

Problem

- **Women represent only 35% of STEM** graduates worldwide—a figure unchanged for more than a decade (UNESCO). This persistent gap is fueled by stereotypes about who is “naturally suited” for STEM (Ertl et al.; Musso et al.)
- Studies show that **adolescents’ aspirations are shaped by representation**: when girls see diverse role models, their sense of belonging in STEM increases (Leslie et al.; Cheryan et al., 2015; Master).
- Extending prior work with a larger dataset (Latorre Ruiz et al.; García-Ull & Melero-Lázaro), this study asks:
👉 **Do AI-generated images reinforce gender bias in STEM professions?**

Methodology

Hypothesis: If an AI algorithm is biased, then there will be a higher representation of men in STEM careers than women. In addition, each algorithm will generate a lower percentage of women than known Bureau of Labor of Statistics (BLS) demographics.

- Variables:**
- **Dependent:** Ratio of men to women images
 - **Independent:** AI-Generations Tools / AI Algorithm
 - **Control:** Career prompts of STEM professions
- Data:**
- AI-Generations Tools: Shutterstock, Canva, Dall-E, and Midjourney
 - 20 groups of 100 images by AI-Generations Tools and prompt, totaling 2,000 images of Stem professional
 - 5 prompts based on BLS top STEM careers.
 - Images coded as Woman, Man, Men, Unknown, No human, or Both.

- Steps:**
1. Create accounts on AI Image Generator platforms
 2. Copy the exact profession title (actuary, data scientist, information security analyst, operations research analyst, and computer and information research scientist) into the AI prompt to provide an image.
 3. Repeat prompt quest 100 times (Figure 1 and 2).
 4. classify image in Excel (Figure 3 and 4)
 5. Quality Control Check

Analysis and Results



Fig 1. Screenshot of images generated with Dall-E 3 using the prompt 'operation research analyst, assisted by the researcher.

