A PICTURE IS WORTH A THOUSAND PROMPTS: TOPIC MODELING OF AI ART SUBREDDIT COMMUNITIES

Jing Han
Klein College of Media and Communication
Temple University

Andrew Iliadis
Klein College of Media and Communication
Temple University

Text-to-image generation (AI art) has become a mainstream phenomenon since the introduction of DALL-E by OpenAI in January 2021 (Nast, 2023). On the one hand, AI art challenges definitions of creativity that center on anthropocentric values and discredits the contributions of artists in the training of these AI models (Knibbs, 2023). On the other hand, it blurs the line between artists and non-artists by enabling new ways of creating art (e.g., prompt engineering: an iterative and experimental text-based process to interact with text-to-image generation models). Regardless of one's ethical stance, practitioners of AI art, including artists of various skills and non-artists, form and participate in online communities to showcase their wares, share practices and resources, and learn from each other. This study uses a topic modeling approach to examine topics within three such subreddit communities centered on three text-to-image generation models (r/StableDiffusion, r/midjourney, and r/weirddalle).

Previous studies on AI art community members have focused on the threats faced by digital art communities (Allred & Aragon, 2023), sociocultural biases (Millet et al., 2023), and prompt engineering (Oppenlaender, 2023). More specifically, Allred and Aragon (2023) highlight a distinction between previous digital art communities, which view themselves as a "digital counterculture akin to transformative fandom" (p. 32) and current AI art communities to understand a potential value misalignment between them. Oppenlaender (2022) examines how creativity is understood differently in these AI art groups and argues that it arises in the interaction between humans and AI via prompt engineering while also highlighting the importance of online communities as the "social constituent of the online creative ecosystem around text-to-image generation" (p. 2). Our study explores this aspect of AI art, aiming to understand the topics and themes within online AI art communities.

We collected the top 500 posts for each subreddit (r/StableDiffusion, r/midjourney, and r/weirddalle) within one month (from Dec 22, 2023, to Jan 22, 2024) using the Python Reddit API Wrapper (PRAW). We chose r/weirddalle instead of other subreddits based on DALL-E series models due to its comparable membership sizes with r/StableDiffusion and r/midjourney. Our data included post titles, submission dates, scores (based on upvotes/downvotes), number of comments, URLs, and link flair text. We used post URLs to collect the post images. We chose not to include iterations of similar images in the analysis by selecting only the first image if the post contained a series (variations of a similar image). Furthermore, we sorted each dataset based on the number of comments and selected rows where the number of comments is greater than or equal to the average.

Our topic modeling analysis included two steps: (1) translating images to textual data and (2) performing topic modeling with hyperparameter tuning on both translated textual data from images and post titles. We used Replicate API (a cloud API that runs a collection of open-source AI models with customization options) to translate images into text prompts. The specific model we used for image-to-prompt translation was img2prompt by methexis-inc, which provides an approximate text prompt with styles. The generated prompts follow the pattern "a subject + subject modifiers + a style + style modifiers." The caption in Figure 1 is an example of a generated prompt. Two researchers manually inspected the accuracy of the generated prompts from a random sample of 20 to confirm their appropriateness. We used BERTopic to conduct topic modeling on generated text prompts and post titles and adjusted the hyperparameters (min_cluster_size, n_neighbors, and n_components) to better fit the topic models to our datasets. We also used the KeyBERT-Inspired model to reduce stop words and increase topic representation by having more diverse topic words.

Tables 1-3 each show seven prominent topics from the post titles of r/StableDiffusion, r/midjourney, and r/weirddalle. Most of the topics in r/StableDiffusion post titles relate to themes of technological innovations/services or technical learning. Innovators advance text-to-image technologies by releasing improved models (e.g., SDXL) and inventing new training techniques (e.g., DreamBooth). Services make innovations more accessible to community members by creating resources and building applications (e.g., Automatic1111 and ComfyUI) on top of open-source code provided by innovators. The theme of technical learning is visible in topics that focus on community members striving to achieve more predictable and higher-quality results by providing workflows and details such as model checkpoints and training techniques. Topics in r/Midjourney relate to themes of showcasing AI art wares and prompt learning. Community members share images generated by Midjourney without apparent intentions to receive and learn from community feedback, focusing less on computational details and more on discussions about prompts. The accessibility of the models could partially explain the differences in community members' activities between r/StableDiffusion and r/midjourney. Stable Diffusion models are open source, enabling anyone to download/train their models. Midjourney models are not open-source and can only be accessed via Discord. Lastly, topics in r/weirddalle focus on competition and the flaunting results; community members seem less interested in sharing knowledge and more in the AI art "game" (i.e., who can produce the most creative or entertaining results).

