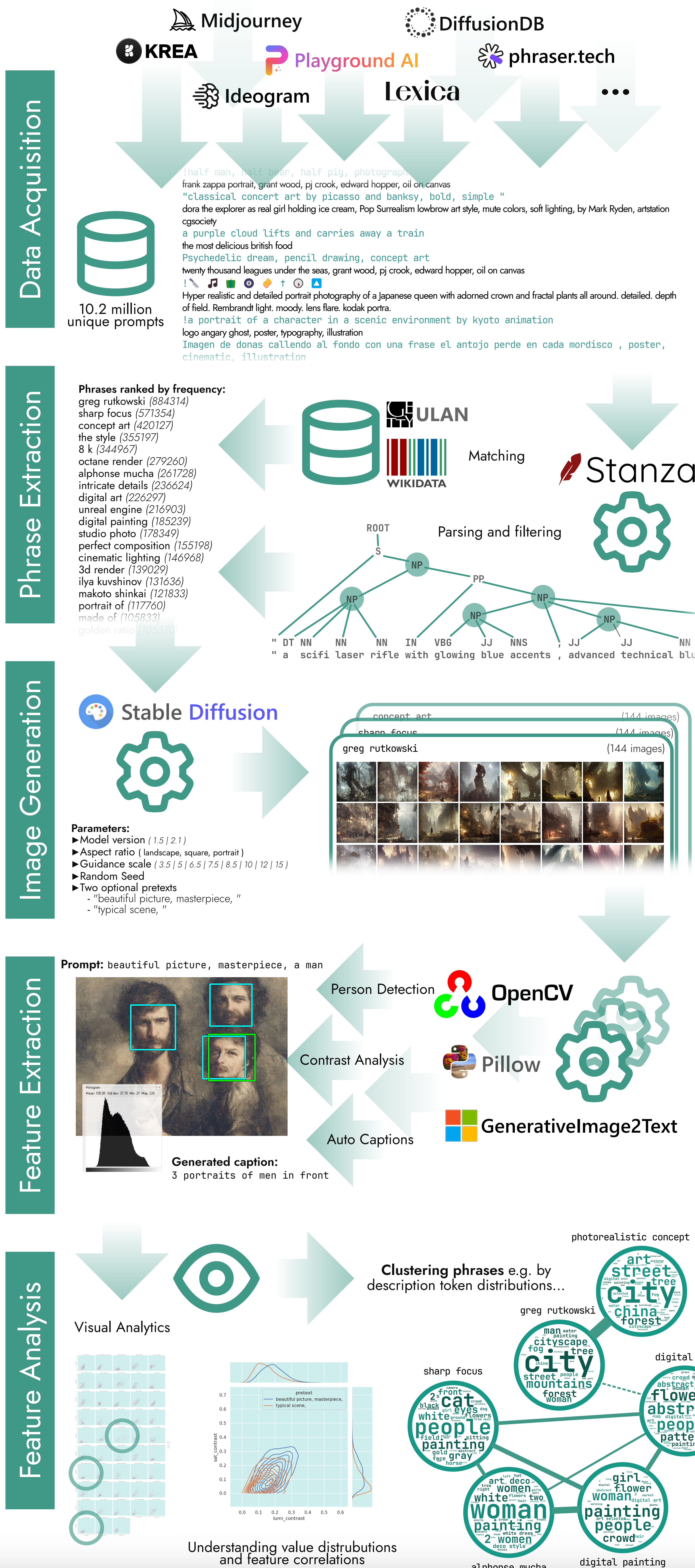# Computational Analysis of Artistic Style Prevalence in Generative AI Art

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Data Acquisition

Midjourney DiffusionDB KREA Playground AI phraser.tech Ideogram Lexica •••

10.2 million unique prompts

Phrase Extraction

ULAN WIKIDATA Matching Stanza

Phrases ranked by frequency:
greg rutkowski (884314)
sharp focus (571354)
concept art (420127)
the style (355197)
8 k (344967)
octane render (279260)
alphonse mucha (261728)
intricate details (236624)
digital art (226297)
unreal engine (216903)
digital painting (185239)
studio photo (178349)
perfect composition (155198)
cinematic lighting (146968)
3d render (139029)
ilya kuvshinov (131636)
makoto shinkai (121833)
portrait of (117760)
made of (105833)
golden rate (105278)

