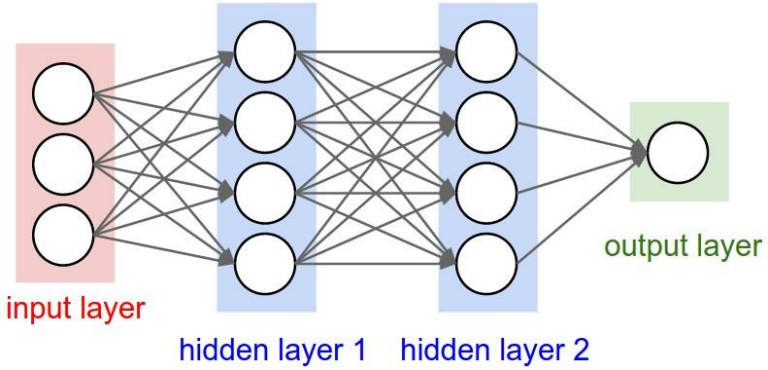
GW Data Science



Machine Learning

FINAL PROJECT

TEJASVI SHARMA

DEEPAK AGARWAL

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About Data

Data used in this project is hand gesture recognition data taken from Kaggle.

Hand gesture recognition database is presented, composed by a set of near infrared images acquired by the Leap Motion sensor.

The data is composed by 10 different hand-gestures that were performed by 10 different subjects (5 men and 5 women).

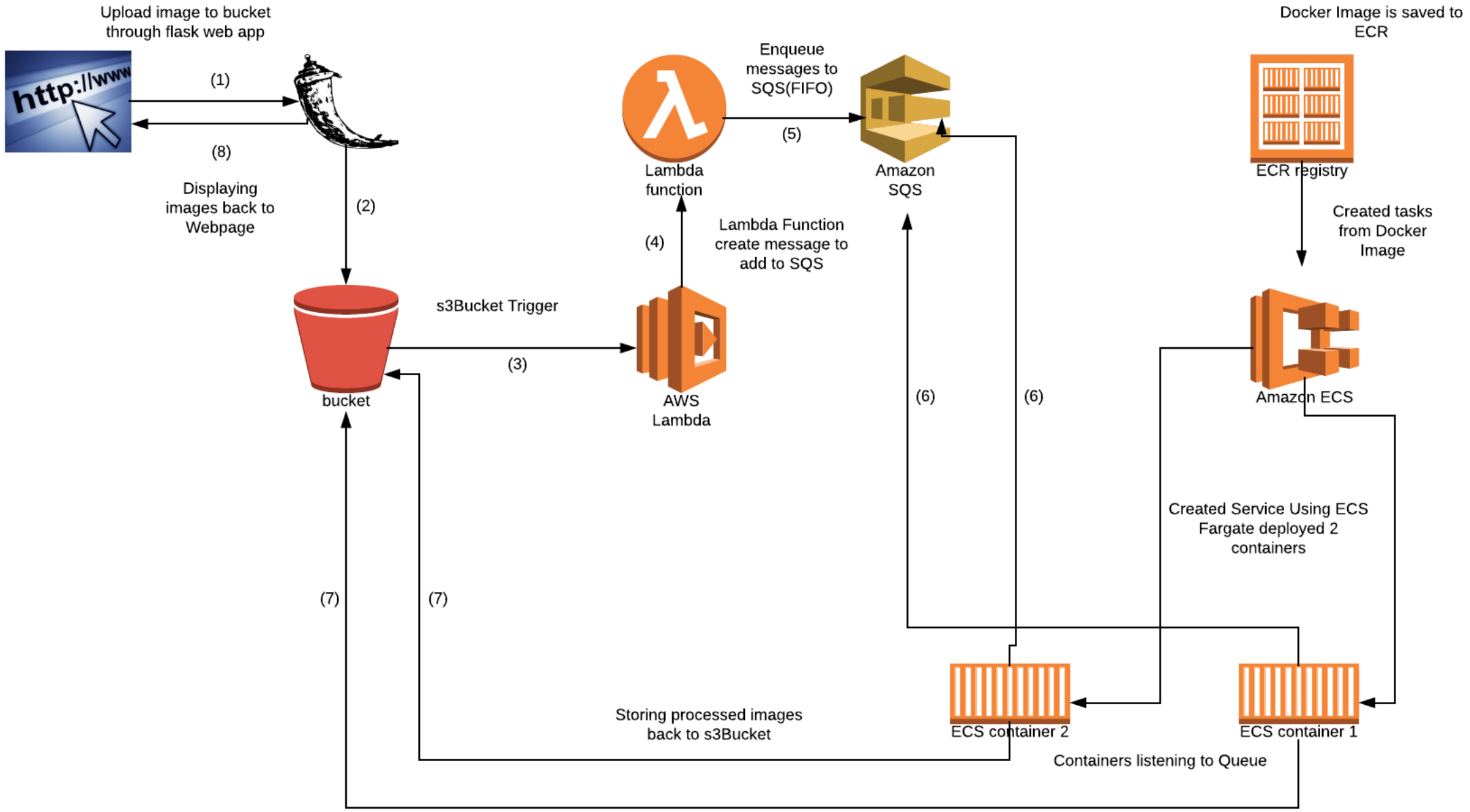
Gestures in data are- Palm, L shape, Fist, Fist moved, Thumb, Index, Ok, Palm moved, C shape, Hand down

