Project Title

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Abstract—In this paper is to attempt to use a neural network to classify rock paper scissors images to be used for playing with computer. Networks will be trained and tested using the NVIDIA DIGITS workspace.

Index Terms—Robot, IEEEtran, Udacity, LaTeX, deep learning.

1 Introduction

THE purpose of this project to create a image classifier which allow user to play rock paper scissors with computer. This solution can be used in a mobile app so user can play on the go. This will be a good use case to use AI in gaming.

2 Background / Formulation

Nvidia Digits work-space provide 3 Standard Networks namely LeNet, AlexNet and GooLeNet. You can define your own custom network by tweaking any above network. This project will be using GoogLeNet and AlexNet to train the network. The data-set has three different folders namely rock, paper and scissors. With image size 300x200. As the required image size is 256x256 and the provided image are not of that size, Squash Resize Transformation is used while creating the image data-set. For this project 15 percentage of data-set is kept for validation and 10 percentage data-set is kept for testing.

3 Data Acquisition

3.1 Supplied Dataset

The supplied dataset consists of photos taken from a Jetson mounted over a conveyor belt. There are three categories of photos: bottle (4568 images), candy box (2495 images), and nothing (3031 images).

3.2 rockpaperscissors Dataset

The data for this project is taken from kaggle dataset named rockpaperscissors. The data-set contains 712 images for paper, 726 images for rock and 750 images for scissors. The file contains the unprocessed images in .png format. Each image is 300 pixels wide by 200 pixels high.

4 Results

4.1 Supplied Dataset

With supplied dataset using GoogLeNet the accuracy of 75 percentage is achieved with as shown in the image below. Supplied dataset helped in understanding the Nvidia Digits works space. Using this as a foundation other datasets can be used for classification easily.

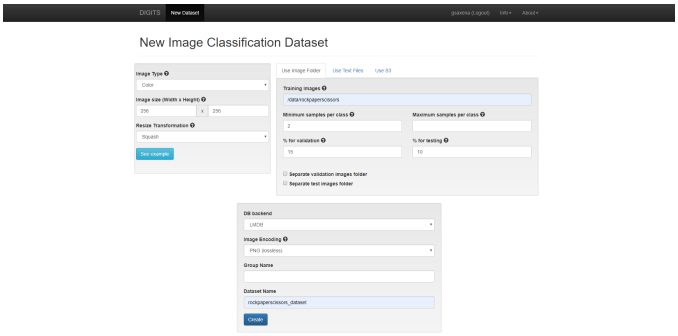

Fig. 1. Image Classification Dataset for rockpaperscissors.

4.2 rockpaperscissors Dataset

With rockpaperscissors dataset the accuracy of 99 percentage was achieved. With Test single images for rock, paper and scissor as shown below. After epoch 11 the accuracy reached 99 percentage and stays there moving forward. Also after 10 epoch the learning rate is reduced to .001 and after 19 epoch learning rate is reduced to .0001

5 Discussion

There was big improvement in obtained accuracy when comparing GoogLeNet network to AlexNet, however the required training time is longer in GoogLeNet and there is additional time when doing inference.

6 Conclusion / Future work

GoogLeNet accuracy is very good in compare to other networks such as LeNet and ALexNet however this comes with cost of longer time required in both training and inference. Accuracy can be improved by adding more data per class but this will require longer training time and more space to store the samples. Recently I have purchased Jetson Nano. Will implement this project on Jetson Nano platform to have a interactive version of rockpaperscissors.

