Interactive Canvas Style Transfer

CMPM 202 // Jasmine & Mahika

Lit Rev // Style Transfer

The **content objective** aims to get neurons to fire in the same position as they did for the content image.

The **style objective** aims to create similar patterns of neuron activation as in the style image — without regard to position.

Parameterizing the learned image in a decorrelated space makes style transfer more robust to choice of model.
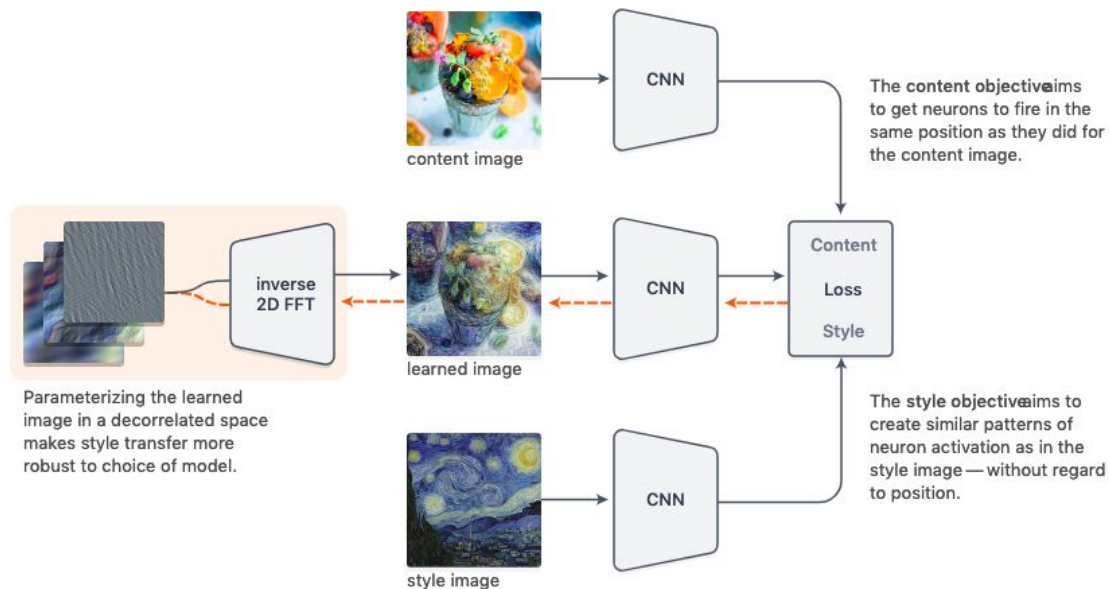
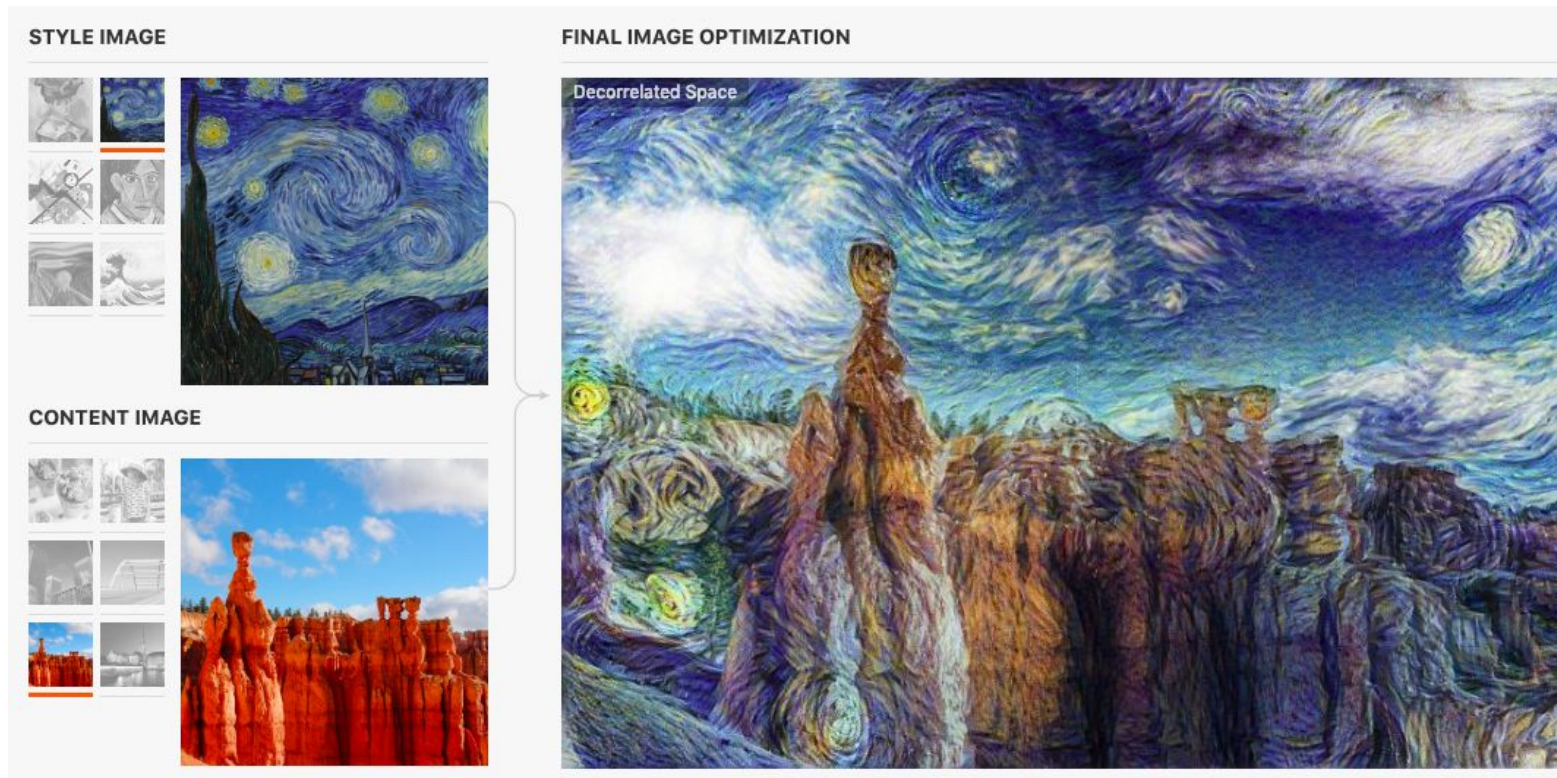- Find F: (content, style image) -> learned image