Data Source : https://www.kaggle.com/benenharrington/hand-gesture-recognition-database-with-cnn/data

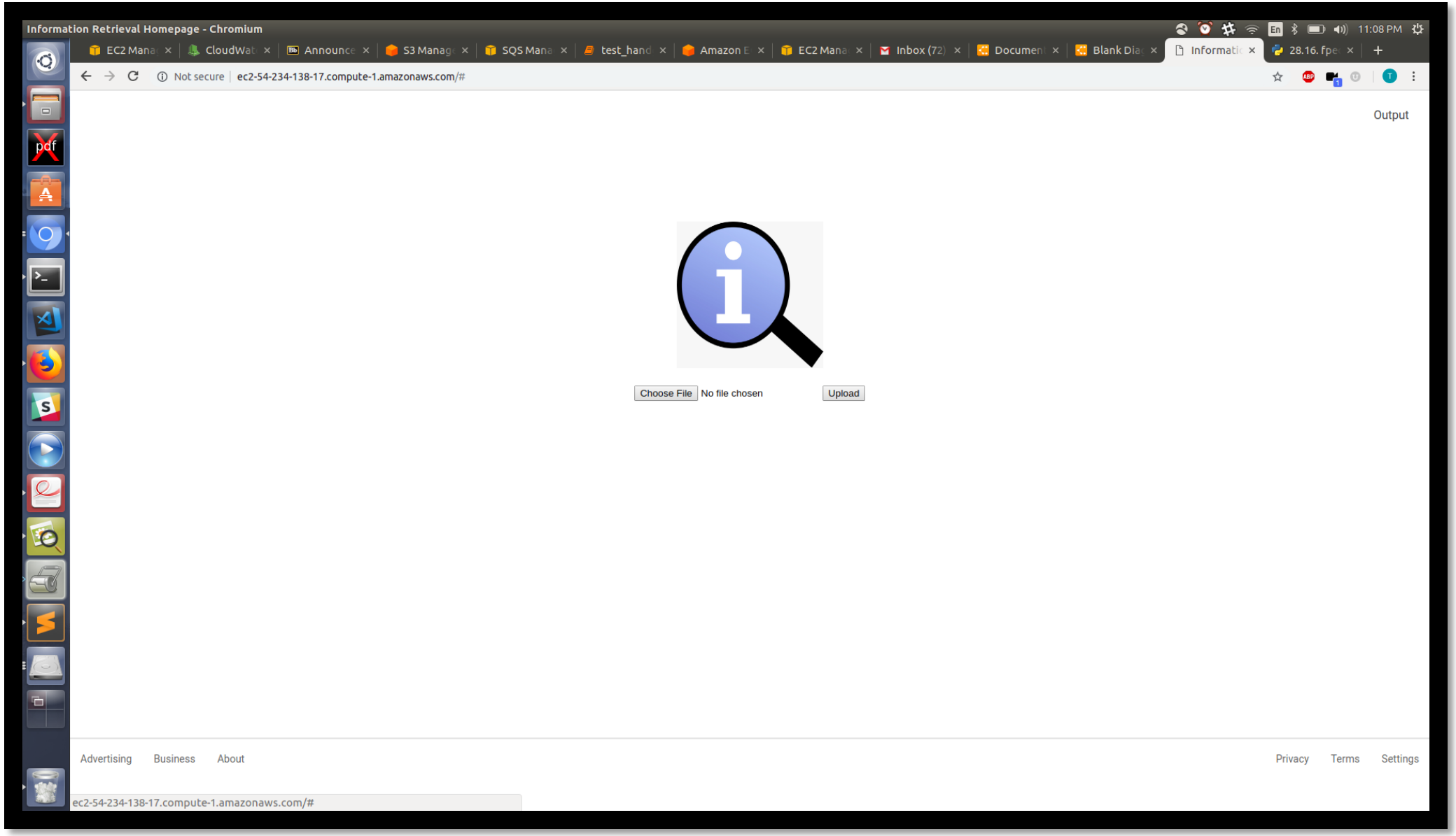
Problem Statement

The objective of our project is to develop a Neural Network, which will be trained on hand gesture data. Net should be able to predict unseen data with good accuracy. Trained model will then be deployed to amazon web services. AWS architecture will be paralleled, so that multiple images can be predicted simultaneously.