Tables 4-6 each show eight prominent topics from the prompts generated using the images of r/StableDiffusion, r/midjourney, and r/weirddalle. The image prompts follow the pattern "a subject + subject modifiers + a style + style modifiers" instead of the pattern of a complete sentence structure. Portraits of women are prominent subjects in r/StableDiffusion images, while photos and photorealistic images are their most preferred styles. The community also generates images of anime and comic characters with trending styles in digital art platforms, such as DeviantArt and ArtStation. Surrealist photos and digital art styles trending on DeviantArt and ArtStation are also prominent styles in r/midjourney images. In addition to women, frequently occurring subjects include food and animals. 3D style is popular in r/midjourney images but less pronounced in r/StableDiffusion images. Images in r/weirddalle encompass styles and subjects seen in the other two communities but with additional varieties. Specifically, images contain photos of products and posters and appear to emphasize the shock value in the image styles and compositions. In sum, the topic words from image captions suggest that community members from three AI art subreddits prefer using popular media characters and digital art platforms in their text-to-image generation prompts and deem a high degree of photorealism in images of people as high quality. They also pursue surrealist styles and choose people, especially women, as image subjects.

References

Allred, A. M., & Aragon, C. (2023). Art in the machine: Value misalignment and AI "art." In Y. Luo (Ed.), *Cooperative Design, Visualization, and Engineering* (pp. 31-42). Springer. https://doi.org/10.1007/978-3-031-43815-8_4

Knibbs, K. (2023, September 6). Why this award-winning piece of AI art can't be copyrighted. *Wired*. https://www.wired.com/story/ai-art-copyright-matthew-allen/

Millet, K., Buehler, F., Du, G., & Kokkoris, M. D. (2023). Defending humankind: Anthropocentric bias in the appreciation of AI art. *Computers in Human Behavior*, 143, 1-9. https://doi.org/10.1016/j.chb.2023.107707

Nast, C. (2023, January 12). Where the AI art boom came from—And where it's going. *Wired*. https://www.wired.com/gallery/where-the-ai-art-boom-came-from-and-where-its-going/

Oppenlaender, J. (2022). The creativity of text-to-image generation. Academic Mindtrek '22: *Proceedings of the 25th International Academic Mindtrek Conference*, 192-202. https://doi.org/10.1145/3569219.3569352

Oppenlaender, J. (2023). A taxonomy of prompt modifiers for text-to-image generation. *Behaviour & Information Technology*, 1-14. https://doi.org/10.1080/0144929X.2023.2286532

Figure 1. Sample image, from which we produced the following prompt: "*a man in a futuristic suit with a gun in his hand, cyberpunk art by Cedric Peyravernay, cgsociety, afrofuturism, unreal engine 5, zbrush, artstation hd*."

Topics	Keywords	Examples
Technological Innovations	'sdxl', 'sdnext', 'generate', 'creations', 'dreambooth', 'images', 'photos', 'life', 'suggestions', 'lapse'	The best SDXL Models are getting very photo-realistic now.
Discussions about Stable Diffusion	'ai', '2024', 'stability', 'stable', 'neural', 'viable', 'prediction', 'engine', 'models', 'next'	I'm calling it: 6 months out from commercially viable AI animation.
Achieving Realistic Results	'photorealistic', 'nightshade', 'pictures', 'image', 'photo', 'portrait', 'picture', 'realistic', 'background', 'looks'	Is she photorealistic enough?
Technological Services	'animatediffv3', 'animatediff', 'automatic1111', 'auto1111', 'animation', 'comfyui', 'vid', 'extensions', 'a1111', 'video'	I created a free tool for texturing 3D objects using Automatic1111 webui and sd-webui-controlnet.
Achieving Predictable Results	'sdxl', 'realvisxl', 'sd', 'anime', 'lora', 'albedobase', 'samplers', 'quality', 'ease', '3x'	The model used was CyberRealistic with the LoRA SDXLRender.
Achieving Higher-Quality Results	'upscale', 'ultraupscale', 'upscaling', 'model', 'checkpoint', 'hd', 'horizon', 'models', 'ultimate', 'custom'	In the workflow notes, you will find some recommendations as well as links to the model, LoRa, and upscalers.
Technical Learning	'sd', 'editing', 'photobooth', 'learning', 'photo', 'tips', 'mindbl', 'quality', 'first', 'grey'	Trying new way of editing photo with SD.

