A Neural Algorithm of Artistic Style

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CSCI570 Theory Project

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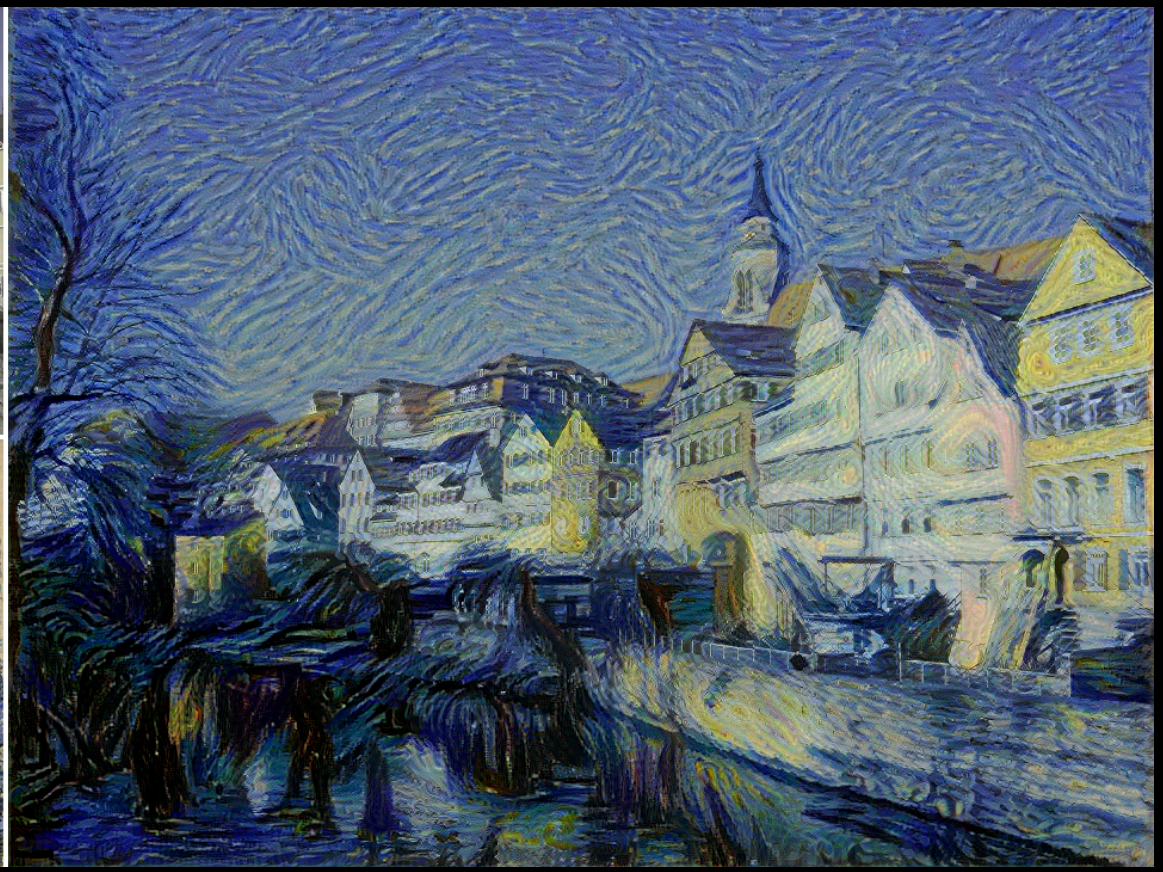
The Problem:

To generate an image that holds the content of an original image but applies the style/texture from a second image.