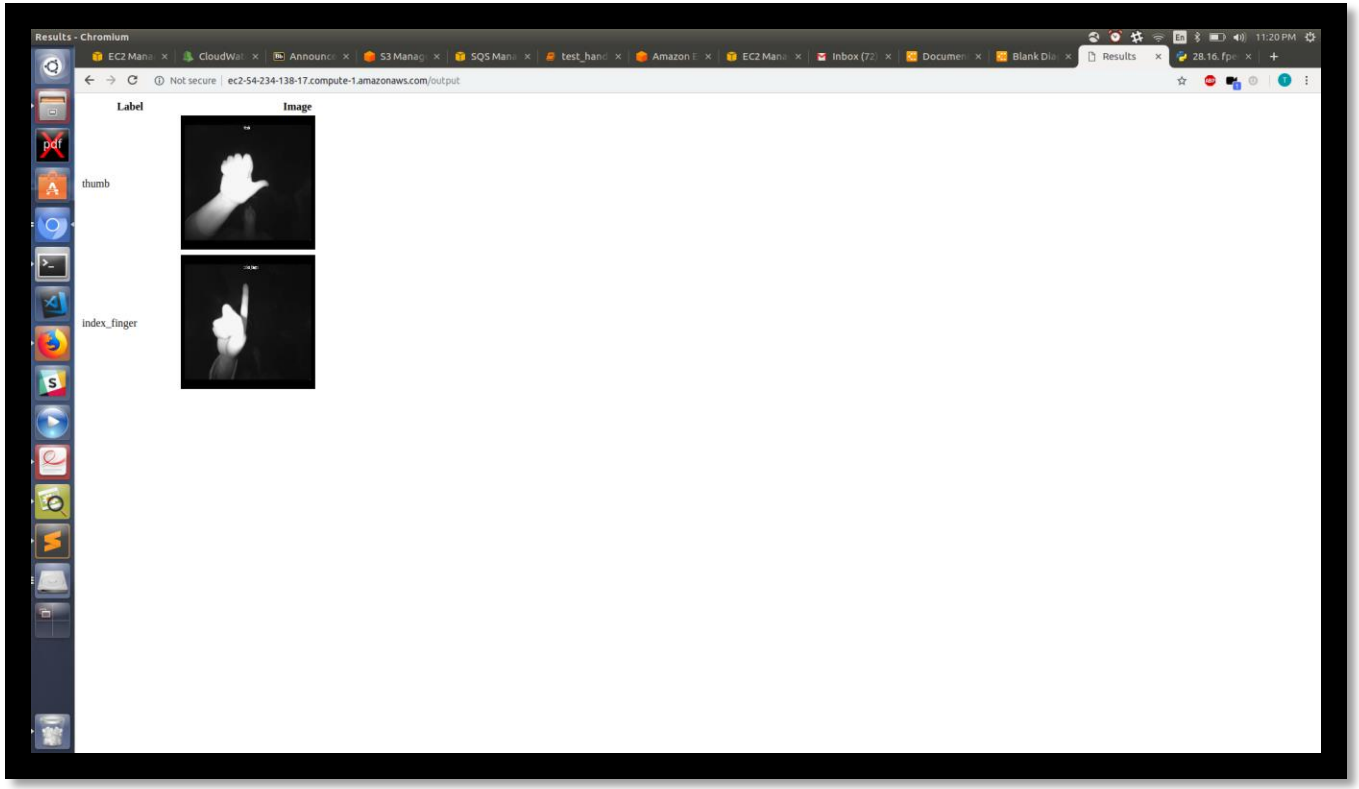
Cloud Backend Architecture



Flask Front End



Prediction Output

