



EMOTION DETECTION THROUGH FACIAL FEATURE RECOGNITION

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Professor:


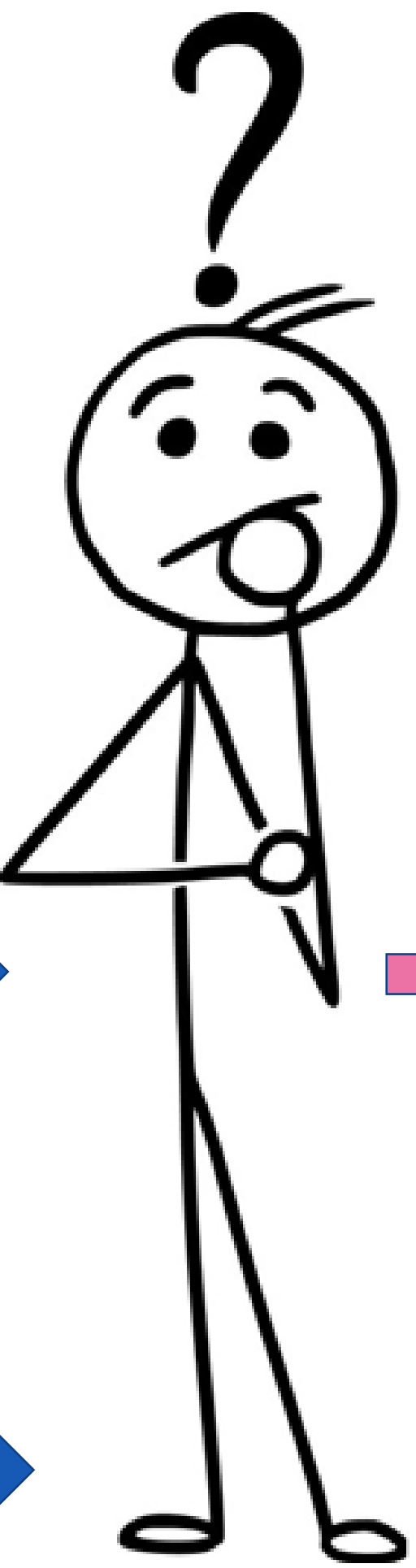



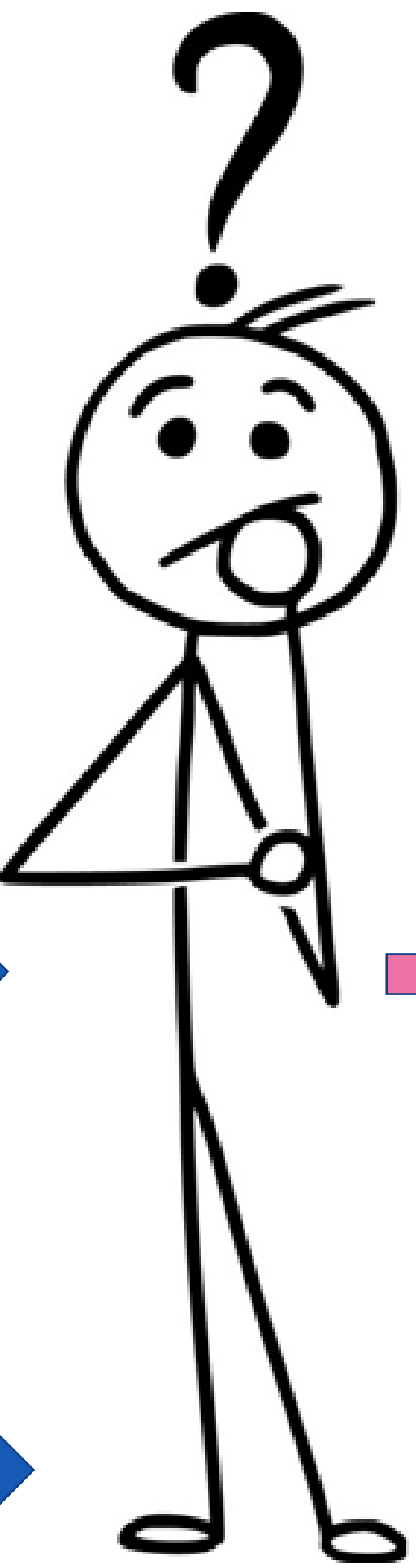



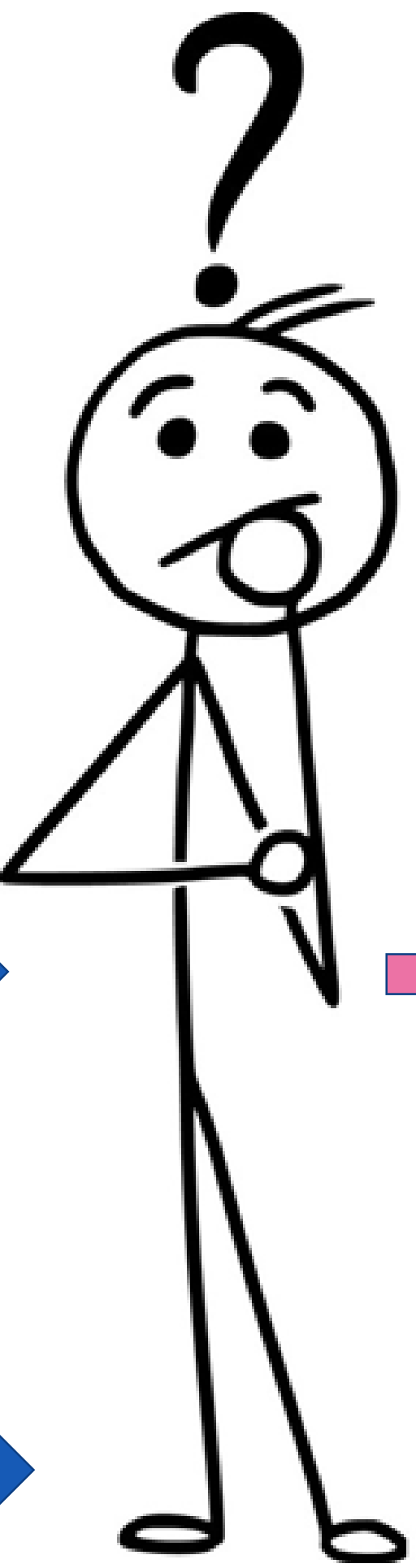