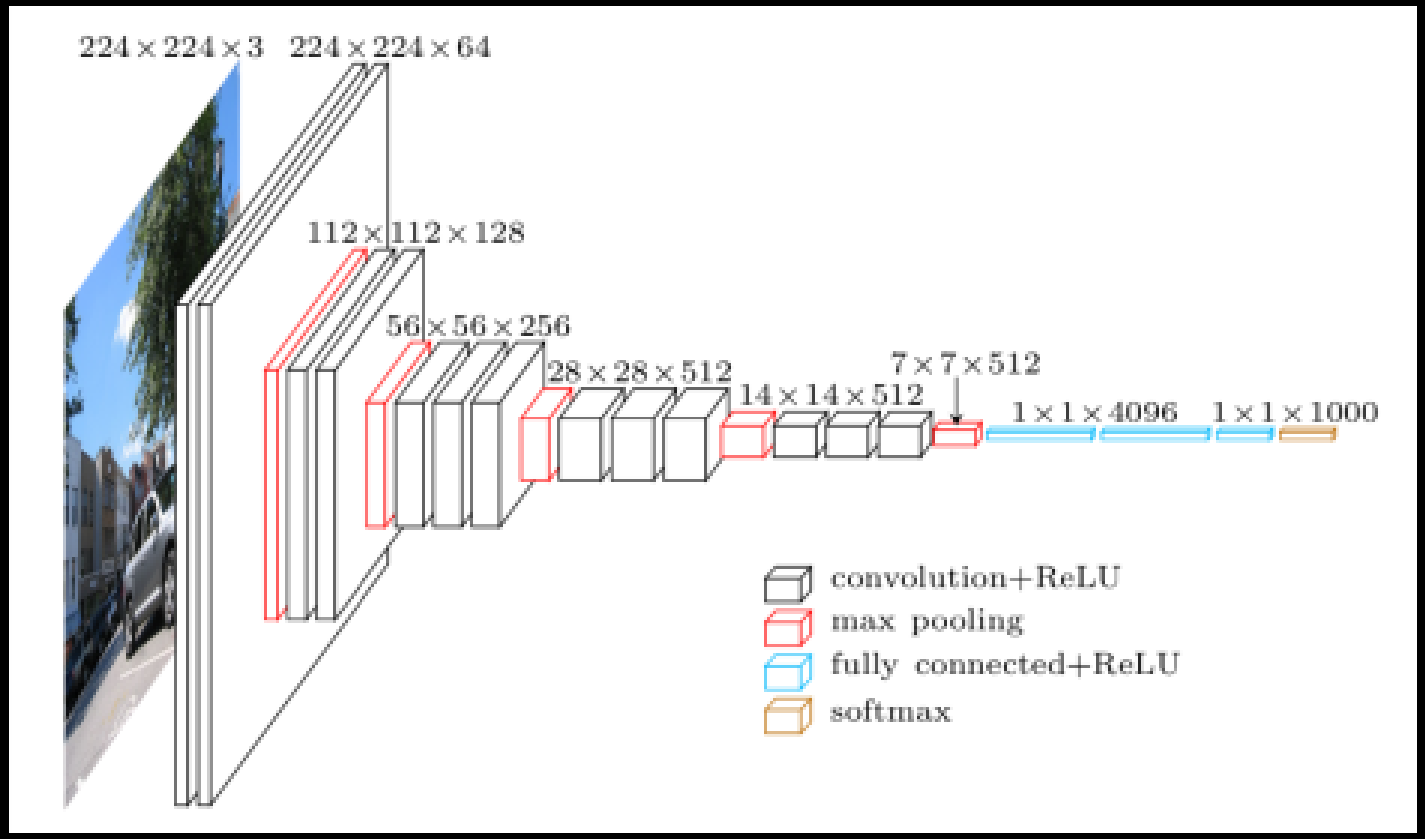


Related Work

- Stroke-Based Method [H98]
- Region-Based Technique [K05][GCS02][SRHC08]
- Example-Based Rendering [H01][ZZ11]
- Image Processing and Filtering[HOG06][GRG04][TOG98]