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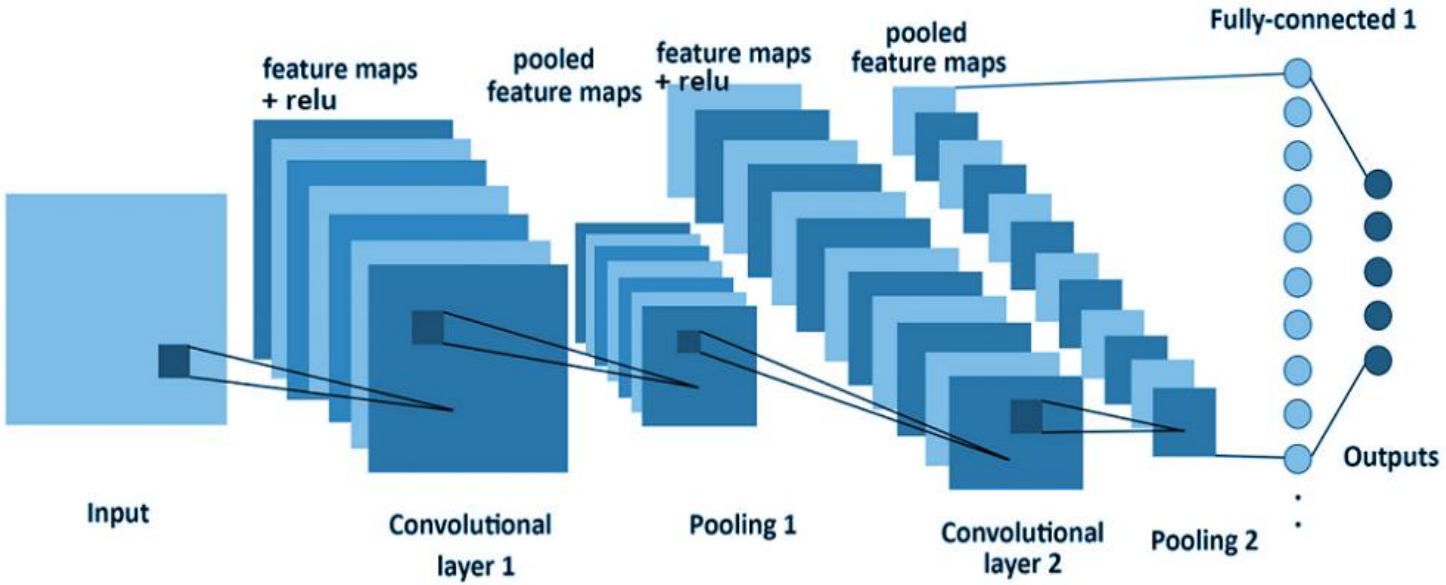
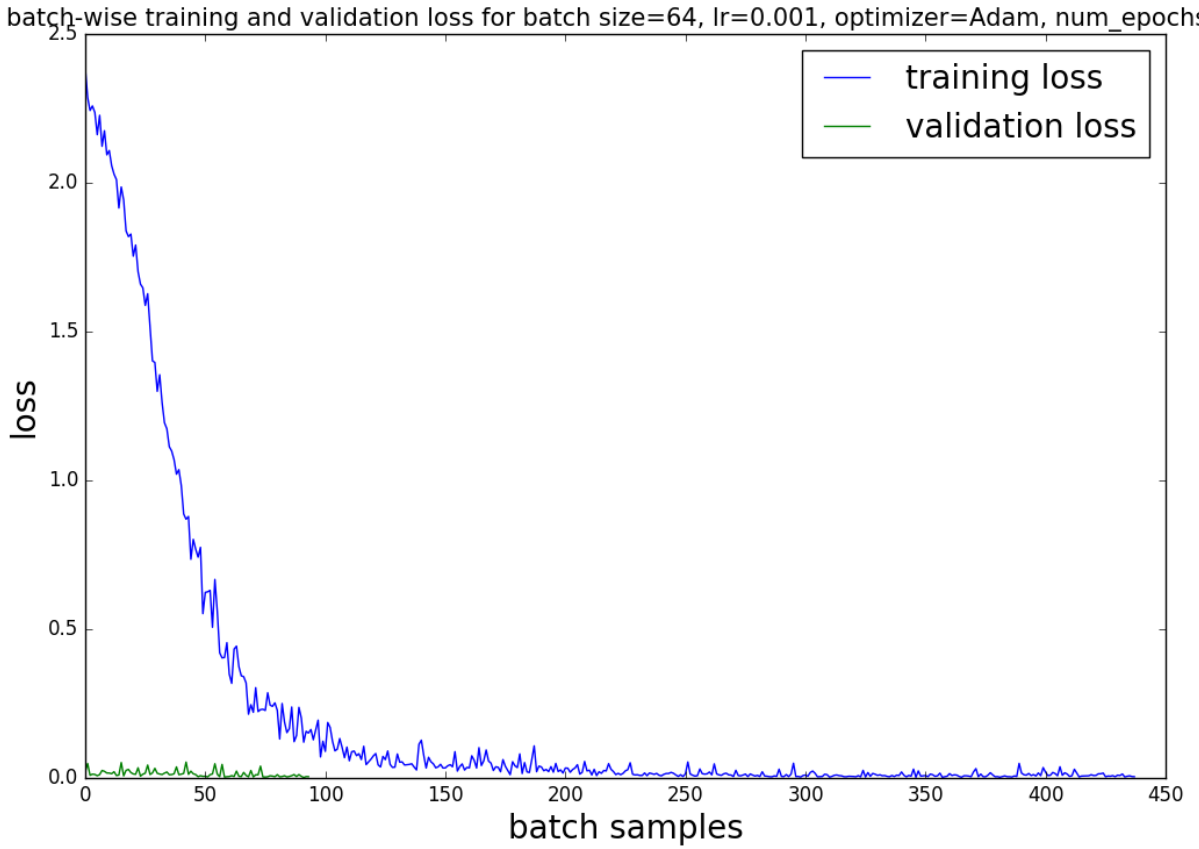
CNN Architecture



