

Indian Institute of Technology Delhi



**EEL709 Pattern Recognition
Course Project**

on

**A Comparative Study of Machine
Learning Approaches for Face
Detection**

Presented by -

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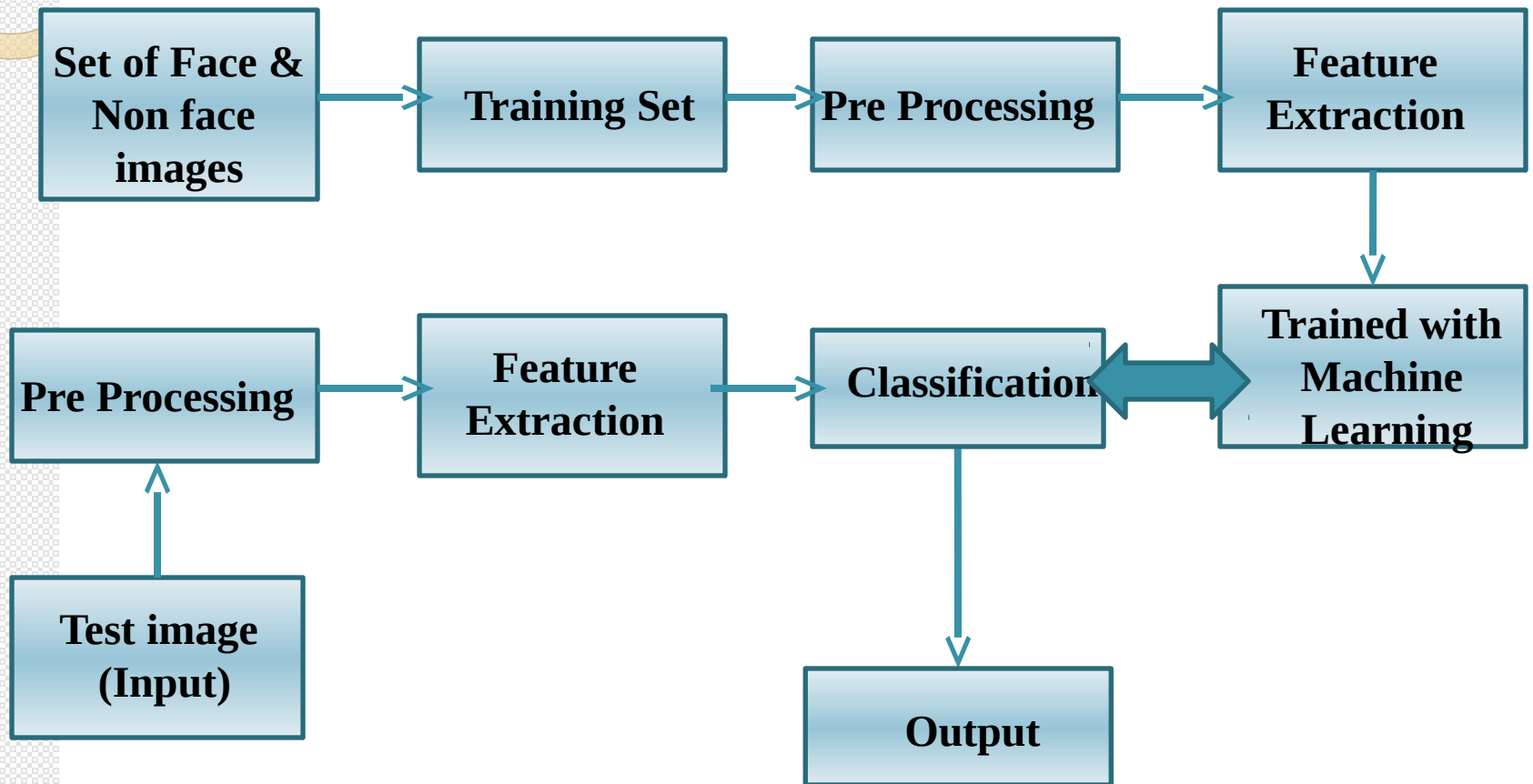
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Objective

- To detect multiple faces in an image for tagging purpose.
- To compare multiple approaches for face detection.

Fundamentals of face detection system



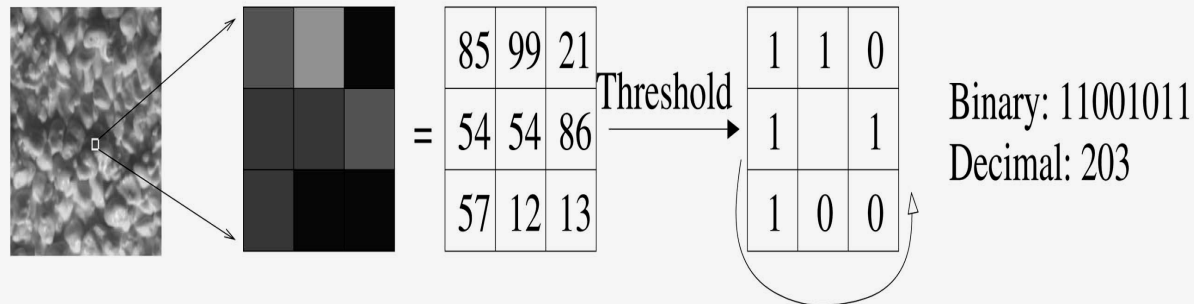


Dataset Specifications

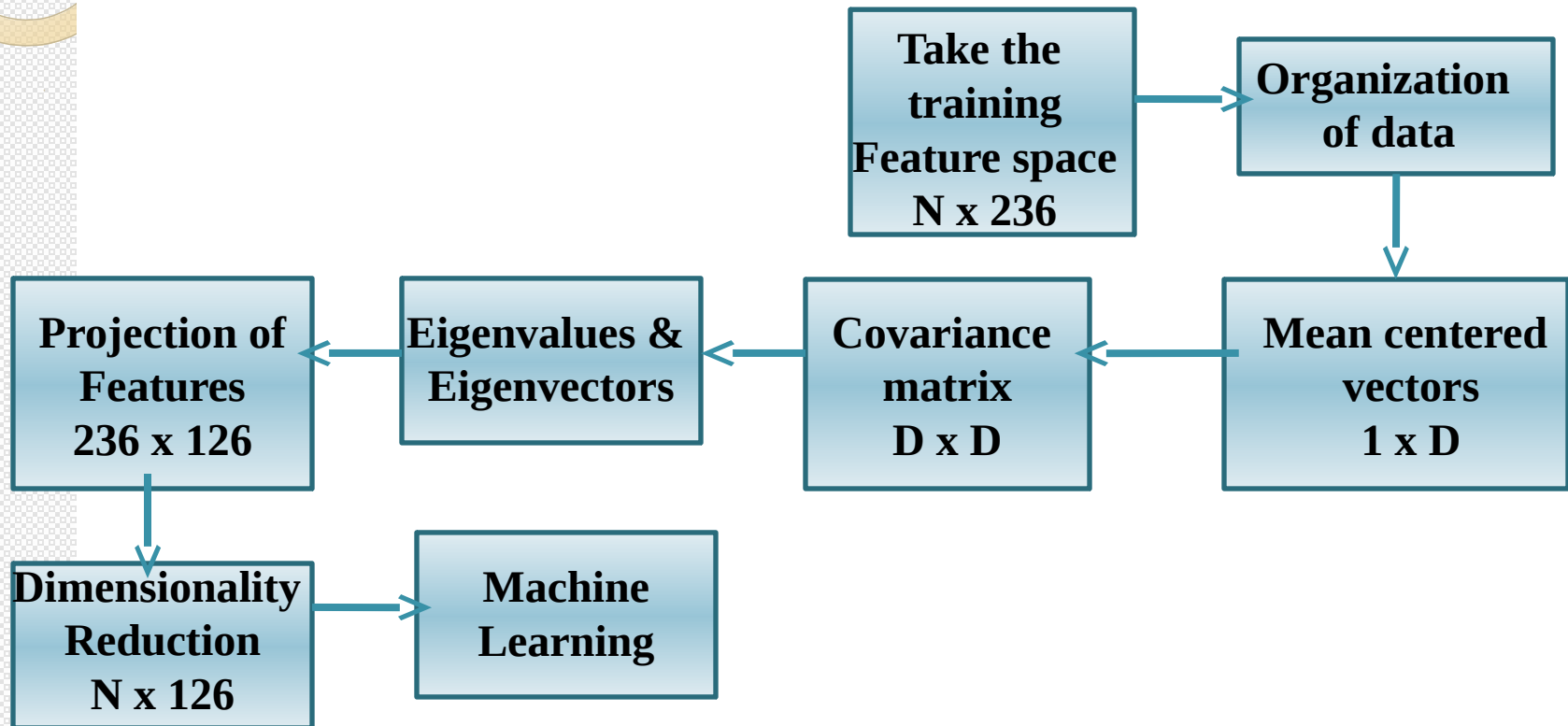
- Face dataset- Faces95 + some faces scanned from images generally available on the web.
- Non-face dataset - Some non-face images from Caltech101 + some non-faces scanned from images generally available on the web.

Feature Extraction - Linear Binary Pattern

- Divided the image into 4 subimages.
- An 8-bit binary pattern calculated for each pixel of image.
- Calculated the histogram of these patterns giving the LBP descriptor of $4 \times 256 = 1024$ dimensions
- For dimension reduction, took only the *uniform* binary patterns thus reducing the dimensions to $4 \times 59 = 236$
- 00000000 (0 transitions), 01110000 (2) and 11001111 (2) 11001001 (4 transitions) and 01010010 (6 transitions)



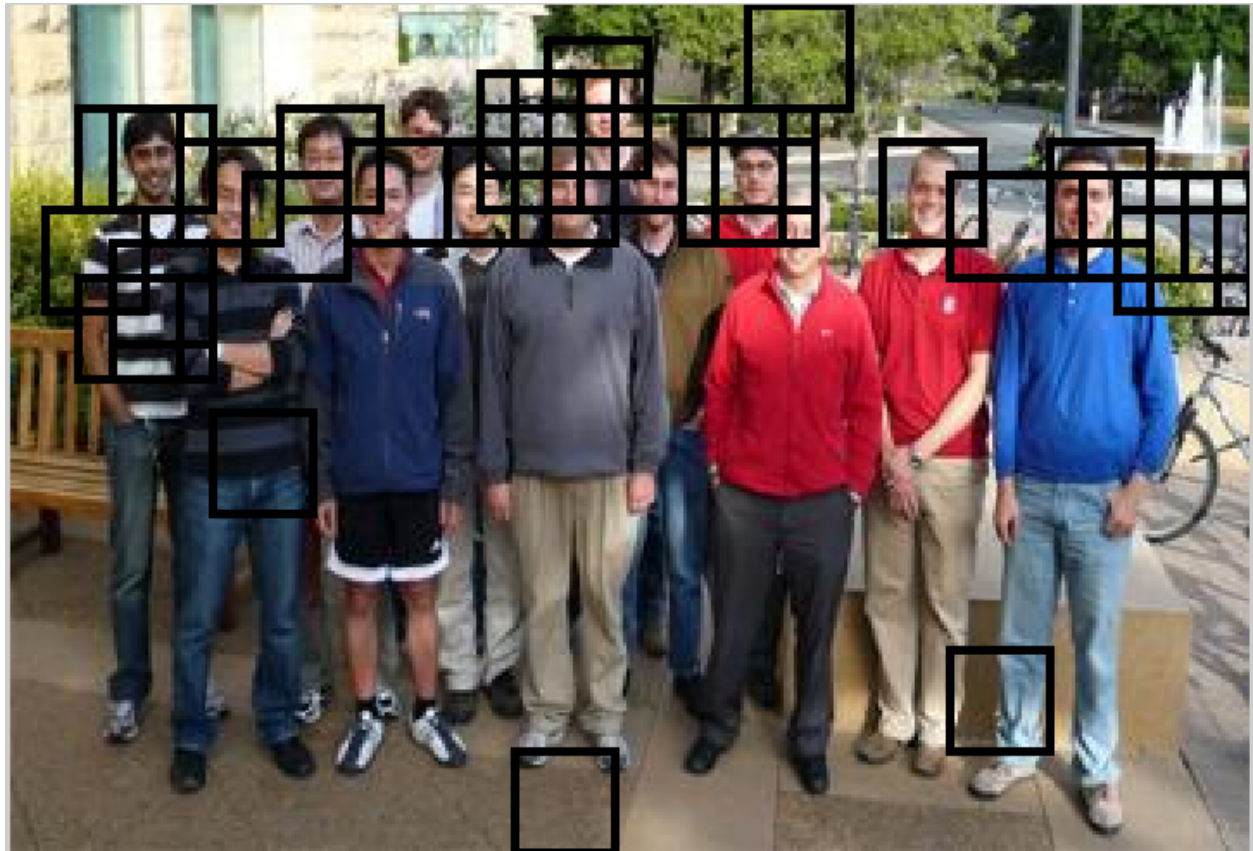
Dimensionality Reduction - Principal Component Analysis



Results – Efficiency on one face images

Method	Efficiency
Logistic Regression without PCA	Overparametrized
Logistic Regression with PCA	82%
SVM without PCA	83%
SVM with PCA	90%

Results - Logistic Regression with PCA

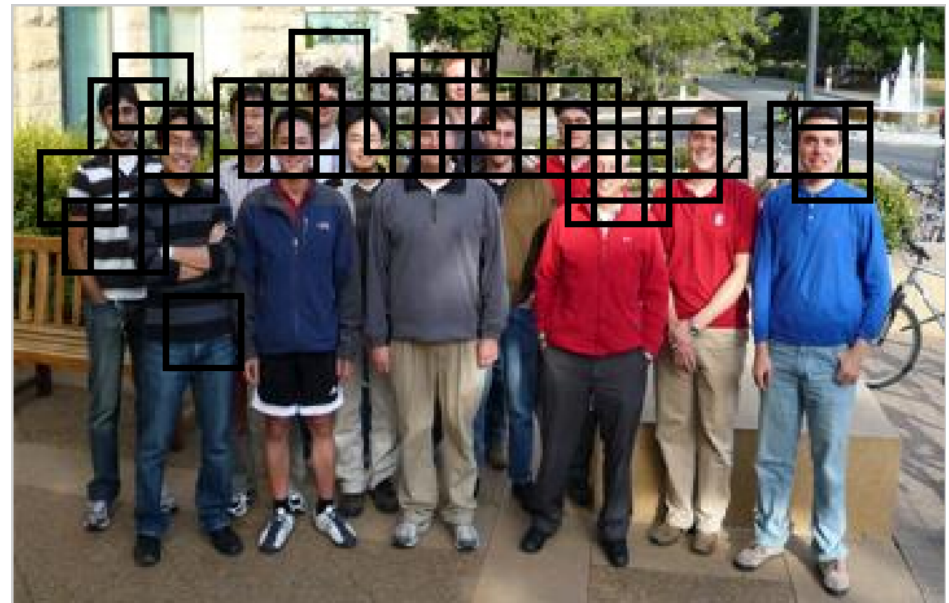


Results - SVM without PCA

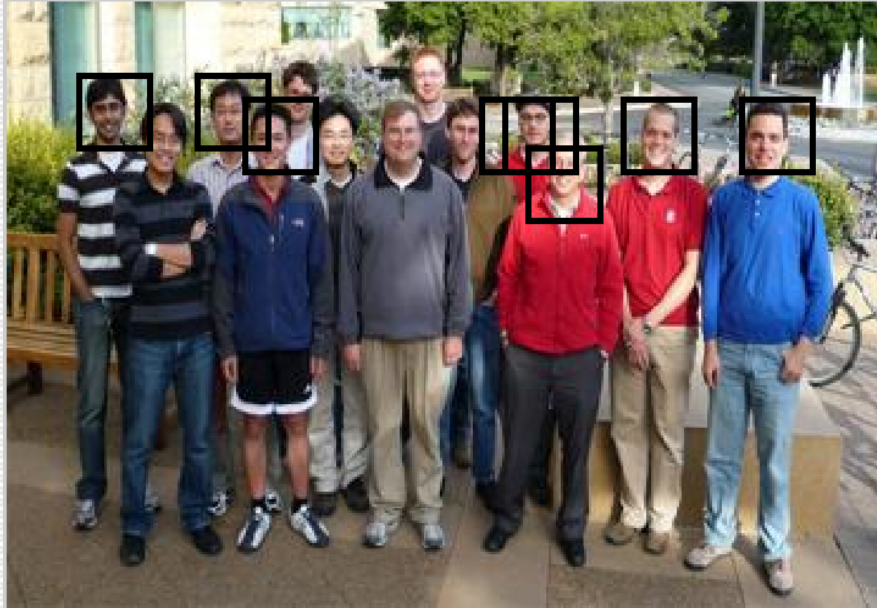


Radial Basis
Function with