Solution

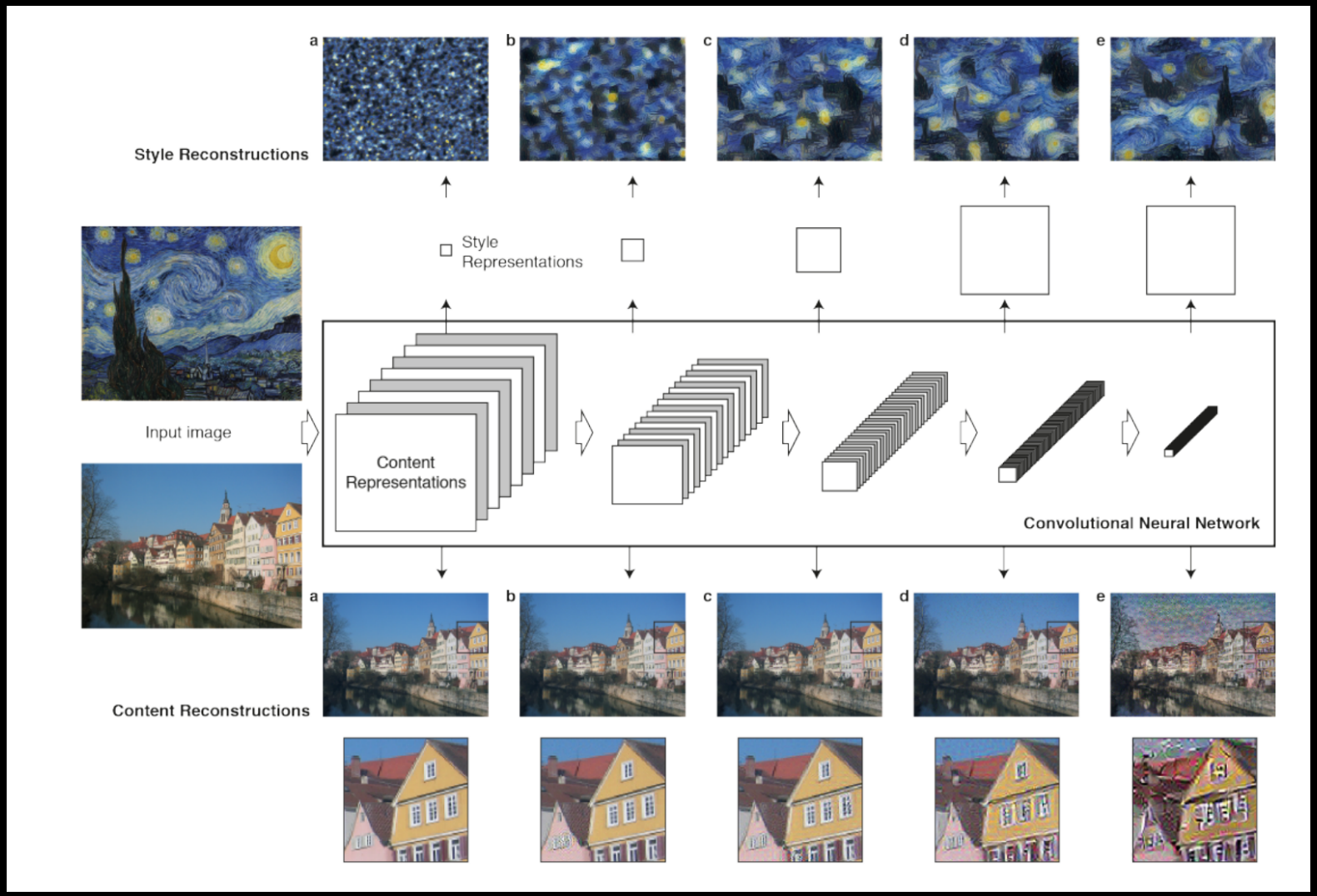
The authors use a convolutional neural network(CNN) to solve the problem. They choose to use VGG-16 which was train in a supervised fashion on object recognition.



VGG-16 Structure

Solution

Forward feed network structure showing how the data is used in the network.



Planned Work

- Using code written as a keras tutorial under Neural Style Transfer with Eager Execution to use different style images and content images
- Attempting to use different layers of the VGG-16 network to test effects of various layers
- Experiment with the ratio in the loss function between style and content
- (long-shot) Try to use implement a picture with one content image but with 2 style images

Issues & Timeline

- Issues
  - My personal computer's logic board broke :(
  - Currently working on installing keras and dependent packages
  - Difficult understanding the "gram matrix" used for the style image
  - How to implement this loss function with two separate networks?
- Timeline Updated
  - Initial Data exploration (Completed)
  - Paper Break Down (Partial-Completion)
  - Implement Code From Keras (10/20/19)
  - Implement different images (11/1/19)
  - Test different ratios of style and content (11/15/19)
  - Different layers for style and content (11/27/19)
  - Attempt to use implement a picture with one content image but with 2 style images (12/1/19)
  - First paper draft (12/4/19)
  - Edits on paper (12/8/19)
  - Paper due (12/14/19)

References

Gatys, L. A., Ecker, A. S. Bethge (2015)

M. Texture synthesis and the controlled generation of natural stimuli using convolutional neural networks *arXiv:1505.07376* [cs, q-bio] (2015)

Jing, Yongcheng Yang, Yezhou Feng, Zunlei Ye, Jingwen Yu, Yizhou Song, Mingli. (2017)

Neural Style Transfer: A Review.

Gatys, L.A., Ecker, A.S., Bethge, M.(2015)

A Neural Algorithm of Artistic Style.
ArXiv, abs/1508.06576. abs/1508.06576. (2015)

Questions?

Sophie!