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Outline

- Introduction
- Implementation
- Results
- Conclusion

INTRODUCTION

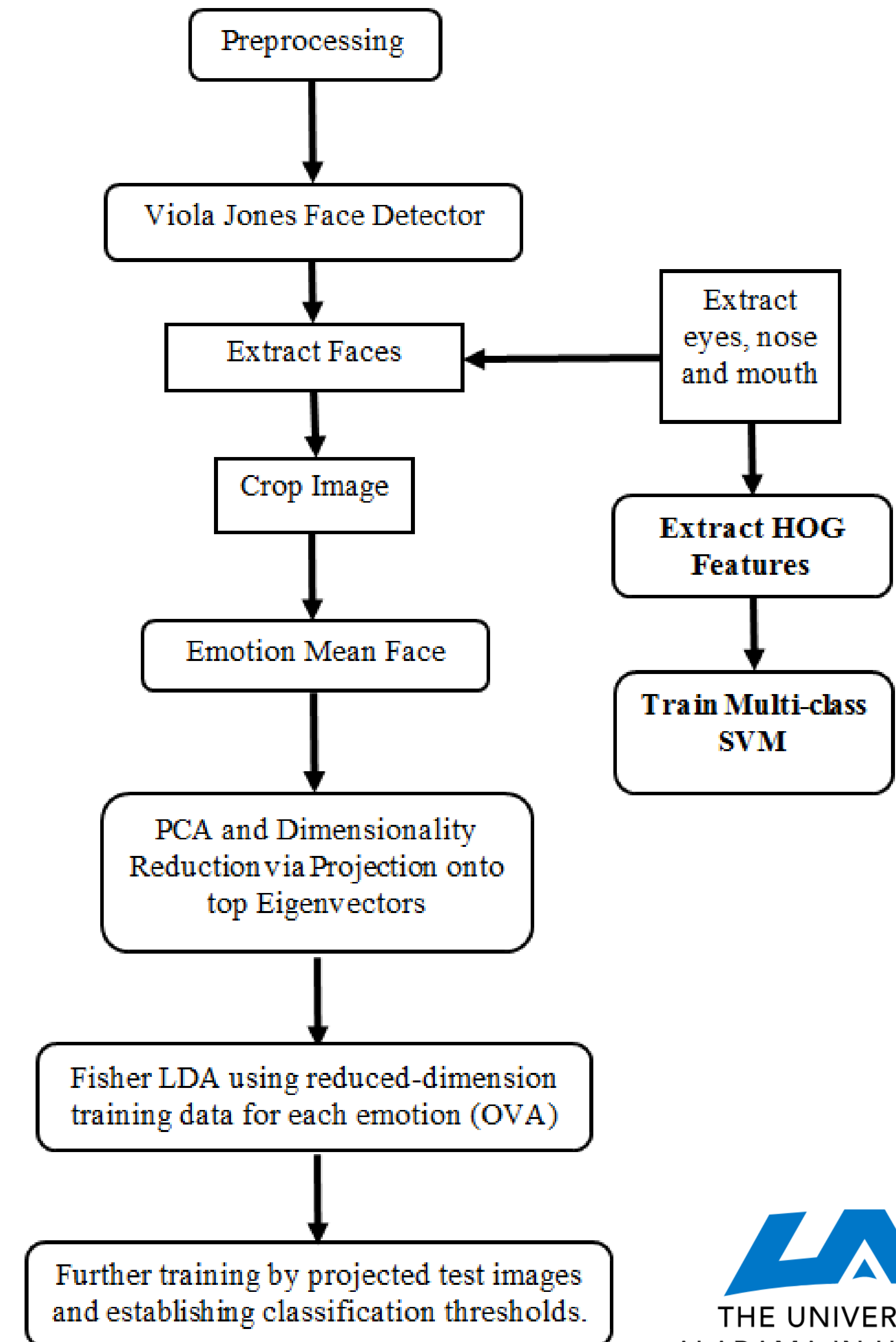
- Project 1:
PCA on detected images?    Eigenfaces!!

- Project 2:
LDA on detected images using Eigenfaces?    Fisherfaces!

- Project 3:
Fisherface + HOG + SVM    Predictor!!
- Classifier in addition to fisherface.
- Most expression information is encoded within the inner facial features.

IMPLEMENTATION

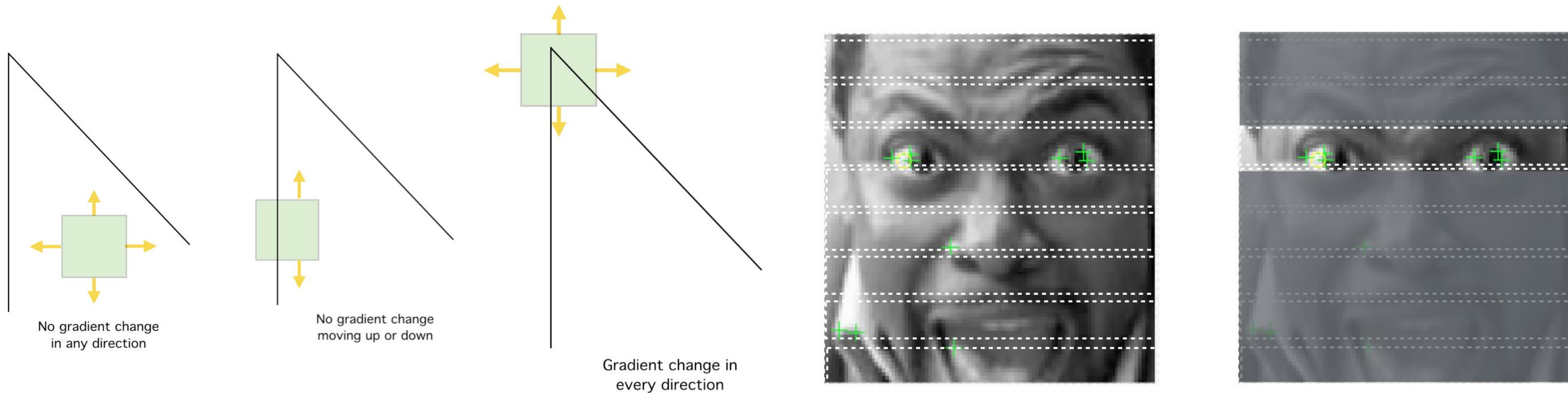
- Train a classifier based on the information encoded in the gradients.
- Extract eye and mouth using Haar-like features.
- Alternate approach: Harris corner detection.
- Successful extraction of eyes and mouth regions.
- HOG features are calculated.
- Image is separated into grids to calculate orientation of the gradient at (x, y) :

$$\theta_{x,y} = \tan^{-1} \frac{L(x, y+1) - L(x, y-1)}{L(x+1, y) - L(x-1, y)}$$

- Binned into a histogram to generate HOG descriptor vector.

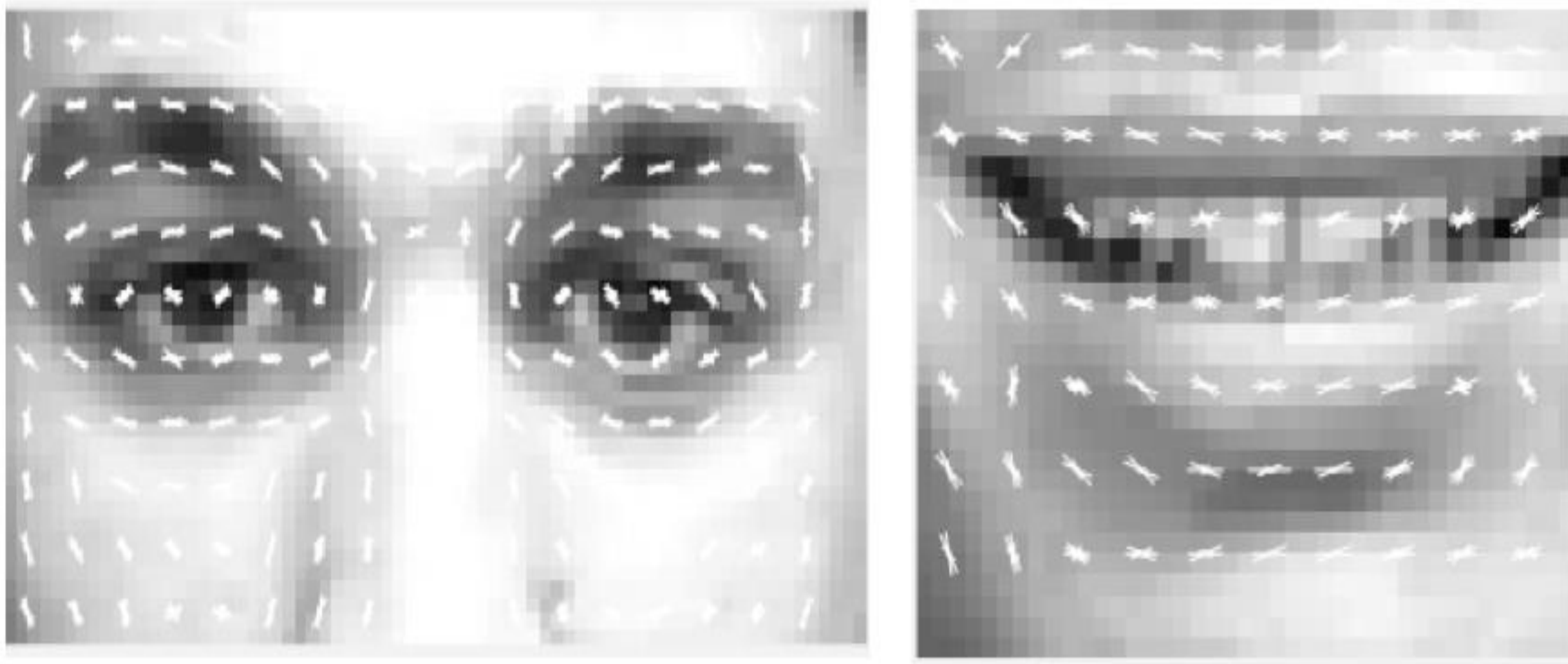


IMPLEMENTATION Cont'd



- Harris detection : seeks to find points that are corners (gradient change).
- Use sliding window to search for corner points.
- Eyes are very non-uniform.
- Strongest corners are in the eye region.
- The interval with the most harris corners detected “wins the vote”.

RESULTS

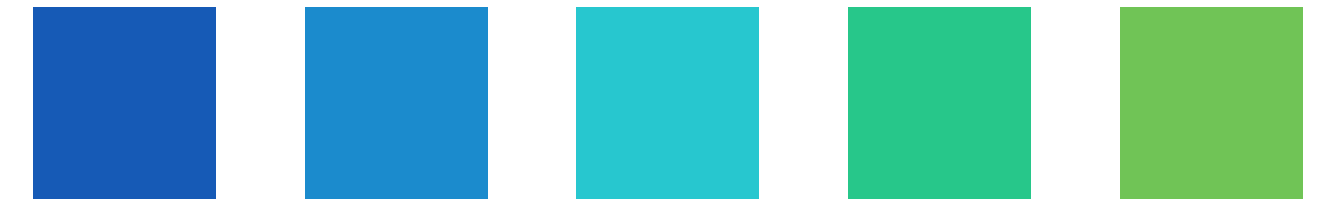


- Facial expressions with different muscular manipulations result in varying HOG features.
- Concatenate eye HOG vector and mouth HOG vector.
- Assign corresponding label.
- Train multi-class SVM using concatenated HOG vector.
- Improvement in speed and accuracy.

Algorithm	Accuracy
Fisherface only (Angry, Fear, Sad, Surprise, Happy)	90%
Fisherface only (All 7 emotions)	56%
HOG only (All 7 emotions)	81%
Fisherface + HOG (All 7 emotions)	81%

CONCLUSION

- An image processing and classification method has been implemented.
- Predicts the seven basic human emotions.
- Predictor is consistently poor at detecting the expression associated with contempt.
- Not successful at predicting emotions that do not clearly belong to one of these seven expressions.



Thank You!

Any questions?

