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Capstone II Proposal

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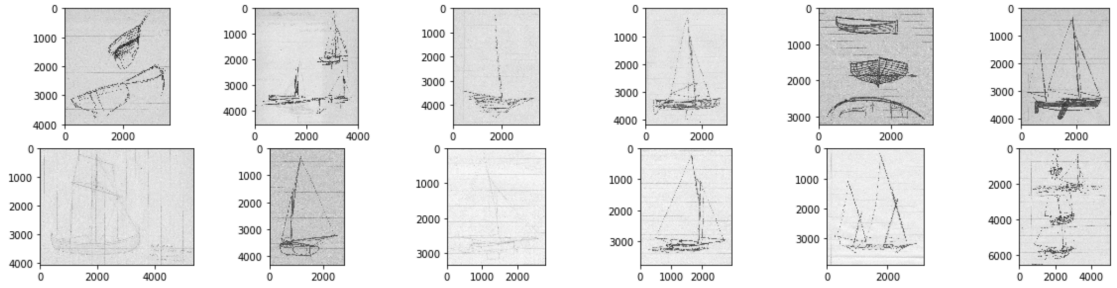
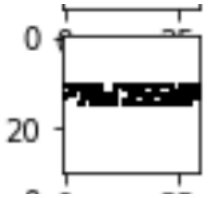
Given my computing resources and time, how can I best utilize a convolutional neural network to remove ruled lines from sketches

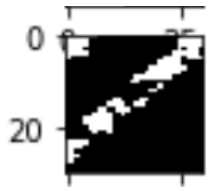
To answer this question, I will analyze 220 unruled sketches and 513 ruled sketches from Uncle Peter's sailboat sketch collection. The size and pixel of these sketches are all over the place. My first steps will be standardizing the images.



Line Class:



Drawing Class:



First, I will assign pixel intensities based on pixel intensities means/std. Using standardized pixel intensities, I can more effectively binarize each image. Next, instead of reducing the images, I will pad them to each be around 8000x8000 pixels.

Training the CNN: I am going to move windows through each image, and classify images as lines or drawings. I think I can automize this process by following lines in ruled images and finding non-white pixels in unruled images. The CNN will be trained on these classes. Once I can get the CNN sufficiently accurate, I will move a window through a ruled image, and use my trained CNN to classify each window as a line or a drawing. Finally I will make all line classified windows white, effectively removing the lines from the image.

Challenges: Many inputs and parameters of the CNN are currently up in the air. I am not sure how large each window should be (I am going to start at around 30x30). I don't know exactly how many training images I need to gather (However, it shouldn't be too hard to collect a lot of training data). Once I have a training set, I am not sure of the values of layers/filters/other parameters in the CNN model. A lot of the week will consist of running models and tuning parameters/training data to achieve better results. Luckily, I have a project to base my project on: Staff-line detection and removal using a CNN (**https://rua.ua.es/dspace/bitstream/10045/68991/5/2017_Calvo-Zaragoza_etal_MachineVisionAppl_preprint.pdf).** I also having experience running docker on an Amazon EC2 instance, so I can run my CNN on the cloud if I am pressed for time.

MVP: I will be satisfied if I can produce a system that quickly produces training data, and if I can successfully remove lines from one binarized image. I will worry about styling images with GANs, etc. for the next capstone project.