Undergraduate Honours Project Self Review

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1 Project Title

Post Rendering Image Processing Using Convolutional Neural Networks

2 Project Description Review

The final project results do not statisfy the original proposed project description. The following is still accurate and represents the results well:

Produce an application that combines the areas of computer graphics and machine learning. The application will produce images that resemble human sketches from an input image using convultional neural networks.

However the following part of the description was probably a little too ambitious:

The overall project did not The application will extract environment data from an image and use it in the construction of the output image.

3 Learning Objectives Review

Here is the list of learning objectives mentioned in the proposal and a short summary of gained knowledge. Some bullets may be applicable to more than one learning objective but are only listed once.

1. Grasp a deeper understanding of neural networks.
    - Trouble shooting non-matching matrices sizes.
    - Better knowledge on required training times.
    - Appreciation for pre-trained networks.
    - Knowledge on using tools such as Keras and Tensorflow.
    - Convolutional Neural Networks and the level of abstraction between layers.
    - Difference between style and content optimizations.
2. Grasp a deeper understanding of image processing.
    - RGBA to greyscale conversion.
    - Sample image gathering.
    - File/Image format handling.
3. Gain an understanding of image processing with machine learning.
    - Appreciation for pre-trained end-to-end neural networks.

- Apply a pre-trained network for image classification to image processing.
- Better comprehension of the limitations for end-to-end or pre-trained classification neural networks; which problems are appropriate for CNNs and End-to-End networks.

4. Gain a deeper appreciation of supervised learning and training maching learning models.
    - Appreciation for time put into training models.
    - Appreciation for effort put into selecting hyperparamters.
    - Appreciation for pre-trained models and taking advantage of pre-exsiting models.
5. Gain an understanding of post rendering image processing for applications.
    - Appreciation for real-time rendering systems.
    - Understanding of using pre-trained end-to-end network for real-time systems.
    - Appreciation for amount of processing power required to produce images at a fast enough rate for real-time style transfer.

4 Possible Future Research

Here's a list of possible future research ideas that stem off from this project:

1. Real-time style transfer on pre-recorded video.
2. Real-time style transfer on streamed video.
3. Producing images from pixel classification.
4. Style removal; removing style from an image leaving only content.
5. Combining style from two seperate images.