



PromptTHis: Visualizing the Process and Influence of Prompt Editing during Text-to-Image Creation



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Background: Text-to-image generative models

Input: Textual prompt

A beautiful painting of a singular lighthouse, shining its light across a tumultuous sea of blood by greg rutkowski and thomas kinkade, Trending on artstation.

Output: images



Disco Diffusion



Stable Diffusion v1.5



Stable Diffusion XL



Midjourney

Use case: explore creative ideas for professional artists

- Not to create a particular image (potentially applicable as well)

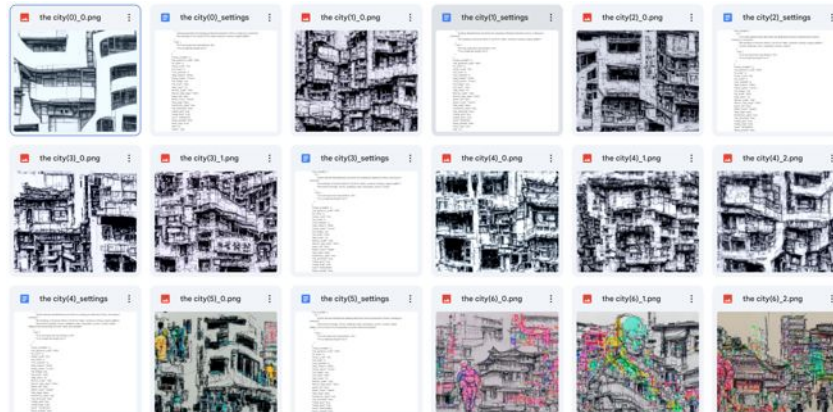
A solution to the climate crisis



Robotic
animals

Problem: Lots of trials and errors

- Users find it difficult to convey their idea with prompts
- Spend a lot of time through trial and errors



A painting of a woman,
head and shoulders



Intended



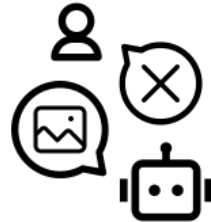
Got

Interview with two artists



Lack of organisation

- What has been explored?
- What to explore next?



Misalignment between intention and output

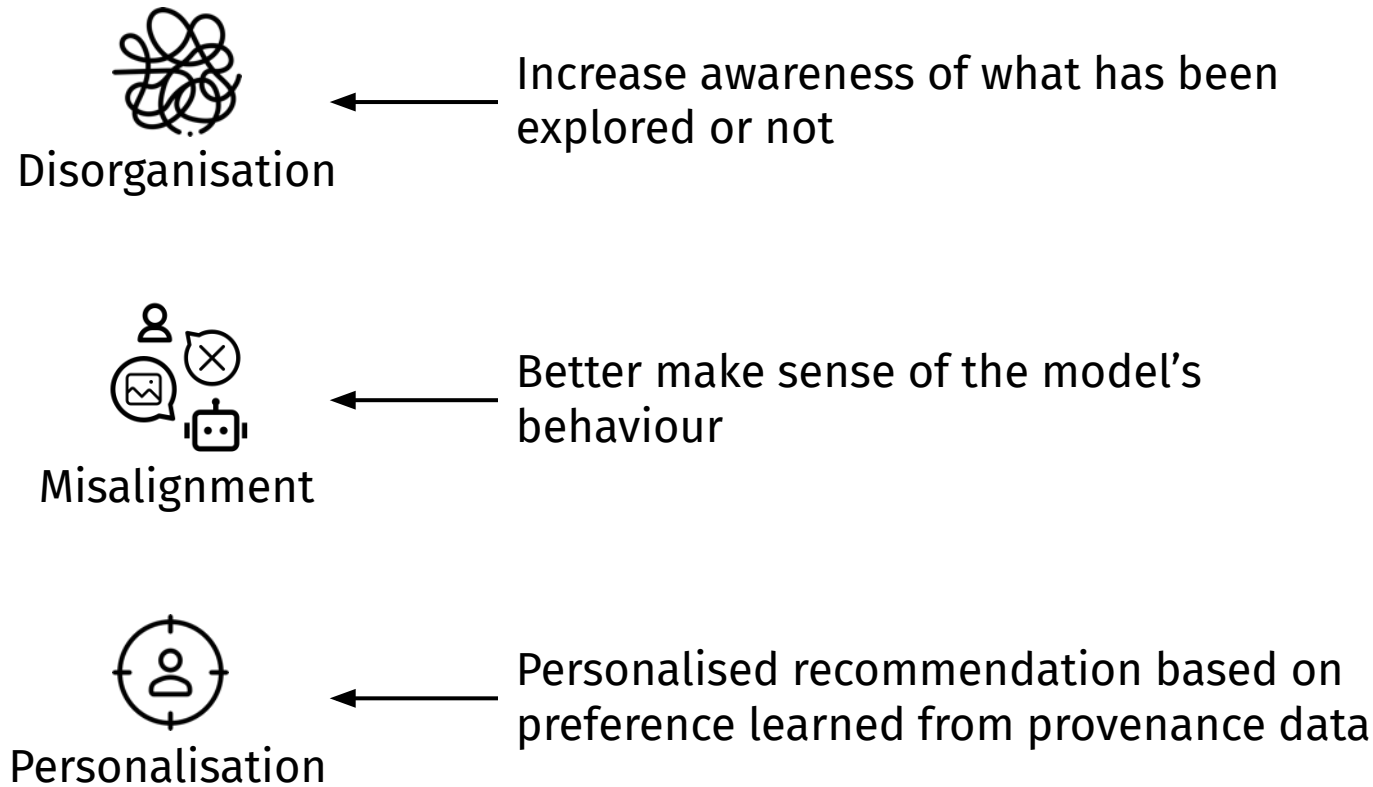
- Unsure about the model capability
- Difficult to convey the intention in a way that the model understands



