Machine Learning Engineer Nanodegree

AWS Capstone Proposal

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1. Domain Background:

The mainfull area of this project is Computer Vision. For Machine Learning Engineers this is a very important area, and commonly used in daily real projects, so it is a good choice to demonstrate the abilities learned during this Nanodegree.

2. Problem statement:

In a distribution center, all the objects are managed by robots, these robots are responsible to take every object into bins. How can we count how many objects there are in each bin?. The objects can be countered by a system in order to get an inventory. This involves knowing how to classify the object's amount by using Computer Vision techniques.

3. Dataset Inputs:

For this project, The Amazon Bin Image Dataset is going to be used. This dataset contains almost

500000 images and metadata from bins of Amazon Fullfillment Center. In this case I will only use a subset of it.

4. Solution:

Train a Convolutional Neural Network in order to get a model that classifies the images into the classes corresponding to the number of objects these have. A pretrained model is going to be used for this proposal.

5. Benchmark Model:

Maybe any simple CNN could be used for solve this problem, but in this case as it is mentioned before, resnet18 is going to be the base of this benchmark model I will train, this kind of model are already tested, so a transfer learning is required, and this option is more efficient, because we only have to train the model in the new classes then compare it with the proposed model.

6. Evaluation metrics:

Accuracy is one of the most important evaluation metrics, this represents the percentage of correct predictions of the model:

$$Accuracy = (Correct\ Predictions)/(\ total\ predictions)$$

By having the confusion matrix, it could being explained as:

$$Accuracy = (TP + TN)/(TP + TN + FP + FN)$$

7. Project design:

I am going to use the AWS SageMaker environment for training and deploying the solution.

7.1 Data:

I am going to recover the dataset from the source of AWS. I will split the dataset into train, eval and test. then I am going to upload them into S3; to prepare the data, I am going to resize each image to the same size and apply some transformation.

7.2 Model training:

I will train the benchmark model by using the splitted dataset. After that I will train a convolutional neural network by using some pretrained model such as resnet50. Both of these steps are going to be developed by using Pytorch Framework.

7.3 Model evaluation and comparison:

I will evaluate the model in a test set and compare its performance with the benchmark model.

7.3 Model Deployment:

Once a model is ready, I will deploy it into a Sagemaker endpoint and make predictions of sample images.