CAPSTONE TERM 2 Group 14

Modeling 1

Project Title: Doodle Recognition System

Course Name: CAPSTONE TERM II

Course Code: 202041.23309-AIDI-2005-01

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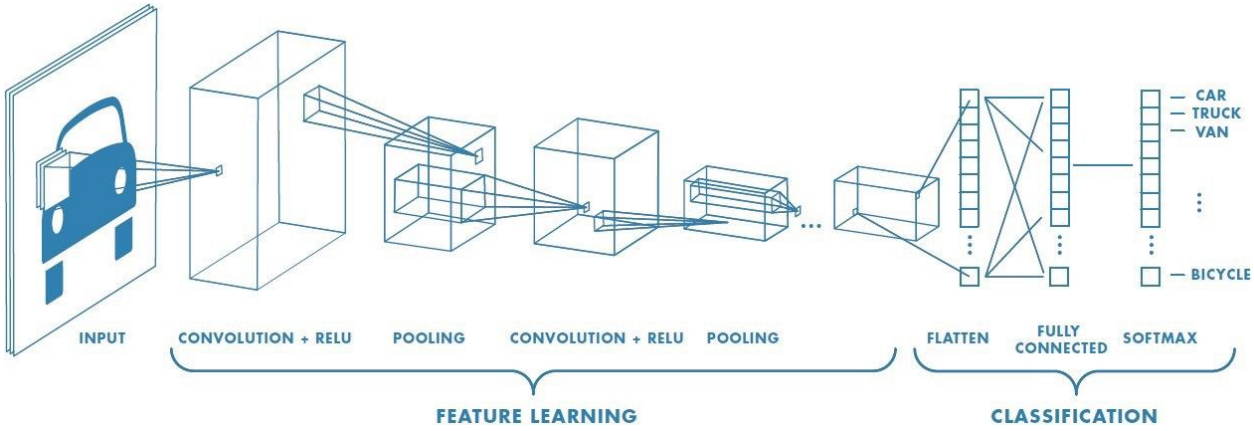
MODEL STRUCTURE:

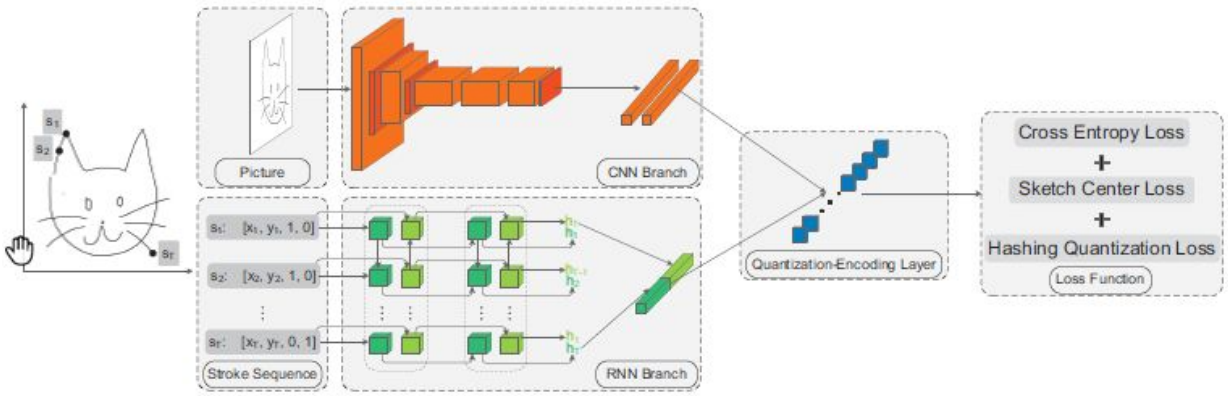
For this project, we will be using various models to test our dataset on. CNN, MobileNet, and Random Forest are the three models that we have selected. In this section, we will provide details on the structures of these models.