Need for personalised recommendation

- Parameter space exploration
- Guidance for refining prompts
- Personal preference

Leveraging prompt edit history (provenance)



Prompt History

Part of **analytic provenance**, i.e., the context of analysis (in this case image generation)

- User input (prompts and parameters)
- The analysis performed (model and its settings)
- Intermediate and final results (the images generated)
- User's (analytic) reasoning, i.e., the creative thinking

Prompt History

Prompt Change

1. a **happy cat** in the style of studio Ghibli

2. a **happy dog** in the style of studio ghibli

3. a **sad cat** in the style of studio ghibli

Prompt Distribution

Influence?

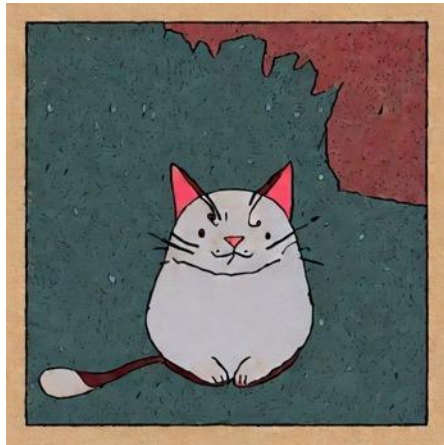


Image Distribution

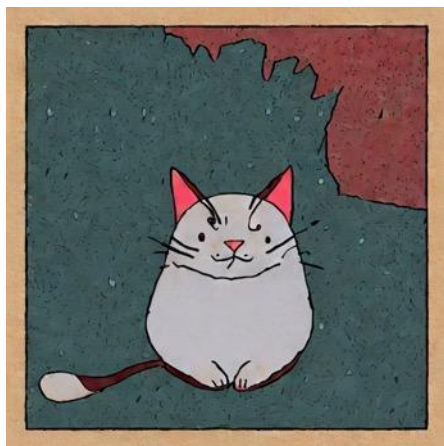
Image Change

Model changes as directed multigraph (Image Variant Graph)