References

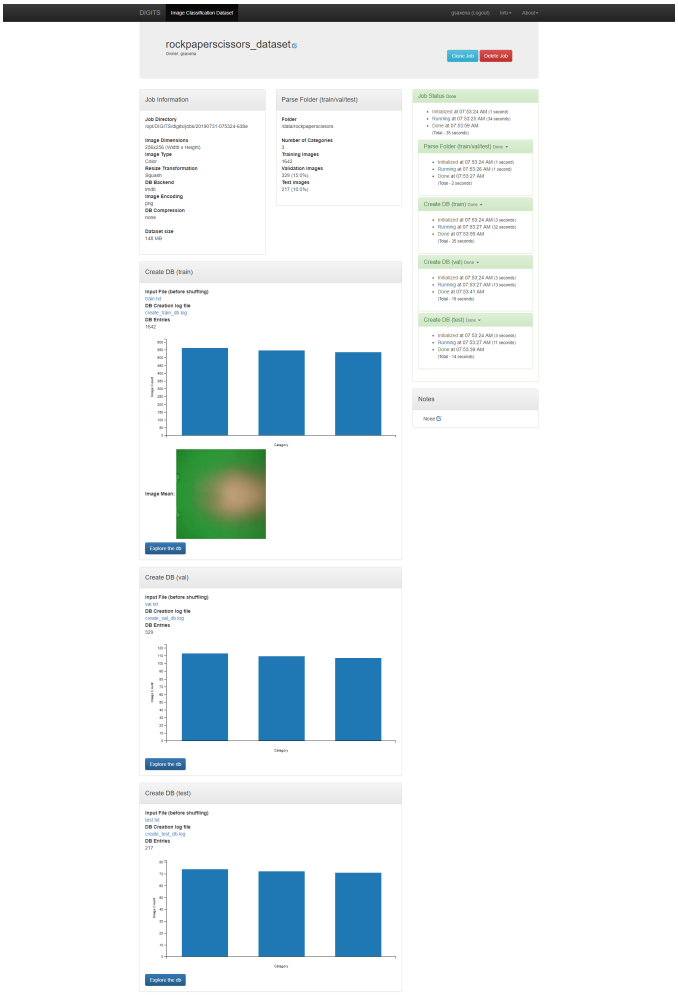

Fig. 2. Image Classification Dataset rockpaperscissors job complete.

