Topic: Neural Art Methodology

What are the common AI tools used in the realm of visual art creation? How does artists use them and what outcome has been achieved? How do I make breakthroughs in this “AI x Art”?

I. Artists to study

- Mario Klingemann (Google Arts, huge resources)
- Sofia Crespo (Biology texture synthesis)
- Anna Ridler (custom dataset)
- Robbie Barrat (Stanford young coder, actual author of the first AI artwork sold in the auction)
- Tom White (aesthetically-pleasing outcome)
- Sougwen Chung (Collaboratively drawing with AI robot arms)
- Memo Akten (webcam gan, use towels to generate fire/ocean images)

* A longer list:
https://www.artsy.net/article/artsy-editorial-art-failing-grasp-christies-ai-portrait-coup
http://www.naturemorte.com/exhibitions/gradientdescent/

* Other names: (art-related researcher)
  - Gene Kogan: https://genekogan.com
  - Aaron Hertzmann: https://www.dgp.toronto.edu/~hertzman/index.html
  - Ahmed Elgammal: https://sites.google.com/site/digihumanlab/home

II. Some conclusions:

1. A neural network can be treated as an image synthesizer, creating wilder results, but with less direct control over the result than the tradition image-generating software/algorithms.

2. Artist can guide the AI by changing:
   - Dataset: feeding appropriate dataset; sometimes the artist has to build their unique dataset, which is extremely time consuming
   - Features: decide which features to be considered more, and which less.
3. In the earlier machine learning period, the dataset is smaller and the features and hand-coded. In contrast, in the current deep learning period, as the features are not pre-defined, the dataset has to be big enough for the machine to grasp the features. (like crack a passcode with brutal force, trying on all different possibilities)

4. The breakthrough possibilities lies in:
   - A better **dataset** complies visual artists’ taste
   - A better **model** about artistic visual properties. Essentially, how do we experience aesthetics? and how to model this experience with visual features? Maybe **visual indeterminacy** is one of the answers?

5. Common AI tools categories:
   - Whole image generation (the whole image outcome is generated at once):
     • Neural Style Transfer:  
       - [https://en.wikipedia.org/wiki/Neural_Style_Transfer](https://en.wikipedia.org/wiki/Neural_Style_Transfer)
       - [https://genekogan.com/works/style-transfer/](https://genekogan.com/works/style-transfer/)
     • Texture Synthesis
     • Text to Image  [https://experiments.runwayml.com/generative_engine/](https://experiments.runwayml.com/generative_engine/)
   - Procedure based image generation: (AI make decision about next step, there is a process of image making)
     • Robots-Human collaborative drawing
       - Drawing Operations, Sougwen Chung, [https://sougwen.com/artworks](https://sougwen.com/artworks)
     • Computer Drawing
   - Image recognition and conversion
     • Image To Text
       - Im2txt, Image Caption Generator: [https://github.com/tensorflow/models/tree/master/research/im2txt](https://github.com/tensorflow/models/tree/master/research/im2txt)
     • Image Evaluation
     • Image To Sound
       - Nao Tokui, [https://twitter.com/naotokui_en/status/963310211950772224](https://twitter.com/naotokui_en/status/963310211950772224)

6. The influence of AI art and the future prediction: (**Can Computers Create Art?**)
   - Elimination: hand-coded algorithm, simulations, etc
   - Improving: More abstract images; More interesting randomizer;

### III. Major related Papers

**A. GANs**

   a) Does not need data of image pairs (A and A′, B and B′), only need two different dataset.
a) Uses image segmentation map to guide the synthesis  
b) uses upscaling training to generate high-res results  
c) Interactive tools

B. Texture Synthesis (generally higher resolution than GAN model, still in exploration)  
1. Deep dream  

C. Image Assessment  
1. Datta: https://link.springer.com/chapter/10.1007/11744078_23  
a) Classical image-rating training framework  
b) Image-rating related features  
a) Innovative pairwise-training method  
3. Computational Understanding fo Visual Interestingness: https://dl.acm.org/citation.cfm?id=3301299  
a) A good overview of different paper relating visual interestingness rating, but not very artist-oriented  
a) Psychological user study about aesthetic emotions in aesthetic people  
b) Cares more about aesthetics

D. Other Papers:  
a) Why AI art is so popular, why AI is so good at making “art”?  
a) Great sorting out the relationship between AI and art, the future prediction.

IV. Others Resources:  
A. ITP Class: Neural Aesthetic: https://ml4a.github.io/classes/itp-F18/