1. a **happy cat** in the style of studio Ghibli



2. a **happy dog** in the style of studio Ghibli



- cat
+ dog



- cat
+ dog



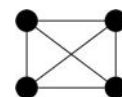
- happy
+ sad



- dog
+ cat



- happy
+ sad



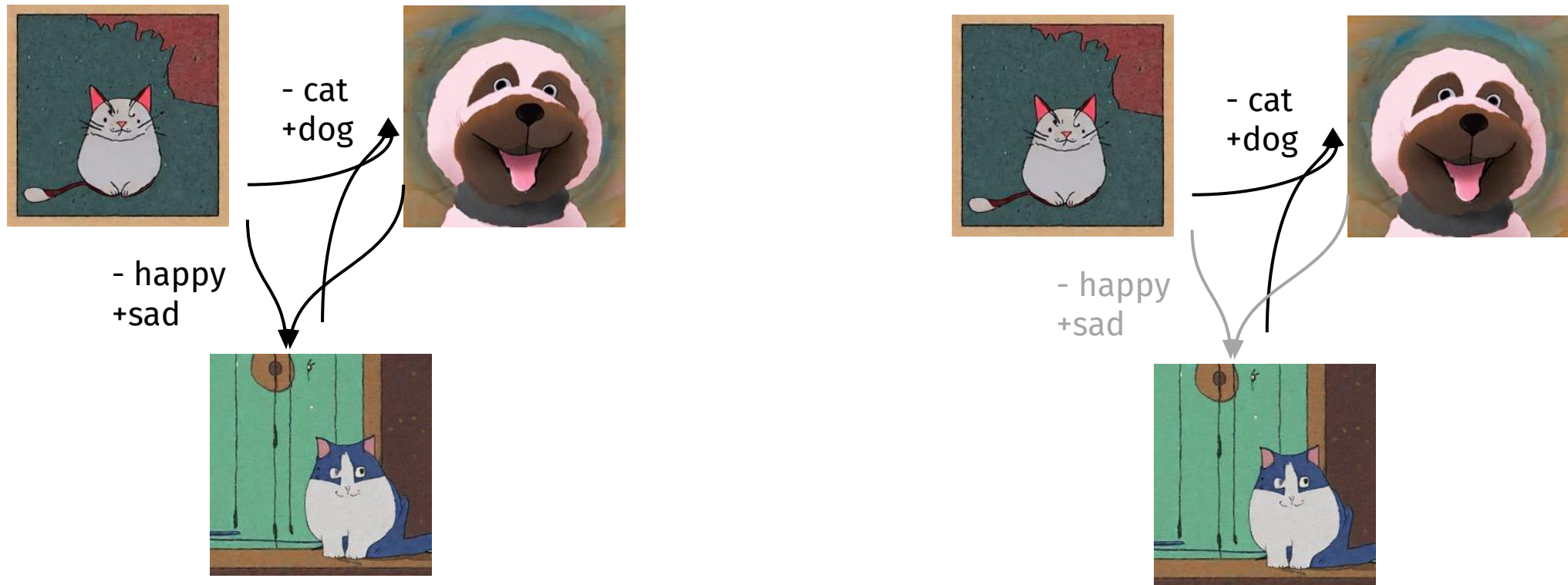
Complete graph?

Too many edges!

