Face Verification Challenge

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Overview of the algorithm

- Data collection and preprocessing
- Feature extraction
- Classification model trained
- Hyper-parameter Optimization
- Predictions on the test set

Data collection and preprocessing steps

- Data - Frontal Faces, varied illumination, emotions, background, occlusion, etc
- Datasets - Caltech, UFI, AT&T, Yalefaces
- Conversion of RGB datasets to grayscale
- Face segmentation - frontal face cascade
- Preprocessing - Image normalization
- Experimentation with other techniques - Clahe (Contrast Limited Adaptive Histogram equalisation)
- Preprocessing technique was selected based on the final F1 score

Feature Extraction/ Feature Selection

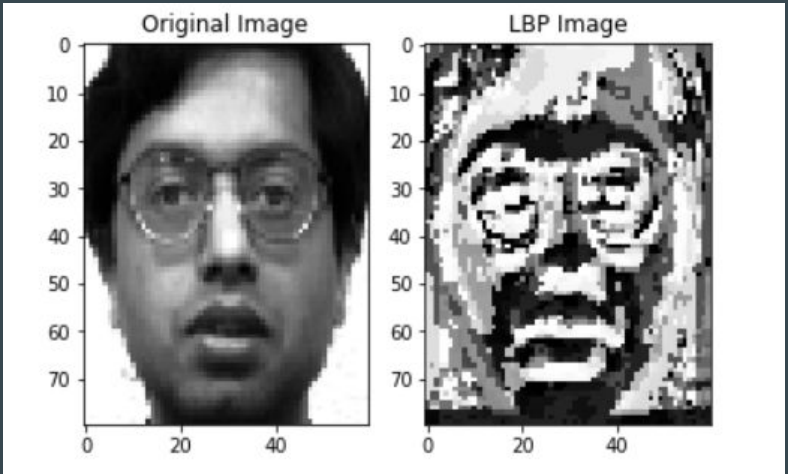
- Frontal face (cropped images) were used to extract features
- LBPH for feature extraction - gave best F1 score for the classifier
- Experimented with HOG, KAZE (like SIFT and SURF), Thresholding
- Feature space dimensionality reduction using PCA (explaining 99% variance in the Data)

Training details

- Selected Random Forest as classifier (experimented with SVC, XGBoost)
- Training employed selecting partial sets of data from the 4 datasets
- Experimented with down-sampling the incorrect combinations to tackle class imbalance
- Train test split to gauge model accuracy, F1 score
- Grid-search to optimize classifier hyperparameters

Results

- Image of the preprocessed data



Results

- Classification Report

	precision	recall	f1-score	support
0	0.98	1.00	0.99	6392
1	0.99	0.51	0.67	278
micro avg	0.98	0.98	0.98	6670
macro avg	0.99	0.75	0.83	6670
weighted avg	0.98	0.98	0.98	6670

Results

- ROC Curve, Precision-Recall Curve