Shot Detection
Face Detection+Tracking
Gender Classification

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Introduction

Why we choose this topic:

We picked this project because we want to explore more on Object Detection. Face Detection is the one of the hardest topic in this field which fits our passion.

Presentation Outline:

Shot Detection:

- Approaches: SAD/SSD and HIST
- Result and Evaluation

Face Detection and Tracking:

- SVM and Training Data
- HoG Detector
- Evaluation

Gender Classification:

- HoG Feature + SVM
- Evaluation

Shot Detection:

Approach1: SAD/SSD - Sum of Absolute Distance

$$Similarity = \frac{\sum_x \sum_y [F_1(x,y) \cdot F_2(x,y)]}{||F_1|| ||F_2||}$$

$$changingRate = (1 - Similarity) \times 100\%$$

Shot Detection:

Approach1: SAD/SSD - Sum of Absolute Distance

−

> 10%

shot!

Shot Detection:

Approach2: HIST -Histogram Differences

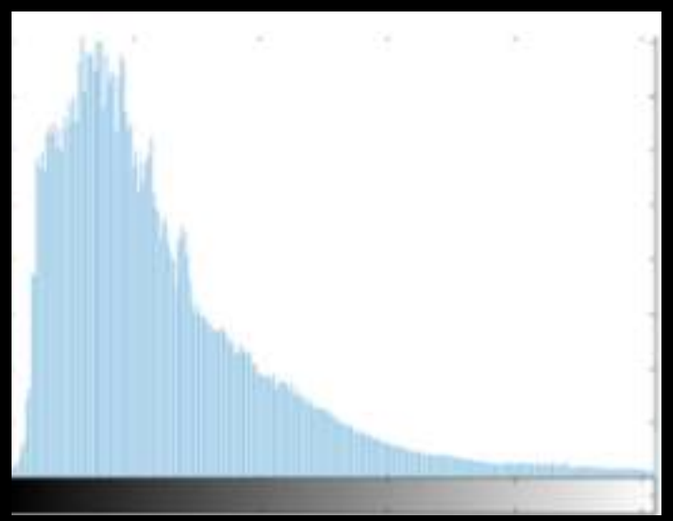
$$Similarity = \frac{\sum_x [h_1(x) \cdot h_2(x)]}{||h_1|| ||h_2||}$$

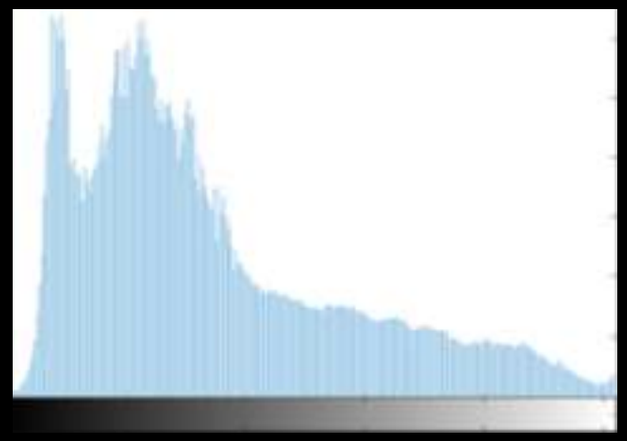
$$changingRate = (1 - Similarity) \times 100\%$$

Shot Detection:

Approach2: HIST -Histogram Differences

shot!