Image Variant Graph - Edge bundling

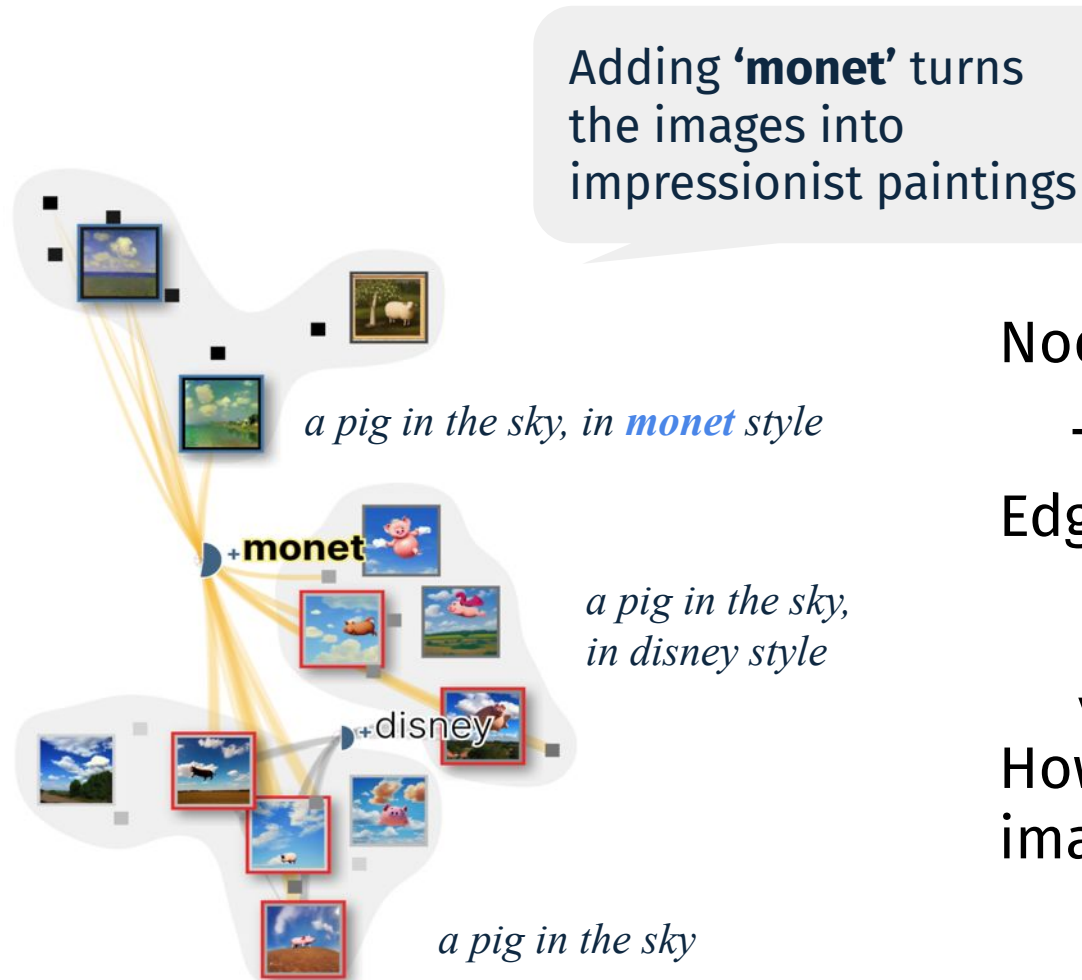


Image Variant Graph - Edge filtering



Filtering changes with **'significant' influences**

Image Variant Graph



Node Embedding: prompt & image distribution

+

Edges: Prompt Changes



How prompt changes influence the image outcomes?

PromptThis: A visual analysis system for exploring prompt history

The interface features a top navigation bar with 'IVG', 'Embedding: Text', 'Image', 'Prompt similarity', 'Edge weight', and 'Cluster distance' sliders, and a user name 'richard'. The left sidebar includes a '+ New Session' button and a list of sessions: 'Dark room', 'Magick', 'Cotton', 'Buildings in water', 'As above so below', 'Portrait', '35 mm indian dancer', 'The lady', 'City', and 'Spaceship'. Below this is a 'Create' section with a text input field and a copyright notice for Stable Diffusion prompts.

The central area displays an 'Image Variant Graph' with nodes and edges. Nodes contain small image thumbnails and text annotations such as '+detailed -bold -detailed', '+detailed +black +white', '+atomic explosion -city -buildings of', '+detailed +Kowloon Walled City -neo-toyoko', '+intricate +streets +walkways', '+bold +Delineated buildings -Moebius', and '+city -with'. Edges are labeled with 'Prompt difference (edge)' and include controls for 'Diff frequency', 'Diff weight', 'Insert', 'Increase weight', 'Reorder', 'Remove', and 'Reduce weight'.

At the bottom left, a 'Generated image (node)' section shows 'Steps: 1' and a progress bar from 1 to 16, with 'show' and 'hide' buttons. Below it are options for 'Images generated by same prompt' and 'Images grouped by' (cluster, exploration stage, hide).

On the right, a 'History box' shows a vertical timeline of attempts (5, 10, 15) and a grid of images. Two entries are visible:

- 15. a intricate detailed black and white line drawing of a **city-atomic explosion** by Katsuhiko Otomo and Moebius , trending on artstation Delineated buildings streets walkways bars holograms crowds budda statues **the buildings of Kowloon Walled City fill the frame windows-making-a-regular-pattern-white space**
- 16. a intricate detailed black and white manga drawing of an underwater city by Katsuhiko Otomo and Moebius and Masamune Shiro , trending on artstation Delineated buildings bars holograms budda mech white space people figures

— **Mini map**
 Navigate attempts
 Organise exploration stages

— **History box**
 Review detailed prompts and images

Creation panel
 Add sessions and enter prompts

Image Variant Graph
 View semantic distribution of images and prompt variations
 Analyse how word-level edits influence image generation



STABLE DIFFUSION XL

SDXL 1.0: A Leap Forward in AI Image Generation

Enter your prompt



Generate

TRY AN EXAMPLE



Conclusion

- PromptTHis - A visual analytic system for reviewing and analysing prompt history.
 - It can also be used by researcher to understand how artist interact with the model.
- Image Variant Graph for presenting the prompting provenance;
 - Help user understand the behaviour of the generative model and craft better prompts.
- An initial step towards personalised support.

Our system is available at <https://vis4sense.github.io/prompthis/>

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