Optimize F against a loss function with two parts:
- Content loss (replicate position)
- Style loss (replicate patterns)

Smaller convolutional networks OK to represent F
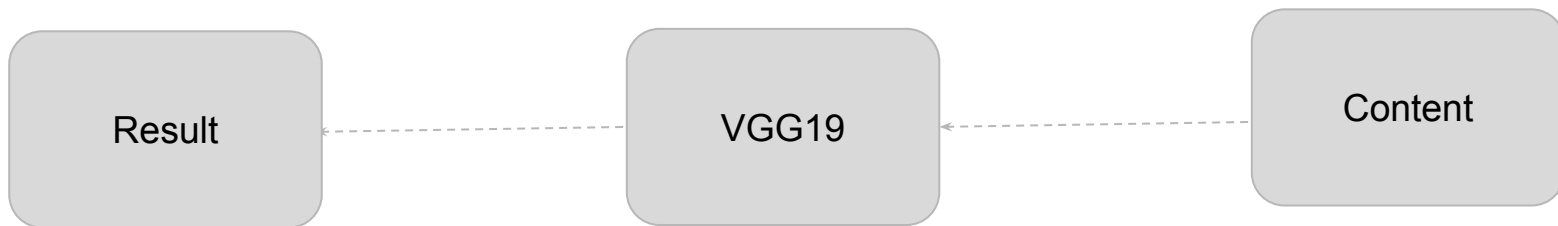- if input amplitudes are indexed by frequency, not by pixel

Lit Rev // Style Transfer

Lit Rev // Real-Time Style Transfer

- Forget about content loss - we don't see content at training time.
- Train a VGG image -> image network to minimize a certain style loss.
  - Does 'perceptual loss' incorporate frequency space?

ml5.styleTransfer() has this architecture:

Result	←	VGG19	←	Content

- VGG19 has 3 convolutional layers *(representing a kernel)*, 5 pairs of convolutional layers *(representing a 'residual' kernel)*, 2 transpose layers *(representing a kernel applied like a stamp)*, 1 more convolutional layer, and finally the activation function and normalization steps.

Lit Rev // Game of GANstruction

- Example: Helena Sarin's art practice using GANs.
- CycleGAN also does style transfer
  - but uses (not very) many texture samples as a 'target domain'.
- CycleGAN trains quickly (isn't deep)
  - 'Input domain' training data can be re-used for final outputs. (The network gets to peek.)
  - Varying the training dataset allows 'fine-tuning', mixing coarser and finer featuresets.

- The loss function breathes.
  - The training dashboard is a tool of co-creation.

- *Let the medium do it.*
  - But iterate on your toolkit. Curate your datasets.

Discussion

- Art creation process - what comes first for you, colors or image layout? What comes first for computers?
- Does style transfer force these processes to be separate?
- Comment on the 'Game of GANstruction' and the role of learning in the artist-critic scenario

Prototype // Design

Brushes

Upload image to canvas & paint

Implementation // Tech Stack

- Mix 'stylized' outputs via interactive masking
  - User overlays 'semantics' onto image by mouse movement

Questions // Thank You