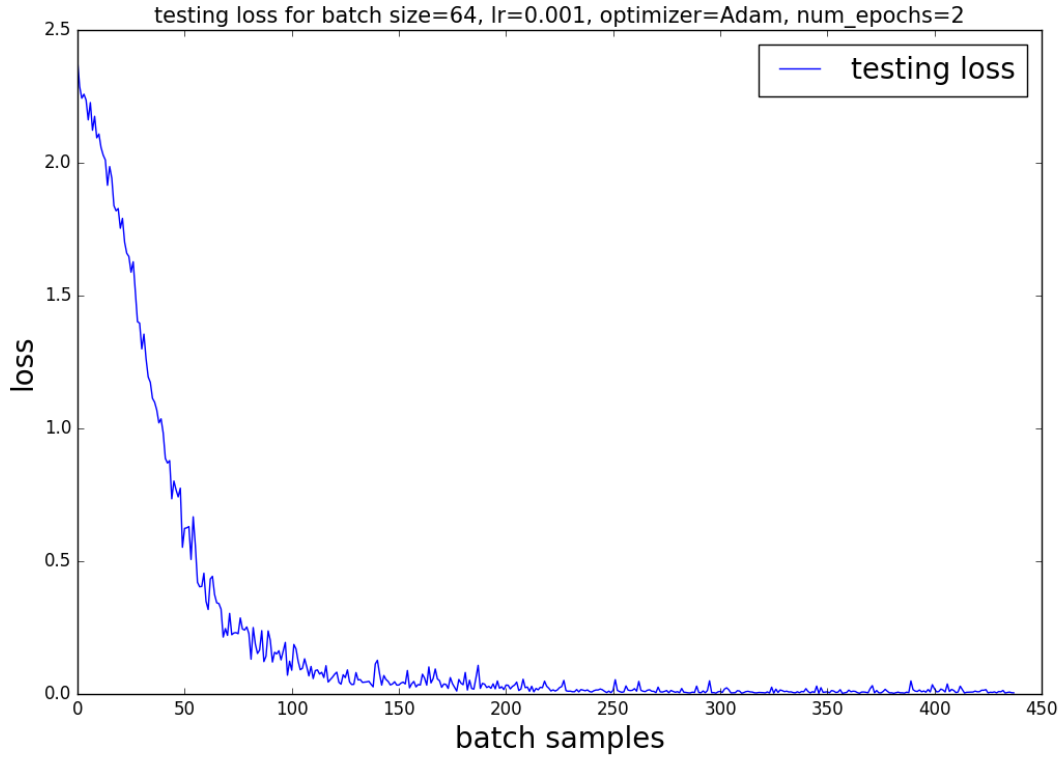
Comparing Batch Size, Optimizers, Learning Rate, Number of Epochs