Table 1. Post Title Topics in r/StableDiffusion (top 7).

Topics	Keywords	Examples
Achieving Higher-Quality Results	'realism', 'uncanny', 'photography', 'v6', 'attractiveness', 'scenes', 'portrait', 'ugly', 'accurate', 'real'	V6 has insane realism with photography Prompts. I've been playing around with some photography Prompts and I can't

		stop being impressed at every single result.
Fantasy	'potter', 'harry', 'dragonball', 'disney', 'thrones', 'characters', 'poll', 'pothead', 'pirates', 'titles'	Harry Potter characters froom book descriptions. Can you guess them all?
Cartoons	'simpsons', 'futurama', 'characters', 'rick', 'selfie', 'scene', 'lion', 'movie', 'life', 'human'	My attempt to make real life Simpson's characters.
Science Fiction	'iron', 'suits', 'v6', 'spacesuits', 'f1', 'swimsuit', 'mario', 'everybody', 'part', 'poolparty'	Everybody gets Iron Man suits
Food	'steroids', 'animals', 'crab', 'stadium', 'evolves', 'food', 'dinner', 'playoffs', 'restaurant', 'somewhere'	Animals on steroids.
Emancipation	'afrofuturism', 'life', 'underground', 'kremlin', '1960s', 'pride', 'people', 'from', 'years', 'gay'	Gay Pride at The Kremlin.
Prompts	'prompts', 'prompt', 'theme', 'colons', 'post', 'image', 'beautiful', 'pictures', 'full', 'midjourney'	Why can't new buildings look more like this? Guess the theme and comment which one you would live in. [prompts in the description].

Table 2. Post Title Topics in r/midjourney (top 7).
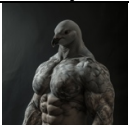
Topics	Keywords	Examples
Razer	'razer', 'products', 'walts', 'school', 'everything', 'chips', 'company', 'money', 'magic', 'coffee'	With the success of the Razer face mask, the company decided to expand. Which 3 products would you cop?
Characters	'prompt', 'portrait', '3d', 'render', 'apocalyptic', 'emaciated', 'character', 'elderly', 'outfit', 'gladiator'	Prompt: ""An emaciated, ill, and dirty CHARACTER, post apocalyptic, realistic 3D render.
Food	'beef', 'eating', 'food', 'breakfast', 'cow', 'flavors', 'cheeseburger', 'raw', 'pizza', 'homer'	Batman's car made out of raw beef (prompt).
Movies	'godzilla', 'kong', 'villains', 'movies', 'movie', 'sequels', 'zelda', 'scene', 'characters', 'horror'	Horror movies as 70s Hong Kong kung-fu movies
Videogames	'simulator', 'gamecube', 'games', 'sims', 'playstation', 'game', 'countries', 'playing', 'european', 'brazil'	Brazil Simulator for Playstation (with screenshots).
Fill in the blank	'coach', 'firehouse', 'supersonics', 'comic', 'questions', 'employees', 'fireworks', 'seattle', 'news', 'answering'	___ as the Head Coach of the Seattle SuperSonics.
Holidays	'reindeer', 'lyrics', 'christmas', 'grinch', 'shoppers', 'song', 'walmart', 'disturbing', 'this', 'business'	The Grinch praying at the mosque.

Table 3. Post Title Topics in r/weirddalle (top 7).

Topics	Keywords	Examples
Photos	'stockphoto', 'photo', 'graphics', 'art', 'photorealism', 'rendering', 'standing', 'screenshots', 'style', 'featured'	

Topic	Keywords	Examples
Paintings	'painting', 'graphics', 'art', 'rendering', 'drawing', 'pixabay', 'matte', 'photorealism', 'arts', 'rendered'	
Anime	'art', 'woman', 'painting', 'artstation', 'portrait', 'anime', 'outfit', 'akihiko', 'women', 'her'	
Comic Portraits	'portrait', 'art', 'deviantart', 'pose', 'comic', 'photo', 'kuan', 'graphics', 'costume', 'kratos'	
Contest Photos	'contest', 'stockphoto', 'photos', 'photo', 'selfie', 'pinterest', 'posing', 'tumblr', 'winner', 'picture'	
Formal Portraits of Woman	'woman', 'portrait', 'photo', 'kodak', 'michelangelo', 'her', 'polaroid', 'renaissance', 'sitting', 'chair'	
Realistic Portraits of Woman	'portrait', 'woman', 'street', 'photorealism', 'eyres', 'road', 'her', 'mollie', 'character', 'scarf'	
Fantasy Paintings	'dragon', 'art', 'painting', 'graphics', 'deviantart', 'airbrush', 'blue', 'poster', 'ji', 'demo'	

Table 4. Image Caption Topics in r/StableDiffusion.

Topics	Keywords	Examples
Surrealist Portraits	'portrait', 'art', 'painting', 'photo', 'surrealism', 'person', 'facial', 'poster', 'photos', 'graphics'	
DeviantArt Paintings	'paintings', 'art', 'painting', 'poster', 'deviantart', 'stockphoto', 'illustration', 'film', 'artstation', 'magazine'	

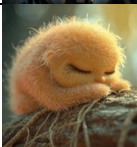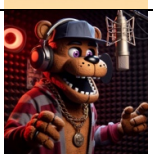| ArtStation Paintings	'art', 'painting', 'artstation', 'deviantart', 'cartoon', 'concept', 'michelangelo', 'robot', 'futuristic', 'costume'	
Futuristic Portraits of Woman	'portrait', 'woman', 'futuristic', 'bodysuit', 'womans', 'kodak', 'photography', 'vanessa', 'character', 'her'	
3D	'sculpture', 'maya', '3d', 'painting', 'statue', 'rendering', 'rendered', 'render', 'animal', 'zbrush'	
Surrealist Photos	'stockphoto', 'photo', 'surrealist', 'image', 'poster', 'stock', 'sign', 'painting', 'trending', 'chair'	
Portrait Photos	'portrait', 'photo', 'lens', 'person', 'photorealism', 'nikon', 'wearing', 'featured', 'conner', 'character'	
Food Contest Photos	'contest', 'plate', 'pizza', 'portrait', 'stockphoto', 'photo', 'restaurant', 'awardwinning', 'winner', 'food'	

Table 5. Image Caption Topics in r/midjourney.

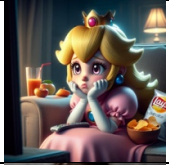| Topics	Keywords	Examples
Deviantart Paintings	'deviantart', 'art', 'painting', 'stockphoto', 'graphics', 'photo', 'cartoon', 'poster', 'artstation', 'photorealistic'	
Cartoons	'cartoon', 'art', 'hannabarbera', 'comic', 'deviantart', 'portrait', 'hologram', 'character', 'marvel', 'akira'	
Posters	'poster', 'billboard', 'deviantart', 'art', 'costumes', 'film', 'painting', 'movie', 'photo', 'freakshow'	
Surrealism	'surrealism', 'surrealist', 'sculpture', 'artwork', 'art', 'statues', 'statue', 'painting', 'demon', 'mickey'	

3D	'cinema4d', 'rendering', '3d', 'rendered', 'render', 'maya', 'animated', 'photorealism', 'realism', 'voxel'	
Photos of Products	'stockphoto', 'shutterstock', 'paper', 'cardboard', 'contest', 'photo', 'papers', 'art', 'stock', 'legos'	
Anime	'anime', 'art', 'miyamoto', 'gift', 'masterpiece', 'contest', 'behance', 'graphics', 'card', 'legos'	
Photos of Woman	'stockphoto', 'shutterstock', 'photo', 'woman', 'women', 'art', 'stock', 'pixabay', 'couch', 'aestheticism'	

Table 6. Image Caption Topics in r/weirddalle.