**Introduction: Which Picture is Fake?**

**Example (Reconstructing Problem):** reconstruct a Chinese painting from its edge map

- Left: Our input (edge of the target painting).
- Middle and Right: One original painting, the other ‘drawn’ by computer.
- Guess which is the real one?

The ‘fake’ image is generated by Generative adversarial networks (GANs). The purpose of our project is to generate realistic-looking Chinese paintings using different types of GANs.

**Datasets and Preprocessing**

**Scratching:** All the Chinese paintings are scratched from Google and Baidu. The dataset is cleaned to prevent repeated and unrelated images.

**Reshaping:** All images are shaped to be $256 \times 256$.

**Edge Extracting:** The edges are extracted by Canny edge detection.

**Implemented Methods**

- **cGANs:** Used for image-to-image translation (edge $\rightarrow$ painting, black white painting $\rightarrow$ colored painting)
  - Condition on an input image and generate a corresponding output image.
- **DCGANs:** Used for creating new paintings from noise.
  - Both the generator and discriminator use the deep convolutional neural network architecture.
- **WGANs:** Used for creating new paintings from noise.
  - Remove log in the loss formula in the original GANs paper.
  - Do not apply sigmoid at the output of $D$.
  - Clip the weight of $D$ to $[-0.01, 0.01]$.

**Performance of DCGANs and WGANs**

**Generating Paintings:** Generate paintings using our full dataset of Chinese Paintings.

- DCGAN and WGAN give results with similar qualities.
- WGAN is more stable while training.
- WGAN is slightly slower in training than DCGAN.