Homework 5 Writeup

Instructions

- Provide an overview about how your project functions.
- Describe any interesting decisions you made to write your algorithm.
- Show and discuss the results of your algorithm.
- Feel free to include code snippets, images, and equations.
- List any extra credit implementation and result (optional).
- Use as many pages as you need, but err on the short side.
- **Please make this document anonymous.**

Project Overview

- Design a CNN model using several methods of preprocessing.
- Design transfer learning; use VGG model as a feature extractor and train a head.

Implementation Detail

First, implemented basic model with standardization. This type has overfitting issue. Added augmentation method. It ameliorated overfitting issue. So added more parameters to the model. To prevent overfitting, also added dropout layer.

Secondly, designed a head of model using VGG as a feature extractor.

Result

1. Standardization (Figure 2). As expected, this case is overfitting.
2. Standardization + Augmentation (Figure 3). This option is less overfitting then the first one but still has some at the end of training.
3. Standardization + Augmentation + Regularization (Figure 4). This option ameliorates overfitting issue. It has almost the same accuracy on both training and test data.

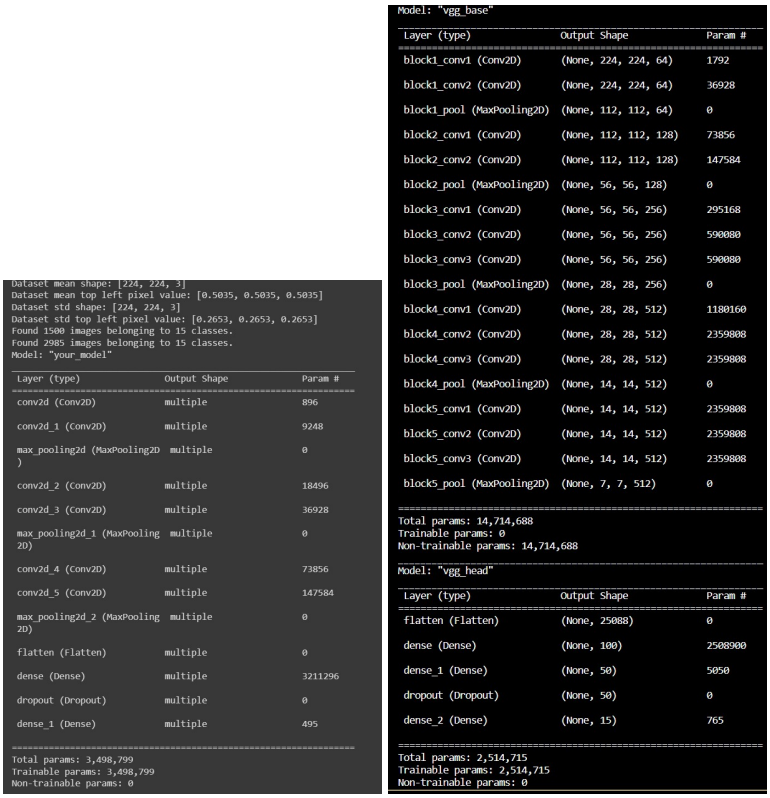

Figure 1: *Left:*My model summary. *Right:* VGG + my head model summary.

4. Vgg model + my head(Figure 5)

5. Lime(Figure 6). Top 5 superpixels are the ones that contribute the most to classifying the given image as coast. The coast has ocean and sand. Top 5 superpiexles resemble ocean and sand, which led to false classification.

6. Lime2(Figure 7). This given image is a coast. It's misclassified as a highway. When we drive on highways, we usually see open sky and an edge of a road that separates a road from back scene.

My results are summarized in Table 1.

Preprocessing	Best Accu on val set(%)
Stand	40
Stand & Augment	66.3
Stand & Augment & Reg	66.4
vgg + my head	86

Table 1:

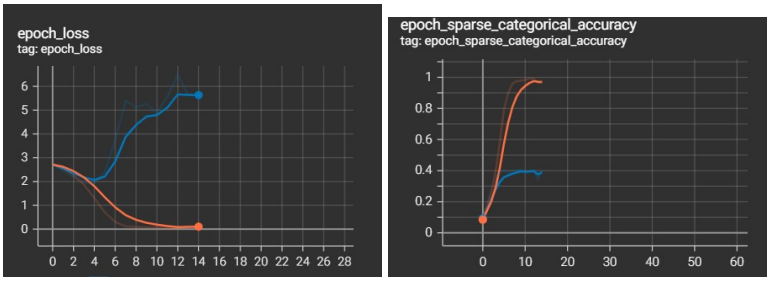

Figure 2: *Left:* Losses on val data set. (Training: orange, Test: blue) *Right:* Accu on val data set.