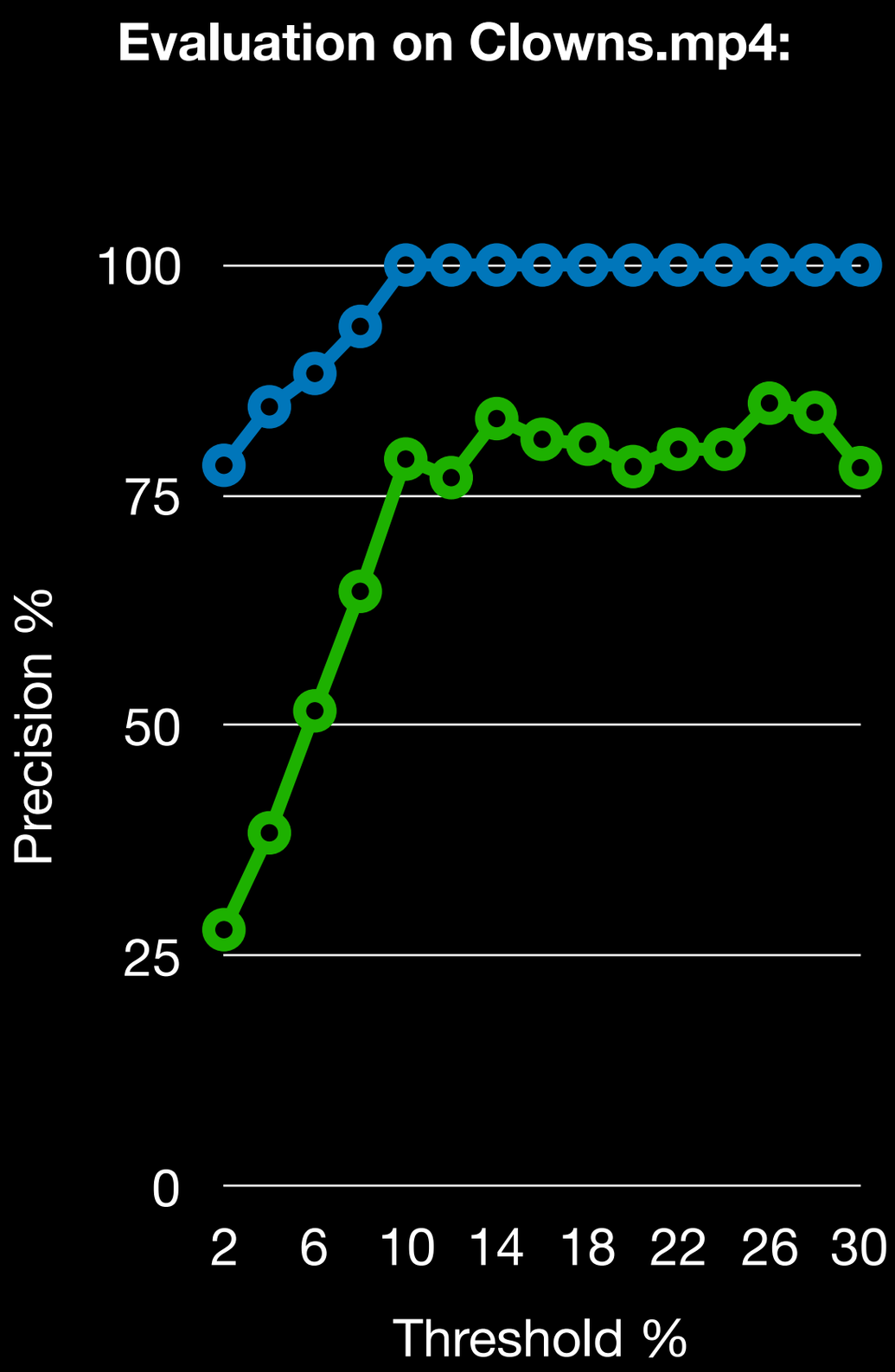


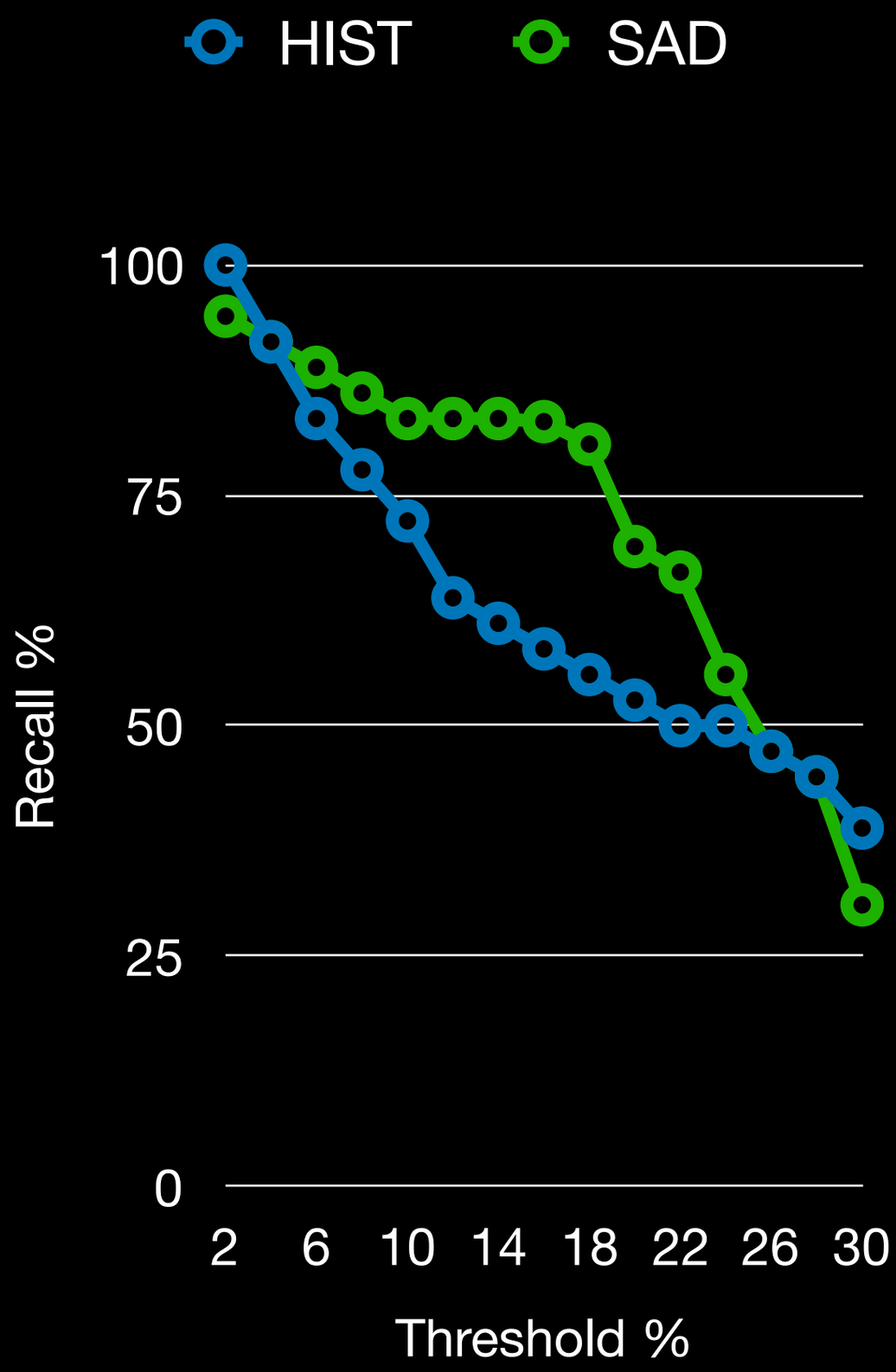


>10%

Shot Detection:

Evaluation on Clowns.mp4:





Shot Detection:

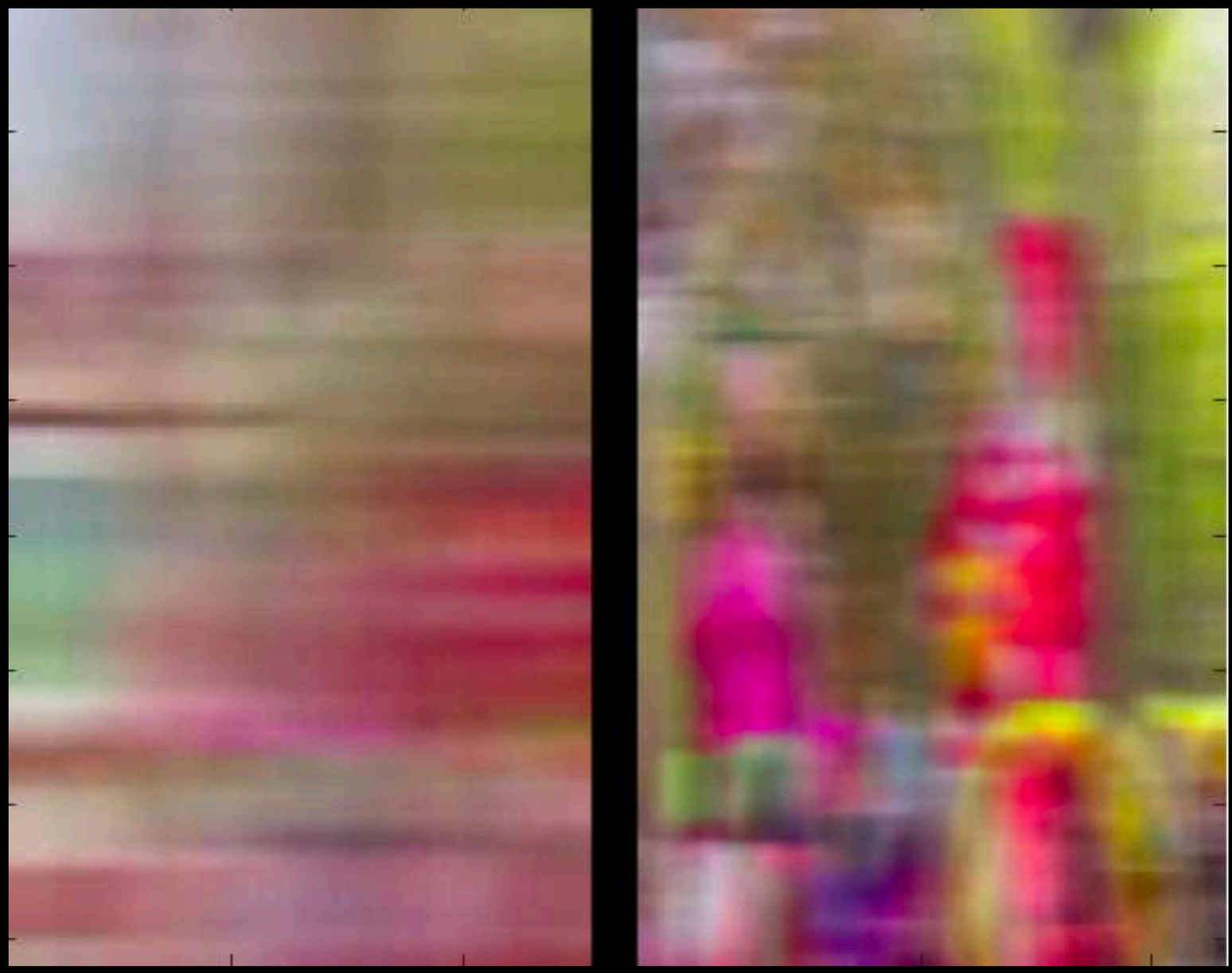
Evaluation on Clowns.mp4:

Dissolve

Shot Detection:

Evaluation on Clowns.mp4:

Wipe



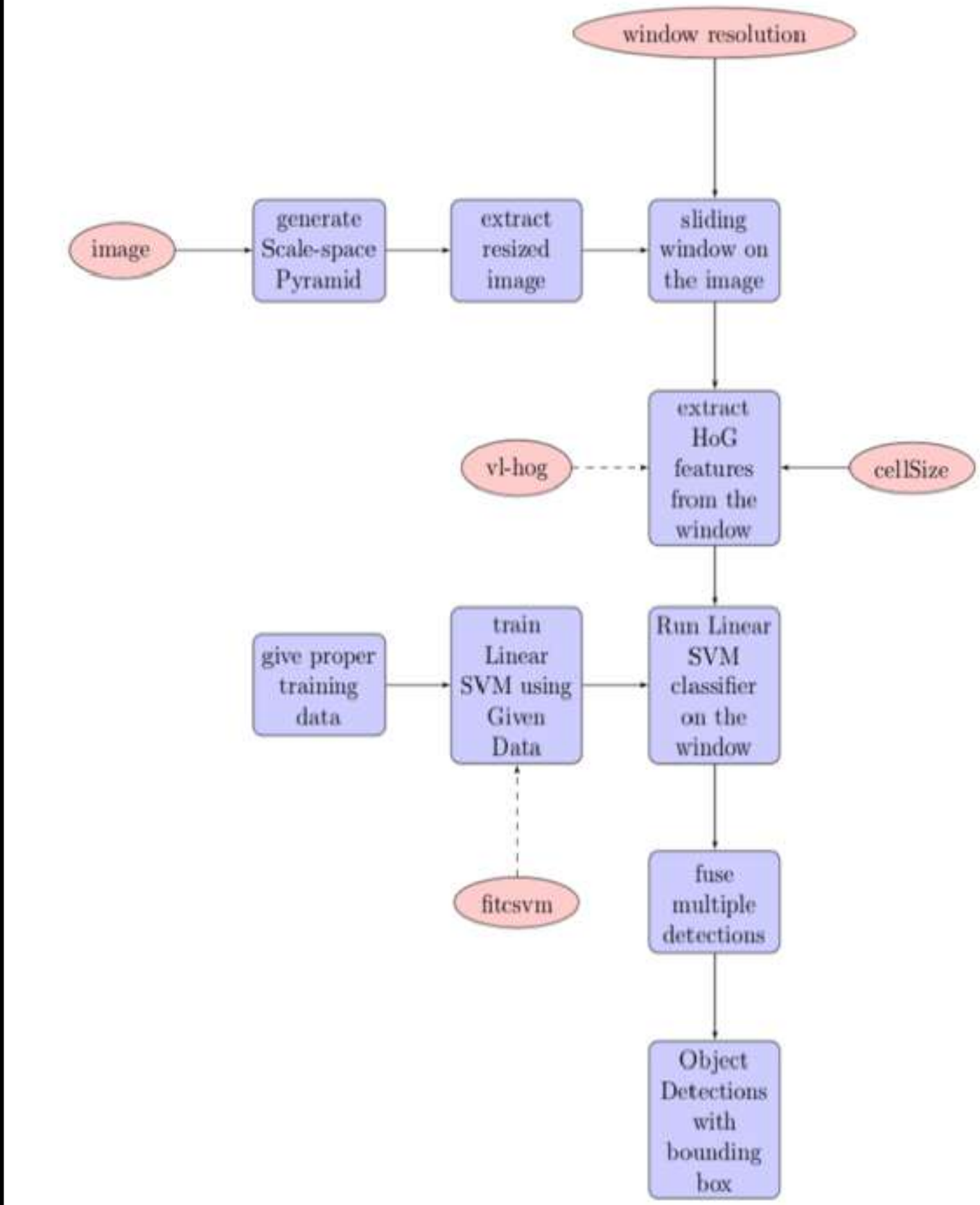
Shot Detection:

Evaluation on Clowns.mp4:

Shaking

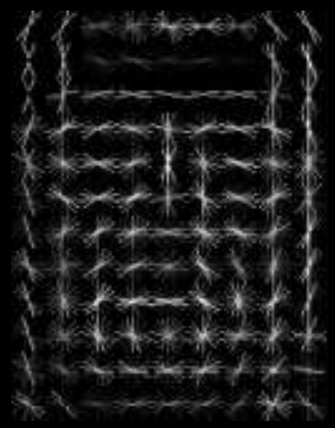
Face Detection and Tracking

Sliding window and HoG Detector

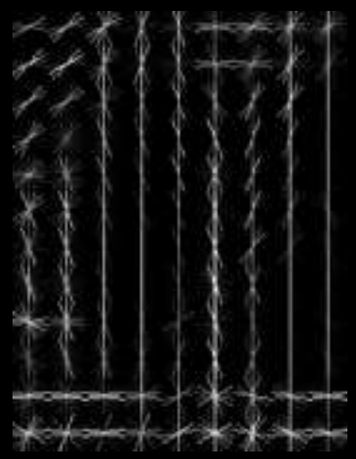


Face Detection and Tracking

SVM and Training Data



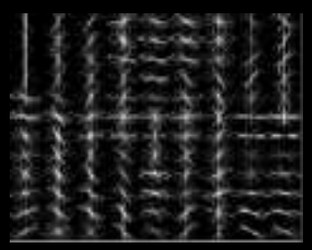
SVM Face HoG Model

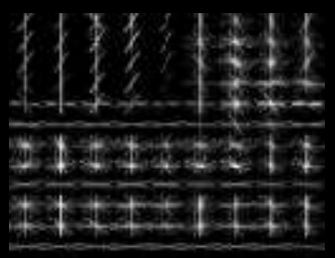


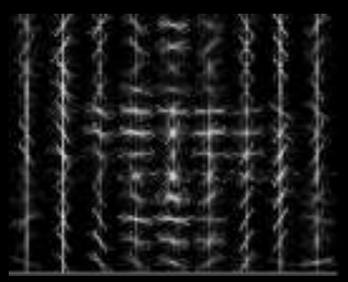
SVM Non-Face Model

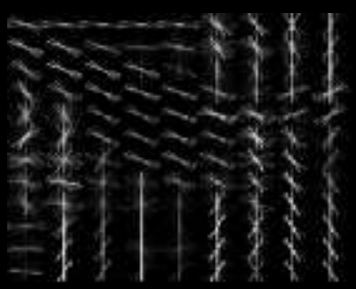
Face Detection and Tracking

Sliding window and HoG Detector









Face Detection and Tracking

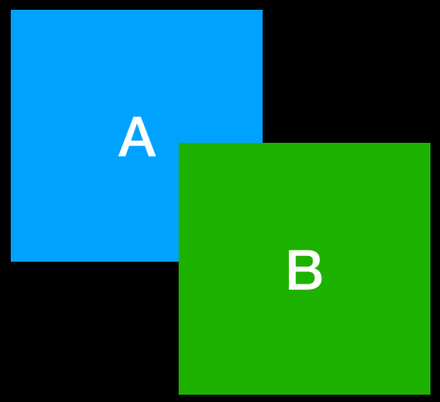
Sliding window and HoG Detector

Without NMS

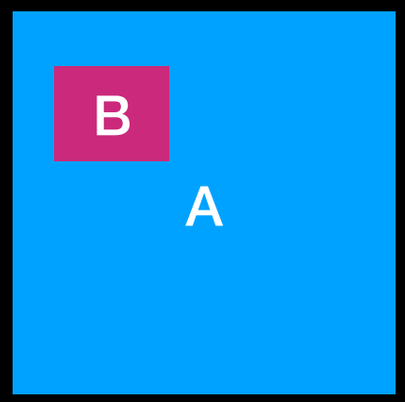
Face Detection and Tracking

Sliding window and HoG Detector

normal NMS



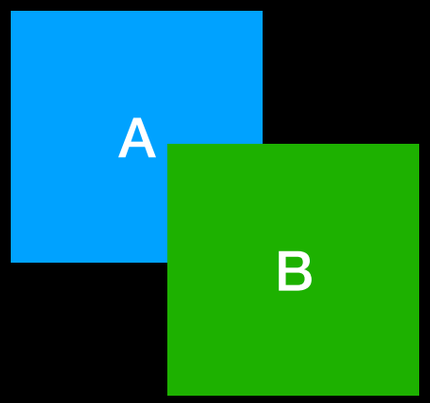
$$\frac{\text{area}(A \cap B)}{\text{area}(A \cup B)}$$



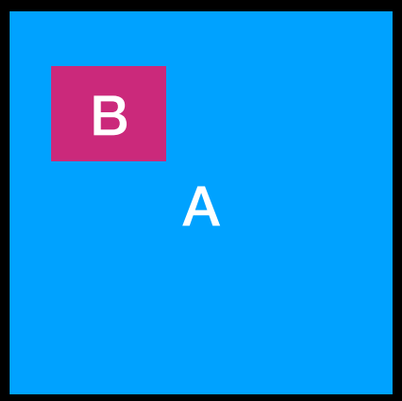
Face Detection and Tracking

Sliding window and HoG Detector

NMS with min box Method



$$\frac{\text{area}(A \cap B)}{\min(\text{area}(A), \text{area}(B))}$$



Face Detection and Tracking

Sliding window and HoG Detector

The accuracy over 521 testing cases is 99.8081 %

House with prediction :
non_faces
score : -2.1986

Face with
prediction : face
score : 0.5427

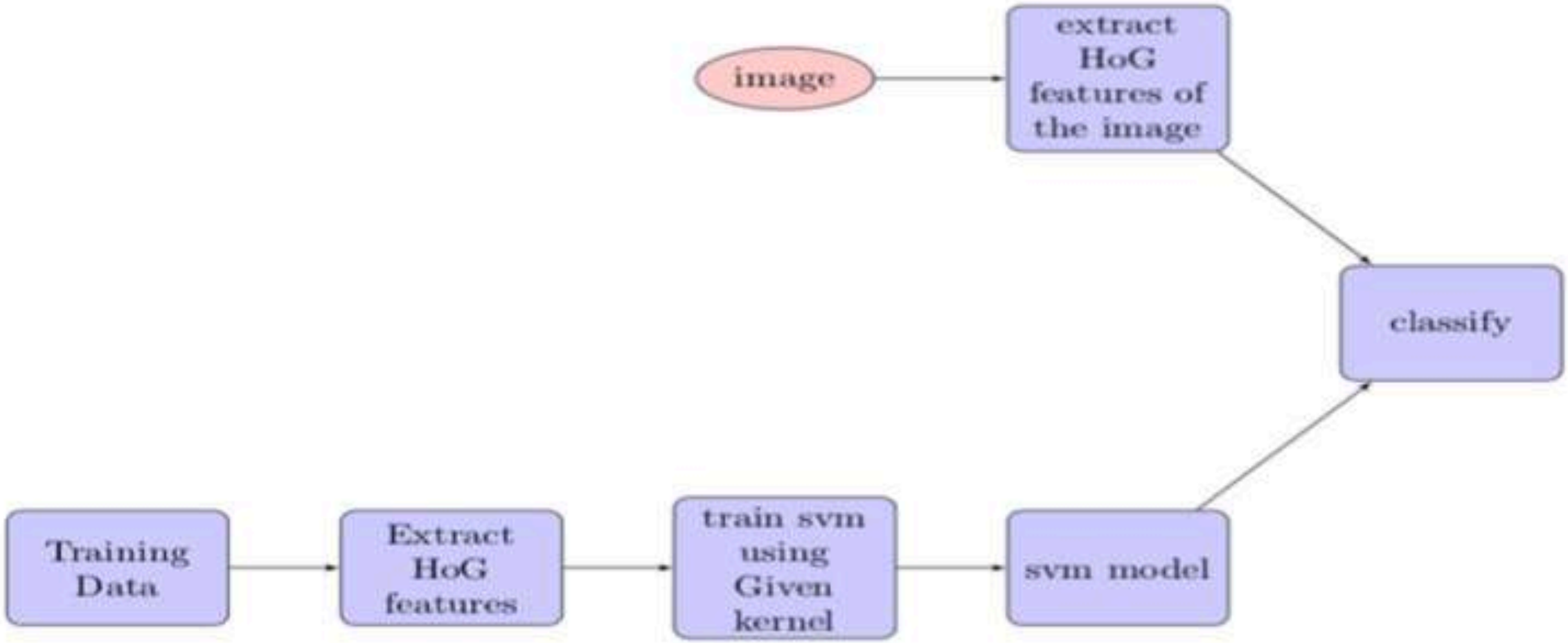
Face Detection and Tracking

Tracking

Similarity Transformation

RANSAC with 1000 trial

Gender Classification:

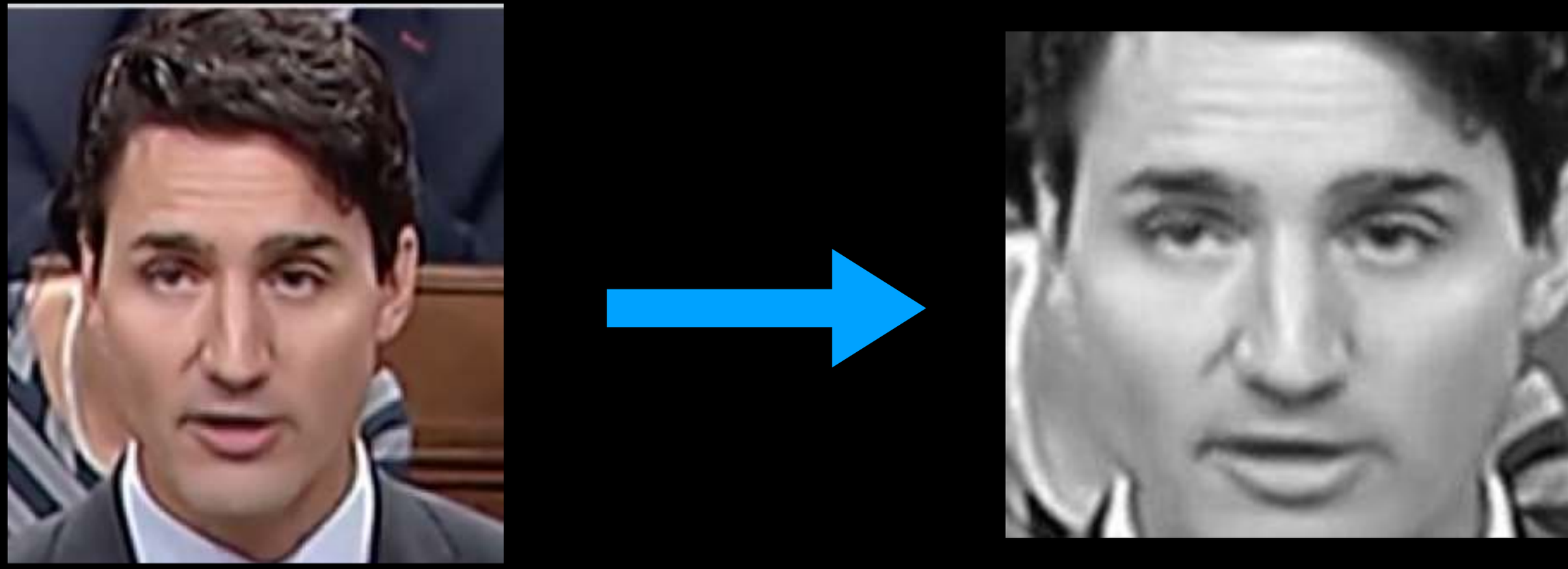


Gender Classification:

Gathering data and preprocessing

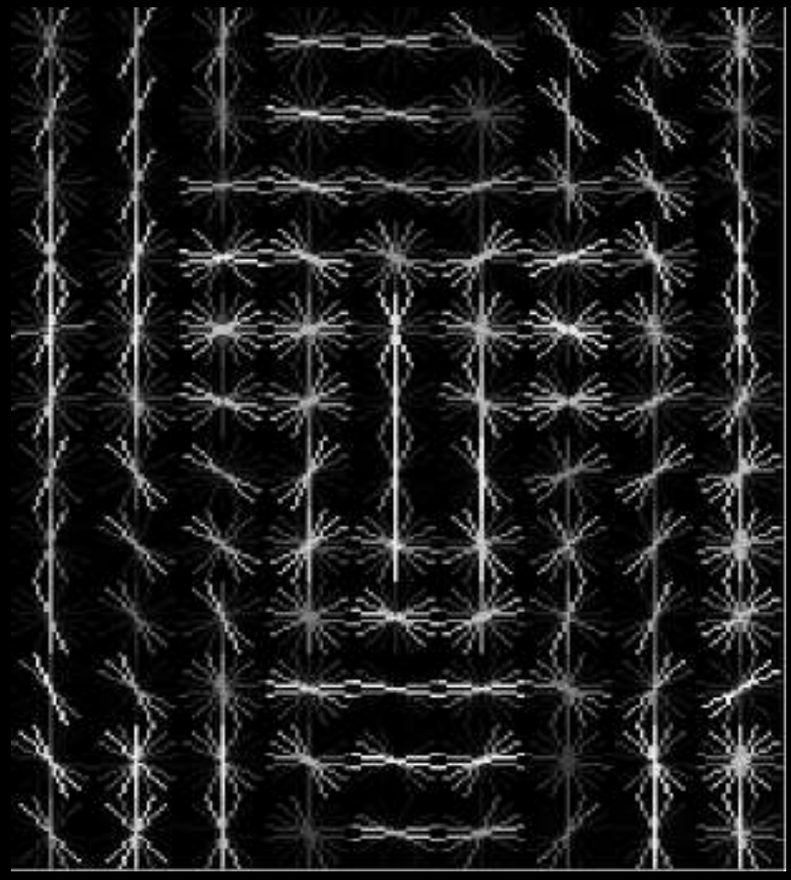
Raw data comes from
“IMDB-WIKI – 500k face images with age and gender labels”

Original **After**



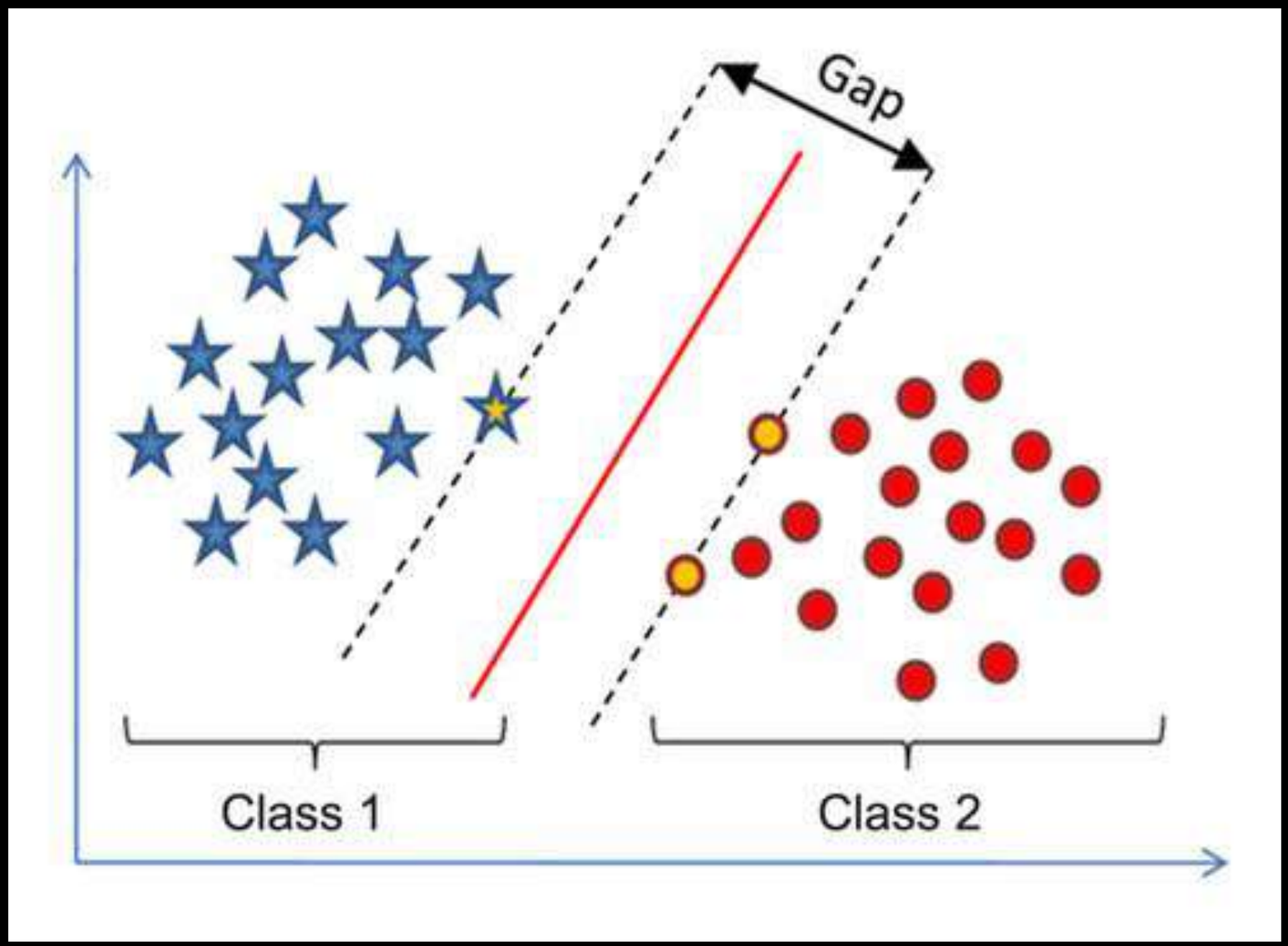
Gender Classification:

Hog feature descriptor



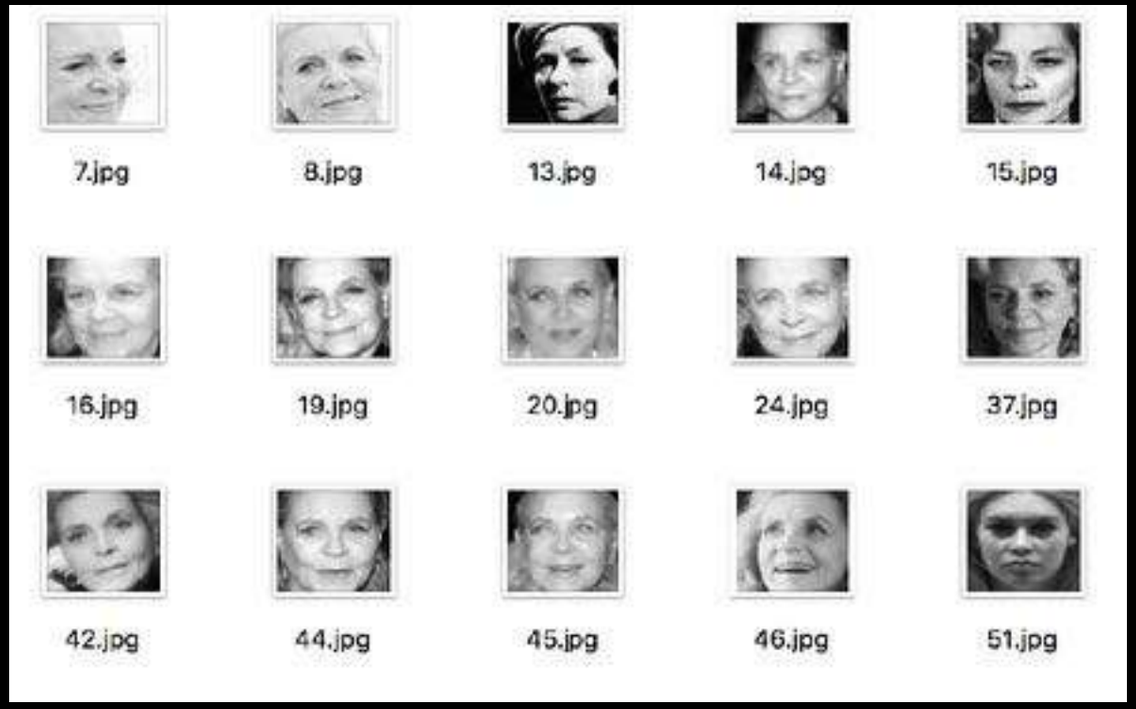
Gender Classification:

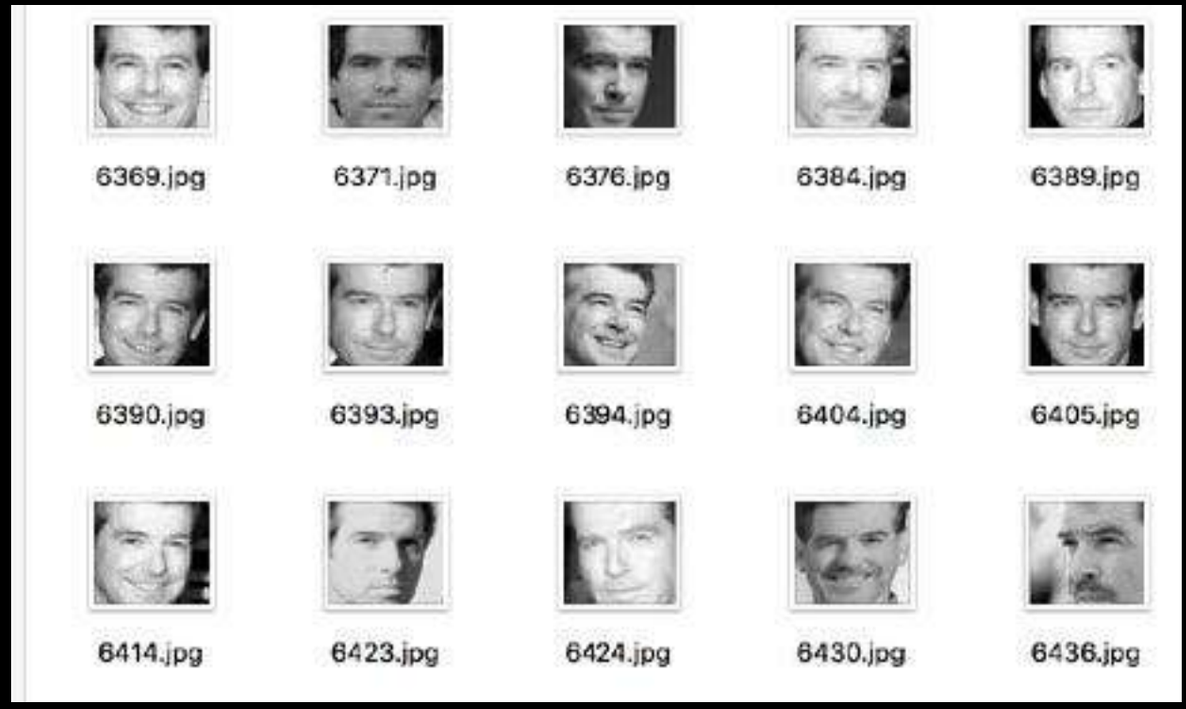
SVM



Gender Classification:

Train a model with sorted data using SVM





Gender Classification:

Detect face using Hog face detector, then using SVM to classifier what gender the face is

Gender Classification:

Evaluation

Train folder: **Male: 800** **Female: 765**

Test folder: **Male: 246** **Female: 310**

Result:

```
Training Gender Classifier
Gender Classifier Training done, Time : 7.8613s

Testing Gender Classifier
Testing : Gender Classification Accuracy : 0.8285
```

Here is a demo video