Robotic Inference Project

Balaveera Thatikonda

Abstract—Achieved the required accuracy for the supplied images captured over the conveyor belt by using the AlexNet neural network. Produced meaningful results for the chosen Robotic Inference idea of classifying three classes of objects(Kitchen Items, Foot wear, Toys) using the AlexNet neural network.

Index Terms—Robot, AlexNet, Udacity, Inference, deep learning.

1 Introduction

TRYING to build a model to recognize the real world objects. Using DIGITS workspace trained a model to recognize written numbers. Here built two models, one to recognize the moving objects on the conveyor belt and other to recognize the objects in the real world objects in a typical home which is the inference idea. This inference idea stemmed out of the need to organize the objects in home, where a considerable amount of time is spent daily to organize the things like the Kitchen items after cooking, organize the toys after the kids play and organize the foot wear left at the entrance once entered into home. Basically want to build a model for "Robotic Maid". Based on the previous experiences in the Follow Me project and the exercises to recognize the written numbers, built inference model using the AlexNet with tuned hyper parameters.

2 Background / Formulation

For both the models, used the AlexNet with different set of parameters. Tuned the parameters based on the experience of the previous Follow Me Project and achieved required results with below parameter values.

TABLE 1
Supplied DataSet

Supplied DataSet of Images Parameters
Learning rate .001
Batch size of images : 64
Epochs : 20

Got an accuracy of 98 percent and predicted the 3 classes objects correctly with below parameters.

TABLE 2
Robotic Inference Project

Robotic Inference Project - Parameters
Epochs : 20
Batch size : 64
Learning rate : 0.005

3 Data Acquisition

For the first requirement of project to recognize the objects on the conveyor belt, used the provided images. For the second requirement of project to recognize the chosen inference idea, collected the images using a web cam through a python program to automatically label them. The images are with a size of 640px height and 480px width in RGB color. Captured around 30 images for each object with a total of 300 images for each class (classes:Kitchen items, Foot wear, toys).

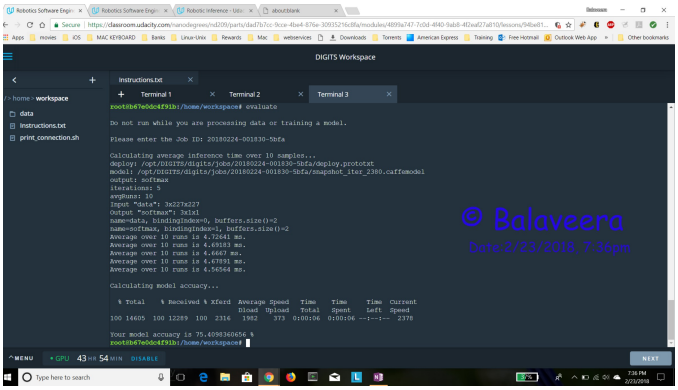
Refer below for the sample images from the inference project.

TABLE 3
Table

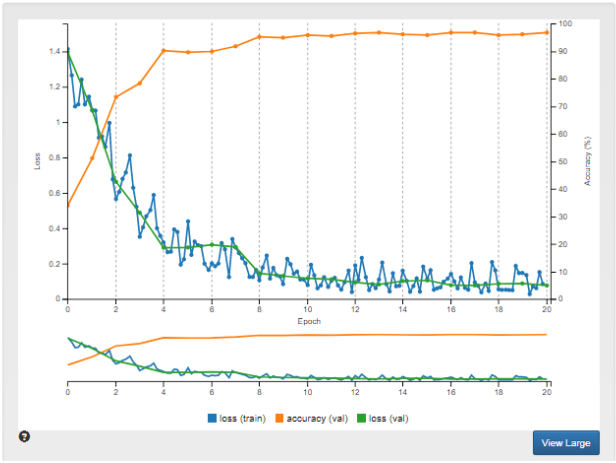
Kitchen Item		
Toy		
Foot wear		

4 Results

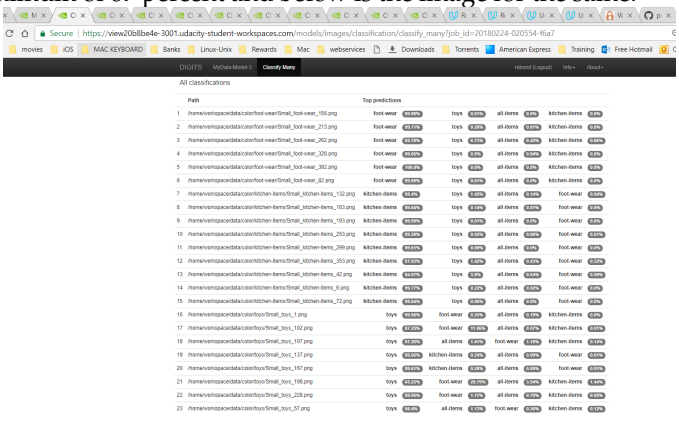
Achieved the results with the required accuracy. Below image is the results for the first requirement to achieve 75 percent accuracy and an inference time of less than 10 ms. Achieved the accuracy of 75 percent with an inference of 6ms Please refer to the below image



For the reference model, achieved a 90+ accuracy while training the model and below is the graph for the same.



The model was able to predict objects correctly with a minimum of 87 percent and below is the image for the same.



5 Discussion

For both the models, used the AlexNet with different set of parameters. Tuned the parameters based on the experience of the previous Follow Me Project.

6 Conclusion / Future work

Achieved a good accuracy in one environment, in order to be commercially viable this has to train and test the model in different possible home environment. In future, train and test the model in different home environments.