ML Interim Project Report

Group-32

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Introduction

Problem Statement

- Classify Chest X-Ray Scans into classes whether the diagnosed individual has Pneumonia or not.

Motivation

- Pneumonia is the leading cause of death among the children under age of 5. We hope to make the diagnostic process quicker and more accurate, thereby making contribution in society.

- https://www.thoracic.org/patients/patient-resources/resources/top-pneumonia-facts.pdf

Related Works

Proposed Models

- CNN based methods
- CNN coupled with transfer learning
- SVM Classifier based method coupled with custom features such as HOG.

- https://arxiv.org/pdf/2004.06578.pdf
- https://arxiv.org/pdf/2006.04603v3.pdf
- https://arxiv.org/pdf/2006.13807v2.pdf

Dataset

Dataset

- For our problem, we choose O.C.T. dataset and Chest X-Ray Images, available under CC 4.0.
- For the Baseline model, images are mapped to their corresponding HOG features, with scaling to (128,64) .

Evaluation Metric

- Inherently the dataset is skewed towards Pneumonia class. So, to mitigate the issue, we used statistical measures such as F1 score, ROC-AUC to evaluate performance.
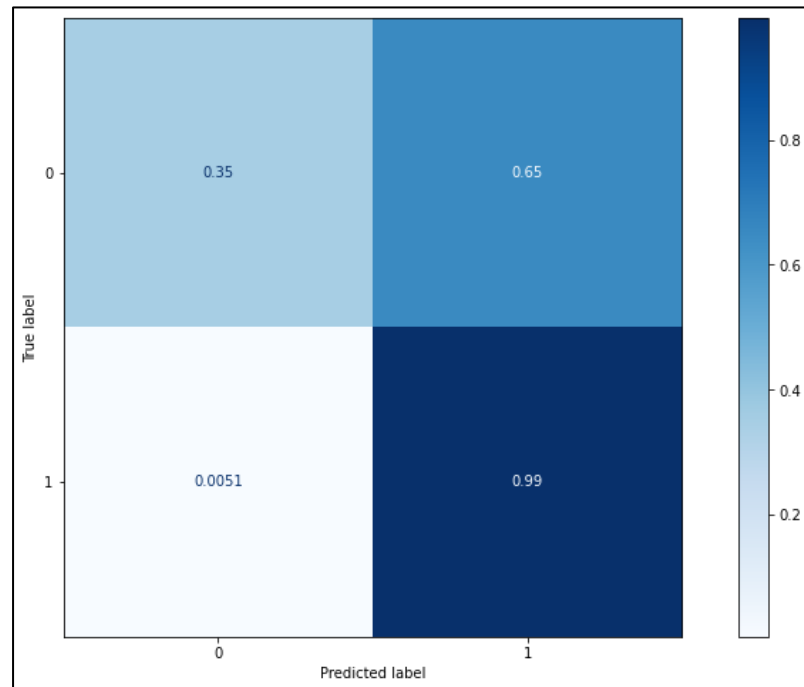
Progress

- Up Till now, we have completed the baseline implementation which is based HOG features coupled with S.V.M.

- Tuning of Hyperparameter of SVM classifier is done through Gridsearch with the fold of 3.

Results: <u>Baseline</u>

	precision	recall	f1-score	support
0	0.98	0.35	0.51	234
1	0.72	0.99	0.83	390
accuracy	-	-	0.75	624
macro avg	0.85	0.67	0.67	624
weighted avg	0.81	0.75	0.71	624

Next steps

- **CNN**
  - A custom cnn implementation, LeNet-5 based architecture for classification task.
  - **Lavanya**
- **CNN with transfer learning on models such VGG-16 and UNet**
  - Transfer Learning on VGG-16 Net.
  - **Aditya**
- **ANN Coupled with Extracted Features (HOG)**
  - ANN model with HoG, this is kept as HOG , SVM showed promising performance.
  - **Prabhat**