

The Algorithm-Mediated Visual Representation: Analysis of Gender Role Construction in AI-Generated News Images

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Abstract. The widespread application of generative artificial intelligence in news image production has not only transformed the production process of news visualization but also sparked academic concerns about how algorithms participate in the construction of visual meaning. Based on algorithmic media theory and visual communication theory, this study conducts a quantitative content analysis of 250 AI-generated news images released by mainstream media outlets such as Xinhua News Agency, The Paper, BBC, and CNN in 2025, exploring the patterns and characteristics of gender representation therein. The results reveal that male images occupy a significant proportion in the overall sample, particularly prevalent in political, economic, and social news, while female images are relatively concentrated in cultural and technological news. Moreover, the relationship between gender and role cues is modulated by emotional tone, exhibiting a clear "male leadership-female neutrality" structure in positive emotional contexts, which tends to disappear in negative contexts. And it further shows that AI-generated news images are not technology-neutral outputs; their representation logic is influenced by training data and algorithmic structure, reflecting the mediating role of algorithms in visual communication.

Keywords: Generative artificial intelligence, News images, Visual representation, Algorithmic media, Gender roles

1. Introduction

In recent years, the rapid development of generative AI has profoundly changed the production and dissemination of news images. In particular, the AI platforms represented by midjourney, Dall · e, and stable diffusion enable news editors to generate visual content through text prompts, thereby reducing production costs and speeding up news release. However, this kind of system not only promotes news dissemination, but also causes new problems due to algorithm deviation and reproduction inequality. In particular, images generated by AI may duplicate social stereotypes in data or editing habits, thereby intensifying the visual presentation of gender. Although the research on AI generated text bias has increased in recent years, empirical research on gender reproduction of AI generated images is still scarce in the field of Journalism and communication. Therefore, this study attempts to establish a link between algorithmic media analysis and visual communication theory, focusing on how generative AI constructs and presents gender roles in the news context. Through the quantitative content analysis of news images generated by mainstream news websites

AI, this study aims to reveal the potential structural tendency and symbolic level in AI assisted news visualization, so as to provide new empirical basis and Enlightenment for the study of AI news and media ethics.

2. Literature review

2.1. AI algorithm media and generative AI

Algorithmic media theory holds that the computing system determines the presentation of information through its algorithm and data logic, thus affecting the public's cognition and behavior [1,2]. Based on this view, generative AI plays a key role in this process, especially in image generation model. For example, Buolamwini and Gebru found that the face recognition system has bias in gender and race recognition, which reveals that the training data may exacerbate social inequality [3]. Similarly, image generation tools such as DALL-E and Leonardo AI often link the technical field with male roles, while women are more likely to appear in nursing and other fields, which reveals the gender bias in Generative AI [4]. Furthermore, Marquez's concept of 'algorithmic gaze' explains how algorithms can quietly affect the formation of social significance by strengthening or weakening specific visual representations [5]. These studies show that generative AI is not only a technical tool, but also plays a far-reaching role in shaping social understanding of gender, occupation and other social roles.

2.2. Visual reproduction theory in media research

According to visual reproduction theory, images are not only the reflection of reality, but also the construction tool of cultural symbols and social cognition [6,7]. On this basis, Goffman points out that gender identity is systematically constructed through visual elements such as body posture, gaze direction and spatial composition, laying the foundation for gender representation from the perspective of semiotics [8]. Furthermore, the critical visual discourse analysis framework proposed by Machin and Mayr expands the scope of semiotic analysis and reveals how color and composition affect the spread of ideology [9]. At the same time, Chouliaraki's concept of 'visibility politics' emphasizes that the presentation of characters in the image reflects the recognition and power structure in the society [10]. These theories show that the images generated by ai not only reflect the social reality, but also play a role in the process of Constructing Gender and social identity. Therefore, the image generated by AI is not only a technical product, but also a part of the visual symbol system, which is involved in the reproduction of cultural and social significance.

2.3. Research blank of image generation and news reproduction by algorithm

Although AI is widely used in media research, the role of generated images in news reproduction is rarely discussed in depth. Existing studies focus on the social impact of algorithm bias and automated content creation, and pay less attention to how AI generated images affect gender, occupation and social identity in news content. Most studies regard the generated image as an auxiliary tool, ignoring its importance in shaping news narrative. Especially in news reports, how the images generated by AI affect the public's understanding of news events through the visual expression of gender and occupation has not been systematically analyzed. Therefore, this study combines the two frameworks of 'algorithmic media theory' and 'visual communication analysis' to explore the visual construction laws of gender roles, occupations and emotions in AI generated news images.

3. Research methods

3.1. Research issues and theoretical framework

The purpose of this study is to explore the gender representation mode in AI generated news images, focusing on how mainstream news media construct gender images through visual presentation. Specifically, the research will focus on the following core issues.

RQ1: What are the general characteristics of gender representation in AI generated news images used by mainstream news media?

RQ2: Are there significant differences in gender reproduction patterns in different news categories (such as politics, science and technology, economy, society, etc.)?

RQ3: How do the visual elements (roles and emotions) in the image jointly affect the construction of gender image?

To answer these questions, this study relies on the framework of "image reading: visual design grammar" proposed by Kress and van Leeuwen [11]. The framework provides a semiotic perspective that images construct complex social meanings through saliency, gaze, modality and other elements. Based on this theoretical framework, the research will combine with quantitative content analysis to systematically encode and quantitatively analyze news images to reveal the laws and patterns of gender reproduction.

3.2. Sample selection and coding scheme

The samples of this study are from mainstream news media such as Xinhua news agency, surging news, BBC and CNN. A total of 250 AI generated news images are collected from January to October 2025. The standard for sample selection is that the image is clearly marked as "AI generation" or "AI assisted visualization," so as to ensure that the selected image conforms to the research topic. In terms of sampling methods, systematic sampling and time sequence sampling are combined. Specifically, a certain number of images are randomly selected from the news platform every month, which can ensure the representativeness and diversity of the sample. In order to further ensure the efficiency and reproducibility of the research, the following coding scheme is designed in this study. The main coding variables include gender, news category, role clues and emotional tone. The specific coding scheme is shown in Table 1.

Table 1. Coding scheme and variable description

Variable	Code value	Description
Gender	1 = Male	character in male representative image
	2 = Female	character in female representative image
	0 = None	gender not recognized in image
News category	1 = Politics	Political news
	2 = Technology	Science and Technology News
	3 = Economic	Economic News
	4 = Society	Social news
	5 = Culture	Cultural news

Table 1. (continued)

Role clue	1 = Leader	Figure showing the leading role in the image
	2 = Neutral	Characters with neutral characters in the image
	3 = Subordinate	People who present subordinate roles in the image
Emotional tone	1 = Positive	The emotional atmosphere in the image is positive
	2 = Neutral	The emotional atmosphere in the image is neutral
	3 = Negative	The emotional atmosphere in the image is negative

3.3. Data processing and analysis methods

All image data will be statistically analyzed by SPSS 28.0. For RQ1, the descriptive statistical method is used to calculate the gender distribution and the frequency of news categories to reveal the gender characteristics in AI generated news images. For RQ2, contingency table and chi square test were used to test the significant relationship between news categories and gender reproduction. For RQ3, hierarchical chi-square analysis was used to control emotional tone variables, test the relationship between gender and role clues, and analyze the impact of emotional tone on gender image.

4. Results and analysis

4.1. Overall feature description of news image generated by AI (RQ1)

Based on the descriptive statistical analysis of 250 valid samples, this study reveals the overall characteristics of news images generated by AI. The study found that male image is dominant, the most widely used in social and technological fields, and the emotional tone is positive. The gender distribution shows obvious differences, as shown in Table 2. The male image (code 1) was dominant in the sample, which appeared 169 times, accounting for 67.6%; The female image (code 2) appeared 81 times, accounting for 32.4%. The ratio of male to female images is about 2.1:1, indicating that men are more frequently presented in visual narration.

Table 2. Description of gender characteristics

		Gender			
		Frequency	Percentage	Effective percentage	Cumulative percentage
Effective	1	169	65.0	67.6	67.6
	2	81	31.2	32.4	100.0
	Total	250	96.2	100.0	
Missing	System	10	3.8		
Total		260	100.0		

As shown in Table 3, the distribution of news categories shows uneven characteristics. Social news (code 4, 31.6%) and science and technology news (code 2, 26.4%) are the most widely used areas of AI generated images. Followed by cultural news (code 5, 14.8%) and political news (code 1, 17.2%), while the proportion of economic news (code 3, 10.0%) is relatively low. This trend may reflect the differences in the demand for visual content in various news fields.