Parsing and filtering

ROOT
S
NP
NP   PP
NP   NP
NP   NP

" DT NN   NN   NN   IN VBG   JJ   NNS , JJ   JJ   NN
" a scifi laser rifle with glowing blue accents , advanced technical bluep

Image Generation

Stable Diffusion

concept art (144 images)
sharp focus (144 images)
greg rutkowski (144 images)

Parameters:
► Model version (1.5 | 2.1)
► Aspect ratio (landscape, square, portrait)
► Guidance scale (3.5 | 5 | 6.5 | 7.5 | 8.5 | 10 | 12 | 15)
► Random Seed
► Two optional pretexts
 - "beautiful picture, masterpiece, "
 - "typical scene, "

Feature Extraction

Prompt: beautiful picture, masterpiece, a man

Person Detection   OpenCV
Contrast Analysis   Pillow
Auto Captions   GenerativeImage2Text

Generated caption:
3 portraits of men in front

Feature Analysis

Visual Analytics

Understanding value distributions and feature correlations

Clustering phrases e.g. by description token distributions...

photorealistic concept art

greg rutkowski

sharp focus

alphonse mucha

digital art

digital painting

...or by t-SNE embedding of numerical features

Understanding similarity

1024x768 768x768 768x1024
alphonse mucha greg rutkowski

art deco woman painting 2 women

Alfons Maria Mucha
1860-1939
ULAN : 500030136

Blended Reading

Objective

Recent advances in neural network-based **generative art** use **natural language** as the primary means of steering the content and visual quality of generated images. Textual prompts encode the users' understanding of the scenes to be depicted and of the **artistic styles** to be employed. However it is unclear which elements of AI art prompting, such as the inclusion of traditional **artist names**, inform which portion of the visual outcome.

Our goal is to open up this emerging cultural practice for discussion within the **Computational Humanities** community and their established methodologies.