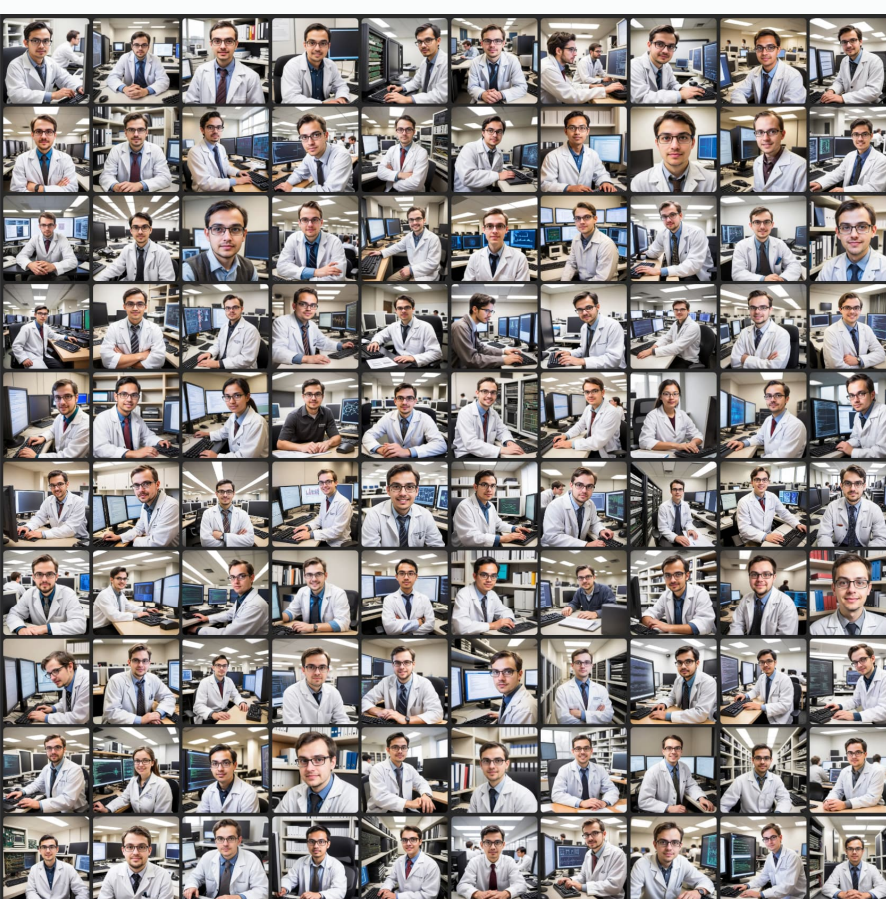


Fig 2. Screenshot of images generated with Dall-E 3 using the prompt 'operation research analyst, assisted by the researcher.



Fig 3. Screenshot of male image generated with Dall-E 3 using the prompt 'Data scientist, assisted by the researcher.

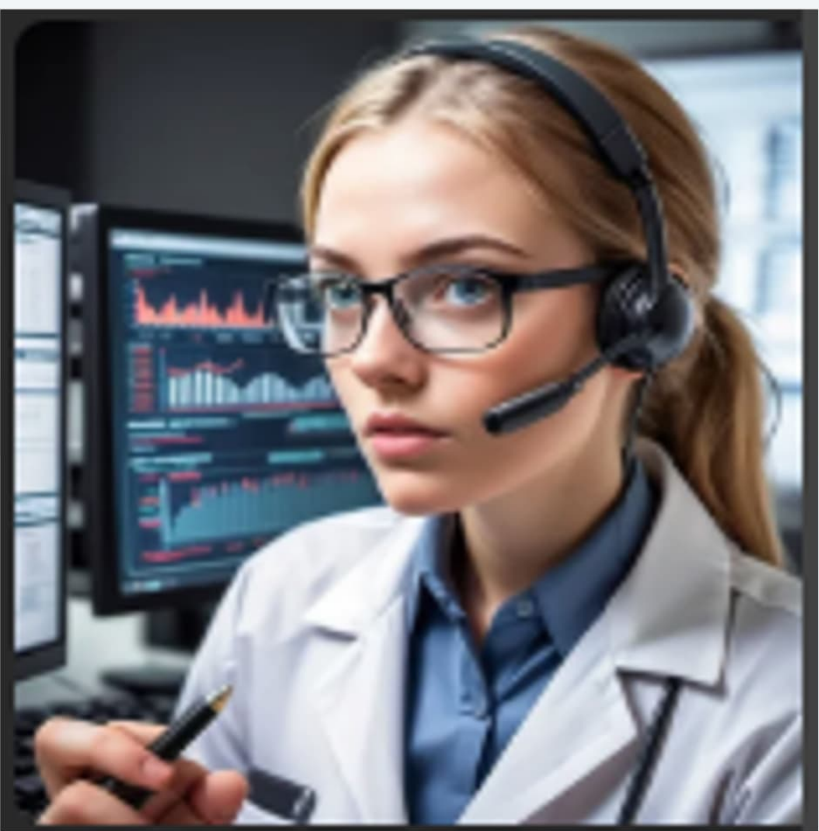


Fig 4. Screenshot of female image generated with Dall-E 3 using the prompt 'operation research analyst, assisted by the researcher.