Table 3. Description of news category characteristics

News category					
		Frequency	Percentage	Effective percentage	Cumulative percentage
Effective	1	43	16.5	17.2	17.2
	2	66	25.4	26.4	43.6
	3	25	9.6	10.0	53.6
	4	79	30.4	31.6	85.2
	5	37	14.2	14.8	100.0
	Total	250	96.2	100.0	
Missing	System	10	3.8		
	Total	260	100.0		

Further, in terms of the distribution of role clues, neutrals (code 2, 56.4%) account for the vast majority, while the frequency of roles of leaders (code 1, 33.6%) and subordinates (code 3, 10.0%) is relatively low, as shown in Table 4. This shows that the news images generated by AI tend to build a decentralized and universal visual context rather than highlighting the hierarchical relationship.

Table 4. Character description of role clues

Role clues					
		Frequency	Percentage	Effective percentage	Cumulative percentage
Effective	1	84	32.3	33.6	33.6
	2	141	54.2	56.4	90.0
	3	25	9.6	10.0	100.0
	Total	250	96.2	100.0	
Missing	System	10	3.8		
Total		260	100.0		

In addition, the emotional tone of the image showed a relatively balanced distribution, slightly inclined to positive emotions (coding 1, 38.4%). Neutral (code 2, 30.8%) and negative (code 3, 30.8%) emotions accounted for the same proportion, as shown in Table 5. Such a distribution may reflect that when AI generates news images, its settings or training data make it tend to produce positive emotional visual content.

Table 5. Description of emotional keynote characteristics

Emotional keynote characteristics					
		Frequency	Percentage	Effective percentage	Cumulative percentage
Effective	1	96	36.9	38.4	38.4
	2	77	29.6	30.8	69.2
	3	77	29.6	30.8	100.0
	Total	250	96.2	100.0	
Missing	System	10	3.8		
Total		260	100.0		

4.2. The differences between news categories and gender reproduction (RQ2)

The contingency analysis between gender and news category shows that there is a significant correlation between gender and news category ($\chi^2(4, N = 250) = 16.69, p = .002$), As shown in Table 6. Since the expected frequency of all cells is greater than 5, the chi square test results are reliable. This shows that there are significant differences in the gender distribution of news images generated by AI in different news categories.

Table 6. Chi-square tests

Chi-square tests			
Value		df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.694 ^a	4	.002
Likelihood Ratio	16.372	4	.003
Linear-by-Linear Association	4.181	1	.041
N of Valid Cases	250		

Further analysis of the crosstab shows the specific structure of these differences, as shown in Table 7. First, male images dominate most news categories. Specifically, the proportion of male image in politics (81.4%), economy (72.0%), society (74.7%) and science and Technology (62.1%) is higher than the average proportion in the overall sample (67.6%). This shows that AI generated news images tend to take men as the default visual symbol when it involves public affairs, economic development, social governance and other issues. Secondly, the reproduction of female images shows a higher field concentration. Although women accounted for 32.4% of the total sample, their proportion in cultural news (56.8%) was significantly higher than the average level, and even became the main gender image in this category. At the same time, the proportion of female images in science and technology news (37.9%) is also prominent. This phenomenon shows that the news images generated by AI may internalize the potential logic of connecting different genders with specific social fields in terms of gender expression.

Table 7. Gender * News category crosstabulation

Gender * News category crosstabulation							
News Category		1	2	3	4	5	Total
Gender	Count	35	41	18	59	16	169
	% within Gender	20.7%	24.3%	10.7%	34.9%	9.5%	100%
	% within News Category	81.4%	62.1%	72.0%	74.7%	43.2%	67.6%
	% of Total	14.0%	16.4%	7.2%	23.6%	6.4%	67.6%
	Count	8	25	7	20	21	81
	% within Gender	9.9%	30.9%	8.6%	24.7%	25.9%	100%
	% within News Category	18.6%	37.9%	28.0%	25.3%	56.8%	32.4%
	% of Total	3.2%	10.0%	2.8%	8.0%	8.4%	32.4%
	Count	43	66	25	79	37	250
	% within Gender	17.2%	26.4%	10.0%	31.6%	14.8%	100%
Total	% within News Category	100%	100%	100%	100%	100%	100%
	% of Total	17.2%	26.4%	10.0%	31.6%	14.8%	100%

4.3. The co-construction of character clues, emotional tone, and gender image (RQ3)

Emotional tone significantly moderates the relationship between gender and role cues. The analysis results show that the correlation between role clues and gender changes significantly under different emotional tones, indicating that emotional tones regulate AI's visual allocation of gender roles, as shown in table 8-9.