Methods

We propose a process chain aimed towards an **explorative research** environment. As illustrated in this poster, we first obtained over **ten million unique prompts** from various **online sources** (many of which were targeting Stable Diffusion-based image generation models). Since simple n-gram based phrase extraction yielded a high percentage of boilerplate output, we decided to use the **constituent parsing** feature of Stanza with a subsequent filtering for noun phrases of appropriate length (between two and seven word tokens) and ranked them by frequency.
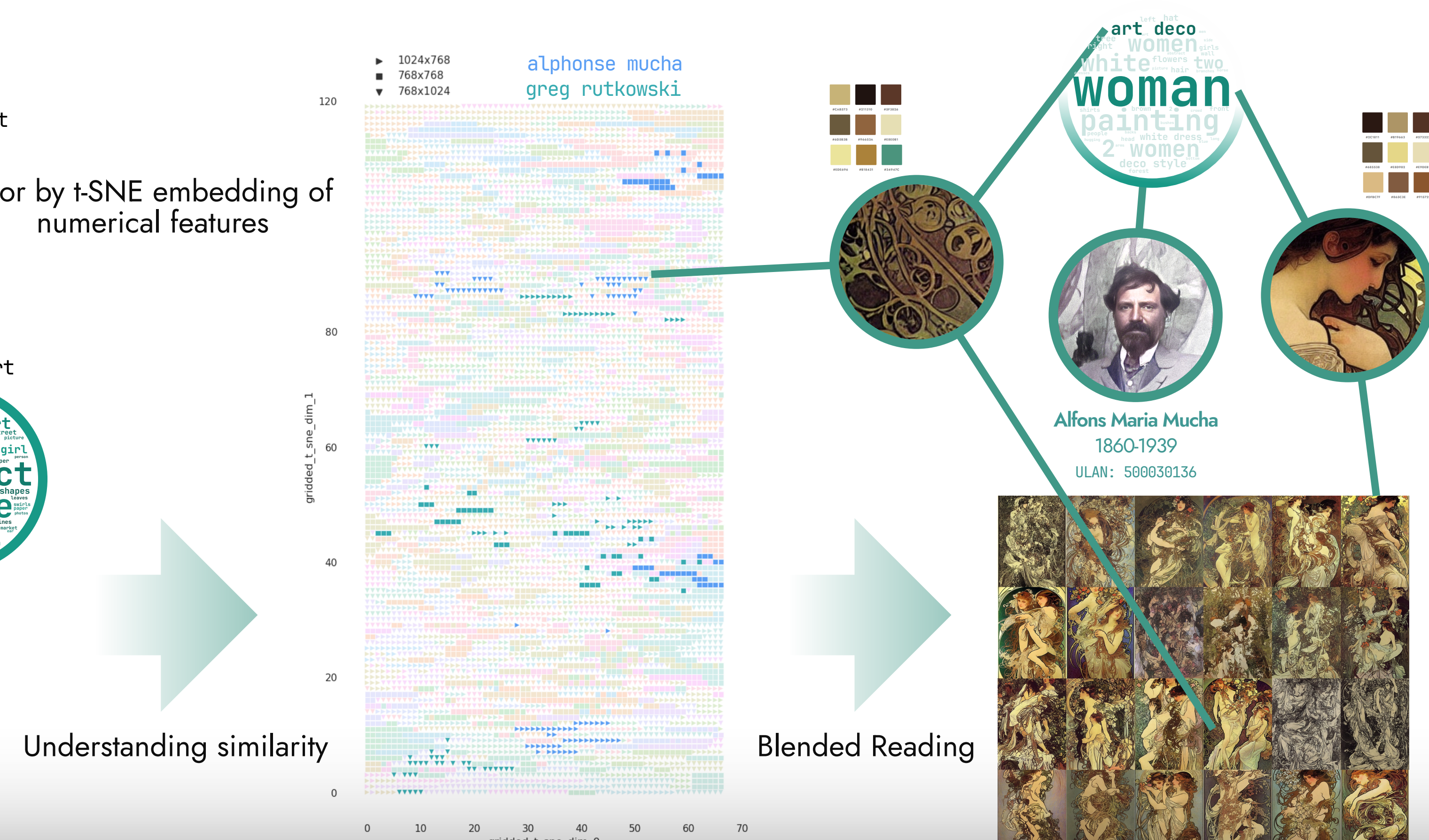
For the extracted phrases we then used **Stable Diffusion** to generate an array of images with a wide range of model parameterizations. These images, keeping track of their **metadata**, were analyzed using standard **image analysis** methods such as contrast analysis, face and person detection as well as more advanced AI based approaches such as automatic **description generation.** The features were then statistically analyzed and used to create axes of comparison for later manual studies. For these, we set out to enable explorative scenarios in the style of a "**Blended Reading**", combining close and distant analyses.

Results

Our **preliminary analyses** show that there are indeed strong "signals" carried by specific phrases into the generated images. Even simple features and metrics can reveal a strong **clustering** of images originating from the same **popular phrases**. Whether these effects are completely understood by the users entering the prompts is doubtful and cannot be inferred from our data. However, it is likely that many prompt parts are readily **re-used**, much like memes circulate in online communities and that these in particular provide a **noticeable stylistic contribution** to the visual quality of the output. In addition, we have found that also the **subject matter** of the images is dictated or at least modified by these popular phrases.

Future Work

Thanks to the extensibility of our pipeline it will be easy to broaden our experiments to include other **models**, especially fine-tuned model snapshots that promise "more artistic" outputs. Besides improving further on phrase extraction, we will also extend our pool of feature extraction methods to approaches for **object detection**, **texture analysis** and different image **embeddings**. Most importantly we aim to get into contact with **art historians** and AI art **practitioners** to establish a novel Computational Humanities powered AI analysis interest group in order to consolidate our work in an insightful and respectful way as a **community**.

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CHR2023
December 6-8 2023

Computational Humanities
https://ch.uni-leipzig.de