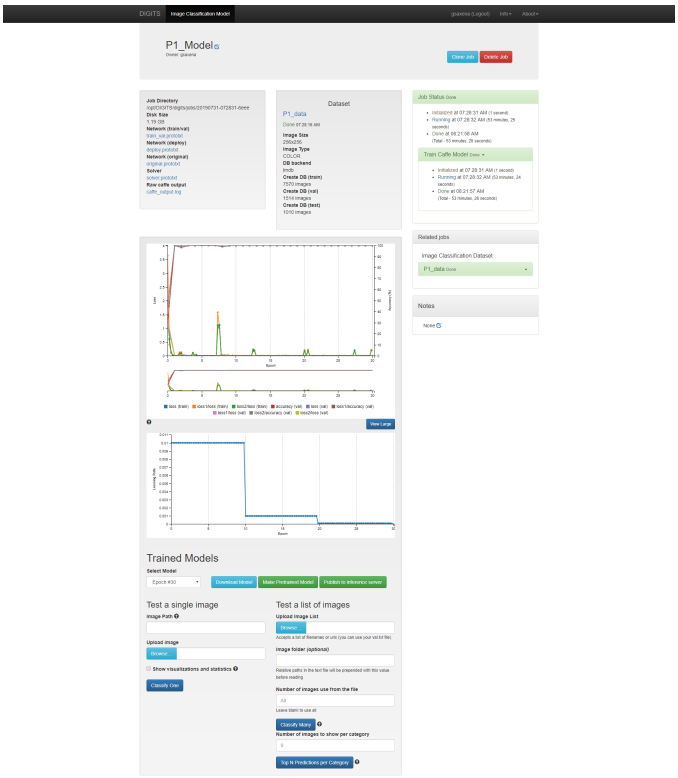

Fig. 3. P1_model result

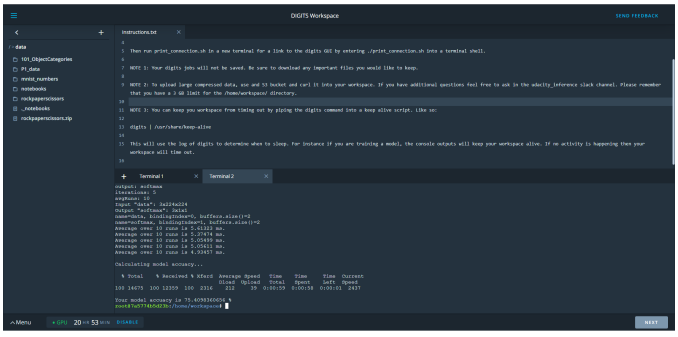

Fig. 4. P1_data evaluate

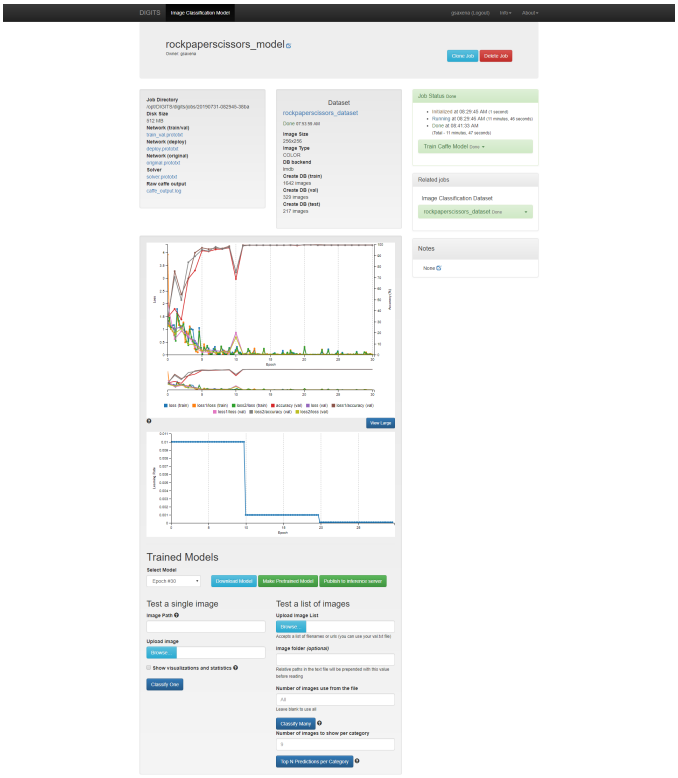

Fig. 5. Rockpaperscissors model

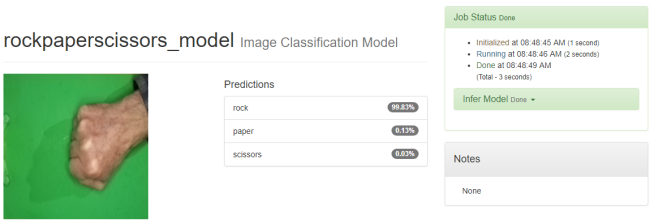

Fig. 6. rock test run

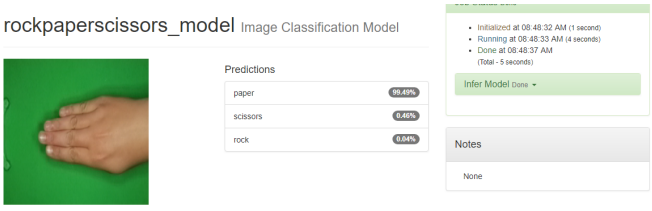

Fig. 7. paper test run

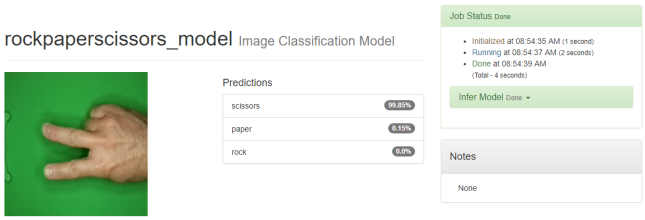

Fig. 8. scissor test run