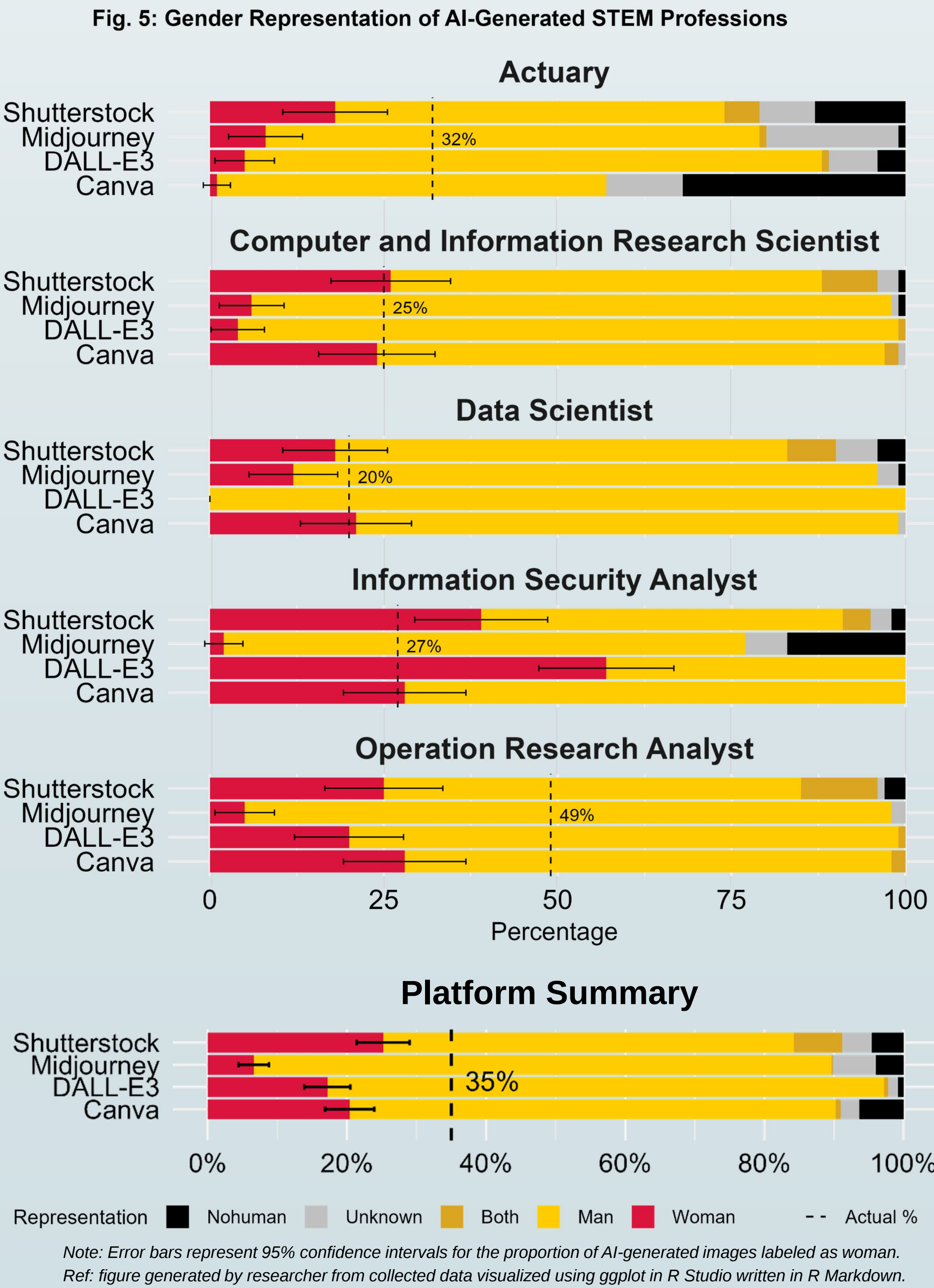


Table 1 - Gender Classification of AI Generated Images by Platform							
AI Platform	Woman	Man	Men	Unk.	No human	Both	Total
Actuary (32%)							
Shutterstock	18 (24.3%)**	56		8	13	5	100
Midjourney	8 (10.1%)**	71		19	1	1	100
DALL-E3	5 (5.7%)**	83		7	4	1	100
Canva	1 (1.8%)**	56		11	32		100
Computer and Information Research Scientist (25%)							
Shutterstock	26 (29.5%)	62		3	1	8	100
Midjourney	6 (6.1%)**	92		1	1		100
DALL-E3	4 (4%)**	87	8			1	100
Canva	24 (24.7%)	73		1		2	100
Data Scientist (20%)							
Shutterstock	18 (21.7%)	65		6	4	7	100
Midjourney	12 (12.5%)**	84		3	1		100
DALL-E3	(0%)**	100					100
Canva	21 (21.2%)	77	1	1			100
Information Security Analyst (27%)							
Shutterstock	39 (42.9%)	52		3	2	4	100
Midjourney	2 (2.6%)**	75		6	17		100
DALL-E3	57 (57%)	43					100
Canva	28 (28%)	70	2				100
Operation Research Analyst (49%)							
Shutterstock	25 (29.4%)**	60		1	3	11	100
Midjourney	5 (5.1%)**	93		2			100
DALL-E3	20 (20.2%)**	79				1	100
Canva	28 (28.6%)**	68	2			2	100
Platform Summary (35%)							
Shutterstock	126 (29.9/25.2%)**	295		21	23	35	500
Midjourney	33 (7.4/6.6%)**	415		31	20	1	500
DALL-E3	86 (17.7/17.2%)**	392	8	7	4	3	500
Canva	102 (22.6/20.4%)**	344	5	13	32	4	500
Total	347 (19.2/17.4%)**	1,446	13	72	79	43	2,000

Ref: table generated by researcher.
** Indicates the percentage is significantly lower than the actual percentage at a significance level of $\alpha = 0.05$.
Note: % in the Woman/Women column is the percent of women to total men and women. In the Platform Summary, the Woman/Women column is (% of women to total men and women / % of women to total images).

Discussion:

- **Woman column:** % of women relative to total men + women.
- **Confidence intervals:** Calculated as $\sqrt{p(1-p)/n}$, where p = proportion and n = number of observations.
- **Key feature:** Red bar segment + confidence interval (left) compared to the **actual % of women** (vertical dashed line in Figure 4).
- **Table 1 highlights:** Professions falling below the actual average, based on a **test of proportion** against BLS-reported values.