batch_size	learning_rate	optimizer_method	num_epochs	time	accuracy
32	0.001	Adam	5	9.06	99.97
32	0.001	Adam	10	8.89	99.97
128	0.01	Adam	10	7.01	99.93
128	0.001	Adam	5	7.02	99.93
128	0.001	Adam	10	7.05	99.93
64	0.1	Adadelta	10	7.61	99.93
64	0.01	Adam	5	7.53	99.93
64	0.01	Adam	10	7.68	99.93
64	0.001	Adam	2	7.57	99.93
64	0.001	Adam	5	7.65	99.93

Training and Validation error graph

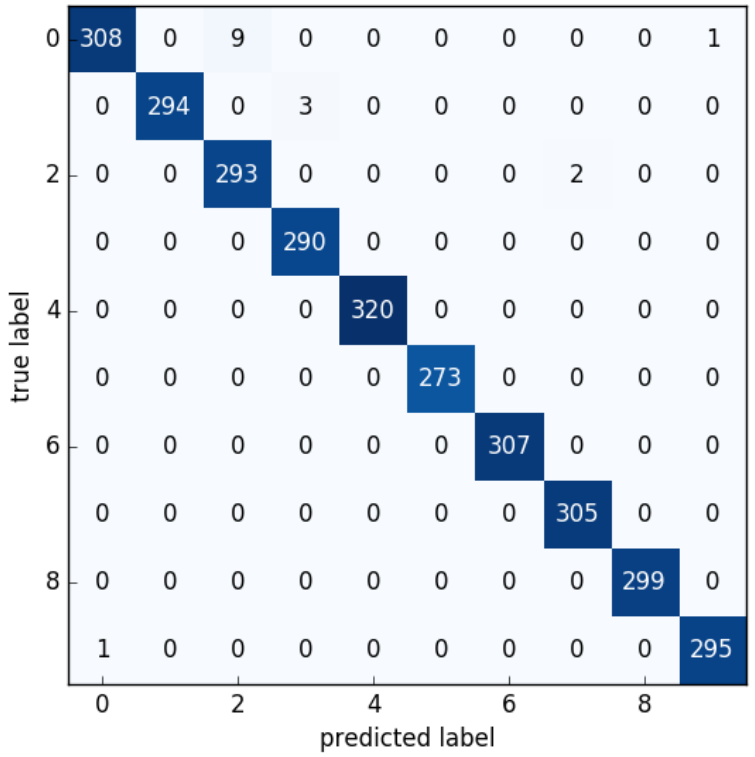


Testing Error graph



Accuracy, Confusion Matrix, F- Score

batch_size	learning_rate	optimizer_method	num_epochs	time	accuracy
64	0.001	Adam	2	7.26	99.47



L shape	1.00
fist_moved	0.99
palm	0.98
ok	1.00
thumb	0.99
fist	1.00
palm_moved	1.00
index_finger	1.00
C shape	1.00
down	0.98

01010100 01101000 01100001 01101110 01101011 00100000 01111001 01101111 01110101