1.) Convolutional Neural Networks (CNN / ConvNet)

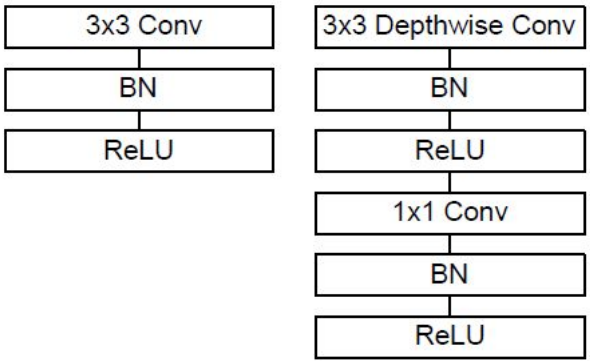


Convolutional Neural Network architectures make the obvious assumption that the inputs are images, this allows us to encode particular properties into the architecture. In turn, this then makes the forward function more effective to implement and immensely condense the amount of parameters in the network. For classification of doodle images, we will use this model to train and test our google quick draw dataset. The above image represents the architecture and process of the CNN model.

2.) MobileNet



MobileNets are based on a streamlined architecture that makes use of depth-wise separable convolutions in order to build light weight deep neural networks. A depthwise separable convolution implements two distinctive steps:

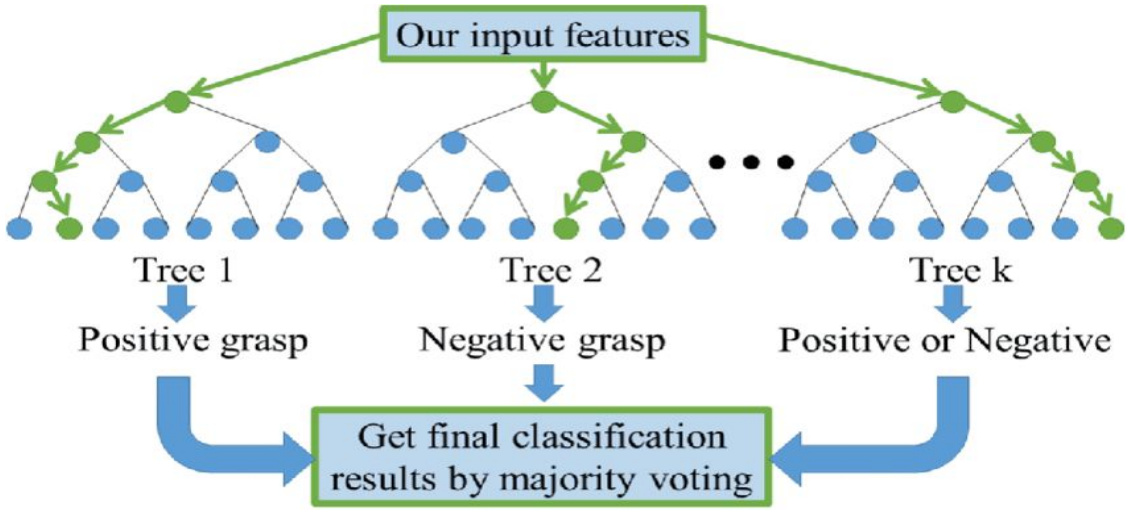


1. Depthwise convolution applies a single filter to each input channel
2. Pointwise convolution, a simple 1×1 convolution, is later used in order to create a linear combination of the output of the depthwise layer

This factorization radically decreases computation and model size as it breaks down the interaction between the number of output channels and the size of the kernel.

3.) Random Forest Classifier

Random forests is an ensemble model meaning that it makes use of the results from numerous distinctive models to calculate a label.



The max_features parameters are the maximum number of features Random Forest can attempt in an individual tree. By restraining the max features to the square root of total features, we improve the model and make it computationally less expensive. We then plot the pixel significance and see that the edges of the doodles tend to be the most critical.

SOFTWARE TOOLS:

For this project we will be using Jupyter Notebook, Kaggle Notebook and Google Colab as our IDE. Visual studio will be used to code and visualize the front end of the model.

CALIBRATION OF MODEL TECHNIQUES:

As mentioned above, we intend to use various types of machine learning algorithms and test our model's accuracy in each one. Our attempts to improve the accuracy of our model will include but not be limited to adding more layers, penalizing the weights, data augmentation, dropout ratios. The focus will be placed on cleaning the noisy data, resizing images, and discarding irrelevant data.

References:

1. https://www.kaggle.com/harunshimanto/lets-play-with-quick-draw#%F0%9F%8F%9E-2.-Random-Forest
2. https://towardsdatascience.com/doodling-with-deep-learning-1b0e11b858aa
3. https://www.kaggle.com/huyenvyvy/fork-of-combining-cnn-and-rnn/notebook