Findings:

- **Overall:** 73% men (**1,446+13**); 17.4 % women (347) of total significantly lower than BLS data ($p < .05$).
- **By profession:** 2 careers had **no AI-Generations Tools match** with actual percentages; 2 others were **mixed but $\leq$ actual rates**. Only **Information Security Analyst** met/exceeded actual representation → overall **bias toward men** in STEM.
- **AI-Generations Tools :** Best = **Shutterstock** (paid), next = **Canva**, worst = **Midjourney & DALL-E 3**. Access to less-biased AI requires a **subscription**, raising accessibility concerns.
- **“No Human” bias:** When images coded as “No Human” women’s representation dropped sharply, reinforcing male dominance.

Conclusion

- **Findings:** Across 2,000 STEM images from four AI platforms, men appeared in 81% of cases, with a ratio of 1,459 man/men, 347 women, 1806 total.
- **Bias Evidence:** These ratios were consistently lower than real-world labor statistics, showing systematic underrepresentation of women in STEM.
- **Accessibility Issue:** The least biased AI-Generations Tools (Shutterstock) requires a paid subscription, limiting accessibility.
- **Takeaway:** When AI repeatedly depicts scientists as male, it sends a message about who belongs in science, closing the door to future scientists. As UNESCO emphasizes, achieving gender parity in STEM is not only a matter of social justice but also an economic imperative.

What’s Next

Educators: Audit AI tools for gender bias; use AI-Generations Tools comparisons; integrate bias-awareness in class.

AI Companies: Publish bias metrics, enable user reporting, diversify training data.

Policy Makers: Require bias disclosure labels; prioritize low-bias platforms in funding.

Research Expansion:

- Replication package for classrooms/researchers.
- Survey students on bias awareness and belonging.
- Test prompt engineering (“diverse scientists”).
- Build automated program to analyze images at scale.

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