Specifically, under the positive mood tone, the correlation between gender and role cues is the most significant ($\chi^2(2, N = 96) = 18.890, p < .001$). In this context, male images mainly appear in the role of "leader," accounting for 83.3% of the role, while female images are highly concentrated in the role of "neutral" (73.3%). This shows that AI tends to construct a differentiated role narrative of "male leadership female participation" in the context of positive emotions. Under the tone of negative emotions, gender and role cues were not significantly correlated ($\chi^2(2, N = 77) = 2.215, p = .330$). There is no significant difference in the distribution of male and female images in each role. For example, in the role of "leader", although the proportion of men is 86.7%, the proportion of women (13.3%) is not significantly different from expectations. This shows that AI does not show obvious gender role differentiation in the context of negative emotions.

It can be seen that the emotional tone has a regulatory effect on the relationship between gender and role clues. In the image of positive and neutral emotions, AI shows a structured and gendered role assignment, that is, men are more associated with leadership authority, while women prefer neutral roles. Under negative emotions, this gender based role allocation model tends to disappear, revealing the complexity and context dependence of AI reproduction rules.

Table 8. Chi-square tests for the association between gender and role clues by emotional tone

Chi-square tests			
Emotional Tone	Pearson χ^2	df	p-value
1	18.890 ^b	2	.000
2	8.059 ^c	2	.018
3	2.215 ^d	2	.330
Total	25.107 ^a	2	.000

Table 9. Distribution of gender by role clues across emotional tones (count and row percentage)

Distribution of gender by role clues across emotional tones					
Emotional Tone	Gender	Leader (Count/%)	Neutral (Count/%)	Subordinate (Count/%)	Total (N)
1	1	40 _a (60.6%)	18 _b (27.3%)	8 _a (12.1%)	66
	2	8 _a (26.7%)	22 _b (73.3%)	0 _a (0%)	30
	Total	48	40	8	96
2	1	17 _a (37.8%)	24 _b (53.3%)	4 _{a,b} (8.9%)	45
	2	4 _a (12.5%)	27 _b (84.4%)	1 _{a,b} (3.1%)	32
	Total	21	51	5	77
3	1	13 _a (22.4%)	35 _a (60.3%)	10 _a (17.2%)	58
	2	2 _a (10.5%)	15 _a (78.9%)	2 _a (10.5%)	19
	Total	15	50	12	77
Total	1	70 _a (41.4%)	77 _b (45.6%)	22 _a (13.0%)	169
	2	14 _a (17.3%)	64 _b (79.0%)	3 _a (3.7%)	81
	Grand Total	84	141	25	250

5. Conclusion

Through the quantitative analysis of 250 news images generated by AI, this study reveals the gender reproduction bias: the study found that male images dominate in general, and are more prominent in political, economic, social and other public issues; Female images are more concentrated in specific fields such as culture, science and technology. In addition, the role assignment shows obvious emotional context dependence. Under positive emotions, men are often shaped as "leaders," while women are concentrated in "neutral"; In the context of negative emotions, gender role differences tend to be vague. These results show that the application of generative AI in news visualization is not a pure technology neutral process. The training data and generation logic of the algorithm affect and shape the final visual presentation. Therefore, by combining algorithmic media theory with visual communication analysis, this study provides a new analytical perspective and empirical basis for understanding the characteristics and impact of AI generated content in public communication. Of course, there are some limitations in this study: first, the samples are mainly from mainstream news websites, which fail to cover AI images in more diverse communication channels such as social media; Secondly, the research method focuses on the output analysis at the content level, and fails to refer to the front-end factors that affect the generation results, such as the input prompts. Yet, there are some limitations in this study, which also points out the improvement direction for future research and practice: in terms of research methods, in the future, we need to shift from output analysis to process research, use experimental methods to track the impact of prompts on the generated results, actively promote interdisciplinary collaboration, and explore the possibility of embedding fairness criteria into algorithm design; In practice, news organizations should establish a mechanism of "prompt word audit" and a visual ethical guide to intervene from the source to generate deviations.

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