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Project Proposal

## **Problem**

I'd like to investigate ways of making computer generated images more lifelike using a combination of computer vision and convolutional neural network techniques. A solution to this problem has applications in VR, AR, video gaming, and movies, among many other types of media. Creating a more lifelike computer generated image would delight many people.

## **Data**

For learning object identification and segmentation, I'll be using the Pascal data sets (<http://host.robots.ox.ac.uk/pascal/VOC/>). I'll procure my own computer generated images from F1 or Forza video games.

## **Methodology**

I propose building off of [1] with the purpose of conforming video game images into the "style" of real world images. Although am I interested to see the results in stylizing the entire computer generated image as a real world image, I wonder if I can create an ever more realistic computer generated image by selecting objects within the image, and stylizing them like an image of the same, real-world object. This would require:

1. Learning the style of real world images and apply the style to computer generated images.
2. Learn object identification (data set might be limited to real-world images) and apply this to computer generated and real-world images.
3. Learn the style of a real-world object and apply the style to the computer generated object.
4. Compare results of 1 with results of 3.

## **Readings**

- [1] A neural algorithm of artistic style, <https://arxiv.org/pdf/1508.06576.pdf>.
- [2] Semantic Segmentation using Regions and Parts, <https://static.googleusercontent.com/media/research.google.com/en//pubs/archive/40666.pdf>.
- [3] Imagenet classification with deep convolutional neural networks, <http://papers.nips.cc/paper/4824-imagenet>.
- [4] Separating Style and Content with Bilinear Models, <https://www.mitpressjournals.org/doi/abs/10.1162/089976600300015349>.
- [5] Smooth object retrieval using a bag of boundaries, <https://www.robots.ox.ac.uk/~vgg/publications/2011/Arandjelovic11/arandjelovic11.pdf>.
- [6] Contour detection and hierarchical image segmentation, [https://www2.eecs.berkeley.edu/Research/Projects/CS/vision/grouping/papers/amfm\\_pami2010.pdf](https://www2.eecs.berkeley.edu/Research/Projects/CS/vision/grouping/papers/amfm_pami2010.pdf).

## **Evaluation**

There will be a qualitative element to evaluation, answering the question: “does this look more realistic?”

Statistically, I will be measuring the loss tradeoff between content and style.

## **Timeline**

February 10th - Read more.

February 18th - data secured for both general object identification and stylistically video gaming

February 25th - Object identification code is built; model is trained and evaluated

February 26th - Project check in

*March 1st through end of quarter - build and explore style models*

## **Requests**

1. Comments on the feasibility/appropriate difficulty level are welcomed
2. Other suggestions for related works are also cheerily accepted!