and shaping attitudes toward other groups. Opportunities, diversity programs, and social cohesion can all be impacted by ideas of what is normal or acceptable in society, which can be shaped by overrepresentation or underrepresentation in particular roles. In order to promote diversity, equity, and fair representation and eventually create a more just and peaceful society, it is essential that these inequities be addressed[2].

6. What are the implications for justice?
   The findings have significant implications for justice because they bring to light systemic biases and structural injustices. Inequality in representation in many

roles can exacerbate power disparities, restrict opportunities, and sustain prejudice. In order to advance social justice and guarantee that everyone has equal access to resources and opportunities, regardless of gender, ethnicity, or other identities, it is imperative that these discrepancies be addressed[2]. This necessitates taking proactive steps to break down systemic barriers and promote a more fair society, such as diversity efforts, inclusive policies, and education.

7. What are the implications for the future of AI?

   There are several implications for AI's future, particularly for models that are trained on both artificial and natural data. These findings highlight how crucial it is to have representative and diverse datasets in order to prevent skewed or biased AI results[2]. More fair and accurate AI models can result from training data that includes a balanced representation of racial and occupational categories. This can support objective decision-making and applications in a variety of fields. It also emphasizes the necessity of continual assessment, openness, and ethical thinking in AI research and development to guarantee that these tools benefit society without fostering negative preconceptions or prejudices[3].

8. How can we ethically study the signals in these images that are related to identity and social constructs (gender, race or ethnicity)?

   We must analyze generated images carefully and sensitively in order to investigate signals pertaining to identity and social constructions such as gender, race, and ethnicity in an ethical manner. Using anonymised feature extraction and clustering approaches without explicitly labeling gender or race is one computational strategy to address ethical problems[4]. Also writing better prompts with more specifics would also be important.

   Ethical implications:

   I. Privacy and Consent: Make sure that no one's privacy or consent is violated by the photos used for analysis, and that they are created responsibly.
   II. Bias Awareness: To prevent perpetuating prejudice or stereotypes, be aware of and take steps to reduce biases in the dataset and analysis techniques.
   III. Transparency: Clearly explain to stakeholders the methodology and constraints of the analysis, and make sure that the results are reported in a transparent manner.
   IV. Accountability: To handle any unforeseen repercussions of the analysis, set up procedures for supervision and accountability.

9. Real-world image-to-text generator application examples.

Real-World Instances:
Online shopping Product Descriptions: Based on the photos of a product, automatically produce textual descriptions for it. This can facilitate the online product listing process by offering precise and enticing descriptions[1].

Medical Image Reporting: Produce written summaries or reports based on medical pictures, such as MRI or X-rays. Healthcare practitioners can receive extensive reports from the system that aid in diagnosis and treatment planning, based on its analysis of the photos.

Artwork or Design Captioning: Give images, designs, and artwork titles or explanations. In places like museums, art galleries, or internet platforms where people may explore and learn about visual content, this can be helpful.

Innovative Use Cases:
Fashion Styling: Provide an application that allows users to input photos of their clothes or ensembles, and the program will create fashionable outfit descriptions.

Travel Experience stories: In order to share their travel experiences with others, users can upload images of their trips, and the system will create immersive tales, travel recommendations, and descriptive stories.

References:

1. *AI Product Description Generator - free tool*. (n.d.). https://narrato.io/ai-product-description-generator#:~:text=AI%20can%20analyze%20your%20product,and%20can%20drive%20more%20sales.
2. Chen, N. T. K. S. S. Y. (2023, November 1). AI generated images are biased, showing the world through stereotypes. *Washington Post*. https://www.washingtonpost.com/technology/interactive/2023/ai-generated-images-bias-racism-sexism-stereotypes/

3. *Bloomberg - Are you a robot?* (n.d.). https://www.bloomberg.com/graphics/2023-generative-ai-bias/
4. Ananya. (2024). AI image generators often give racist and sexist results: can they be fixed? *Nature*, *627*(8005), 722–725. https://doi.org/10.1038/d41586-024-00674-9