 $\sigma = 6$

Radial Basis
Function with
 $\sigma = 9$

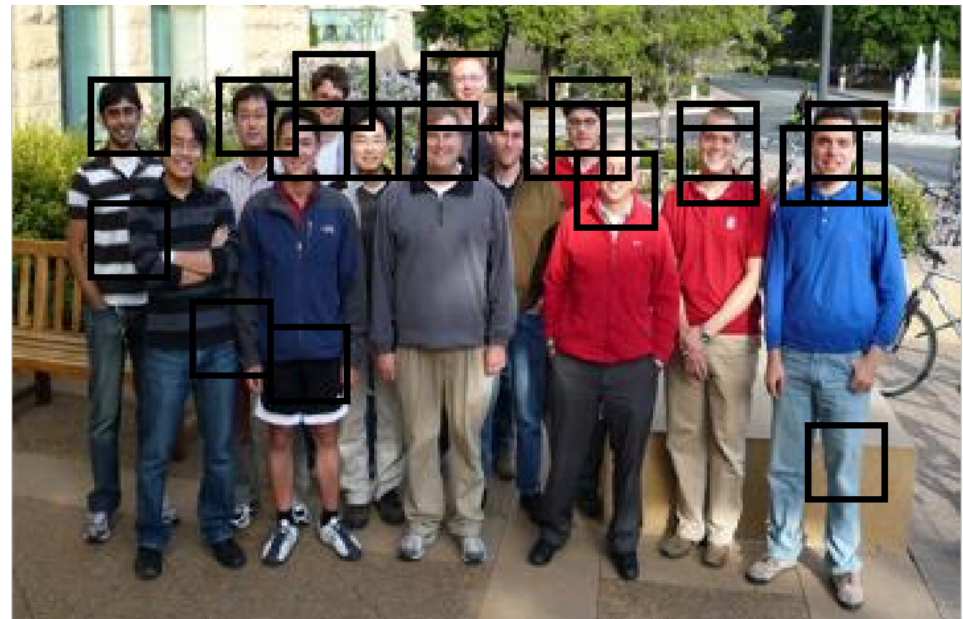


Results – SVM with PCA



Radial Basis
Function with
 $\sigma = 6$

Radial Basis
Function with
 $\sigma = 9$



Conclusion

- In our case, SVM (rbf) is better classifier than Logistic Regression
- Classification results depend on capturing environment
- Size of human face