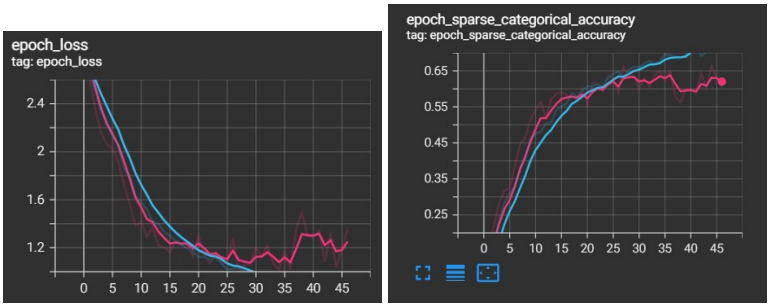

Figure 3: *Left:* Losses on val data set (Training: blue, Test: red). *Right:* Accu on val data set.

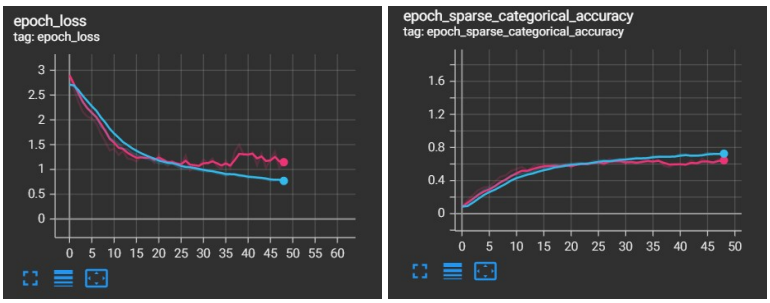

Figure 4: *Left:* Losses on val data set (Training: blue, Test: red). *Right:* Accu on val data set.

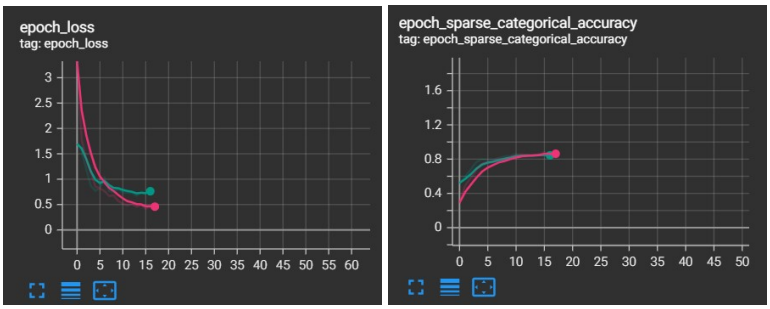

Figure 5: *Left:* Losses on val data set (Training: red, Test: green). *Right:* Accu on val data set.

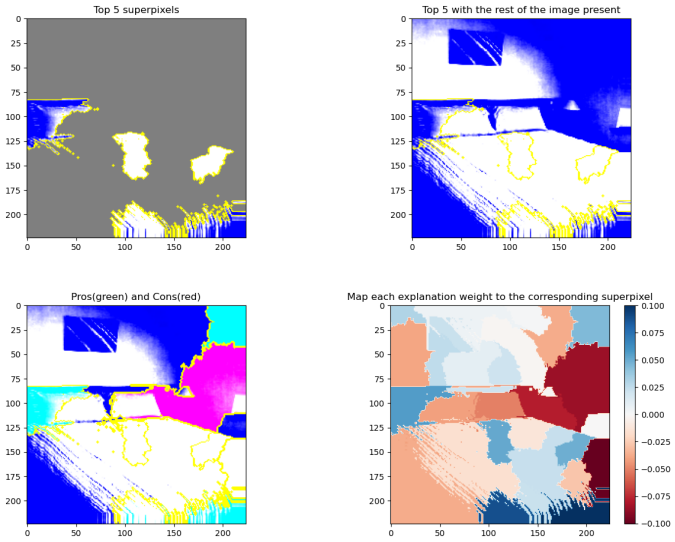

Figure 6:

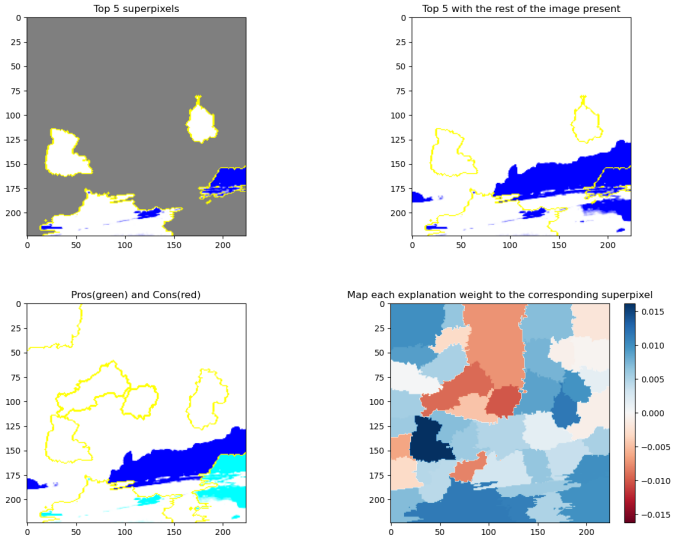

Figure 7: