

Dynamic facial recognition in crowded environments

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CONTEXT

Large gatherings



HIGH RISK of being separated

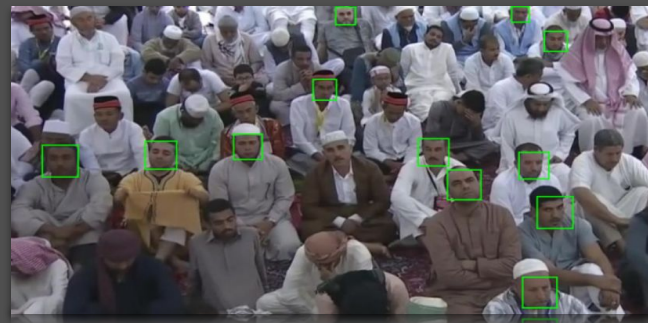
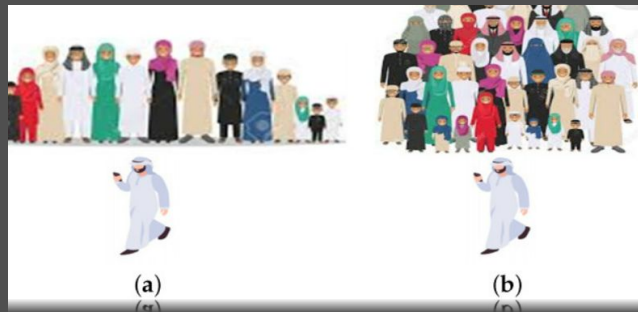
LOST people



How do we find them?



GOAL



Application Goal



A service where groups can report missing people and locate them

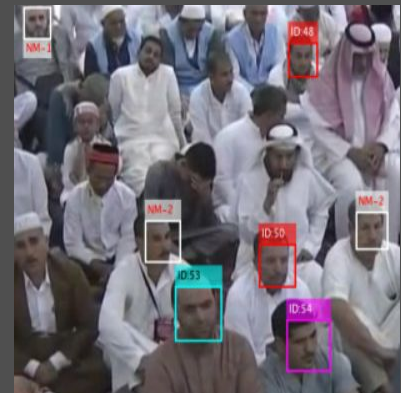
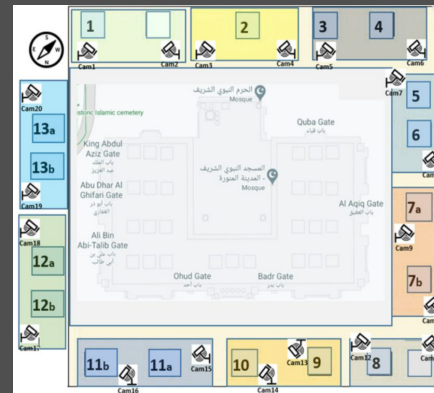
Benefits of the Application



Speed up the search for lost people!

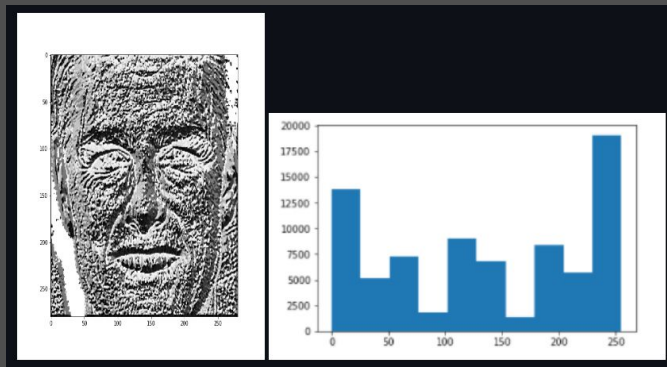
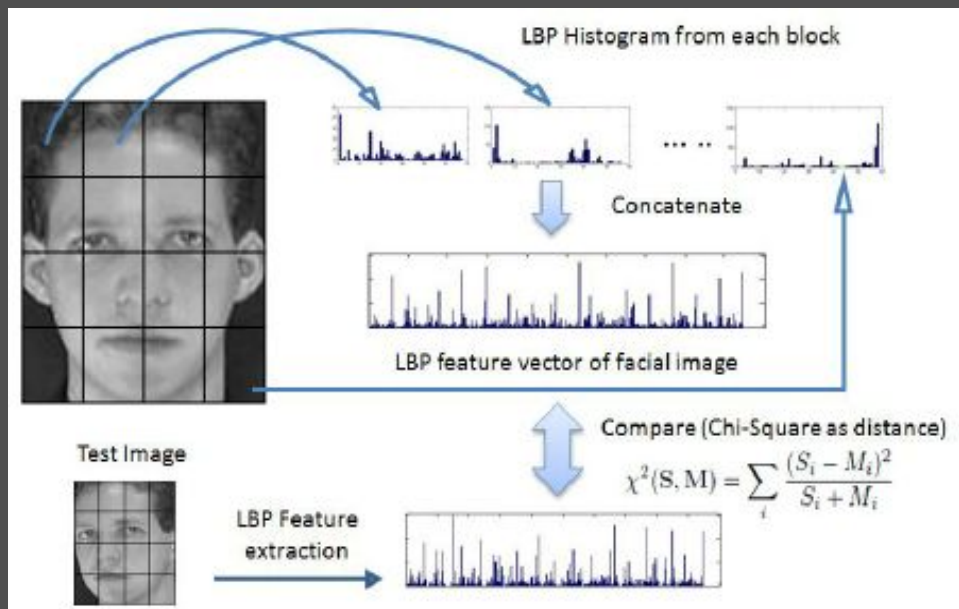
Implementation & Solution

- Video surveillance across multiple areas
 - Spatial and temporal information
- Multiple facial detection and recognition algorithms
 - Greater detection rate
- Fusion of Viola-Jones cascade classifiers
 - Fast, real-time detection & recognition



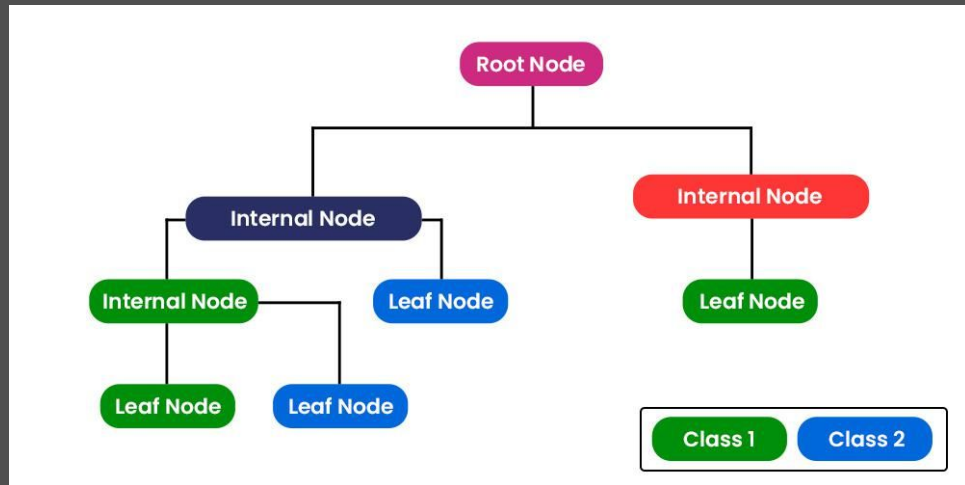
LBP Face Detector

- Local Binary Patterns as texture descriptor
- Split the face region into blocks
- Calculate histogram of LBPs for each
- Classify as face or not-face using Adaboost
 - Can use cascades of classifiers
- Recognize identity with descriptor distances



CART Face Detector

- Classify through binary decision trees
- Create “decision nodes” from discriminatory features
 - Metrics: Gini index, class “purity”
- Recognize identity by using another tree
- Fast, but by itself too simple
- Does not consider feature interactions



RESULTS

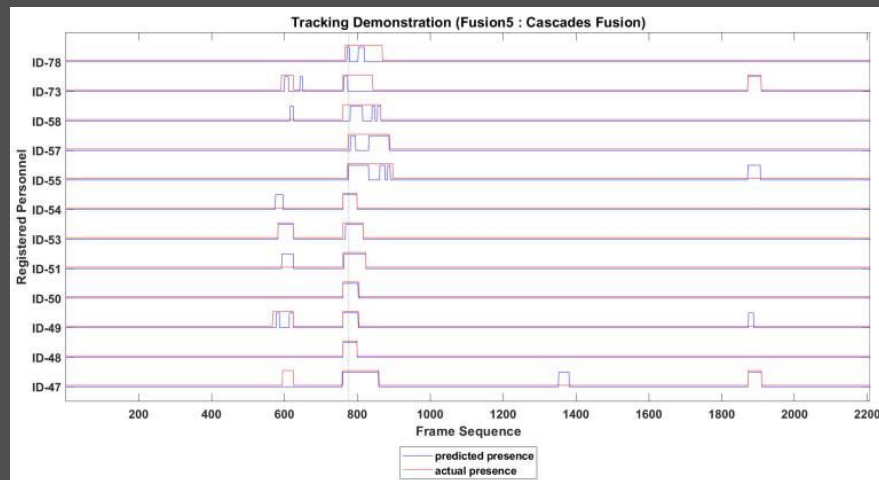
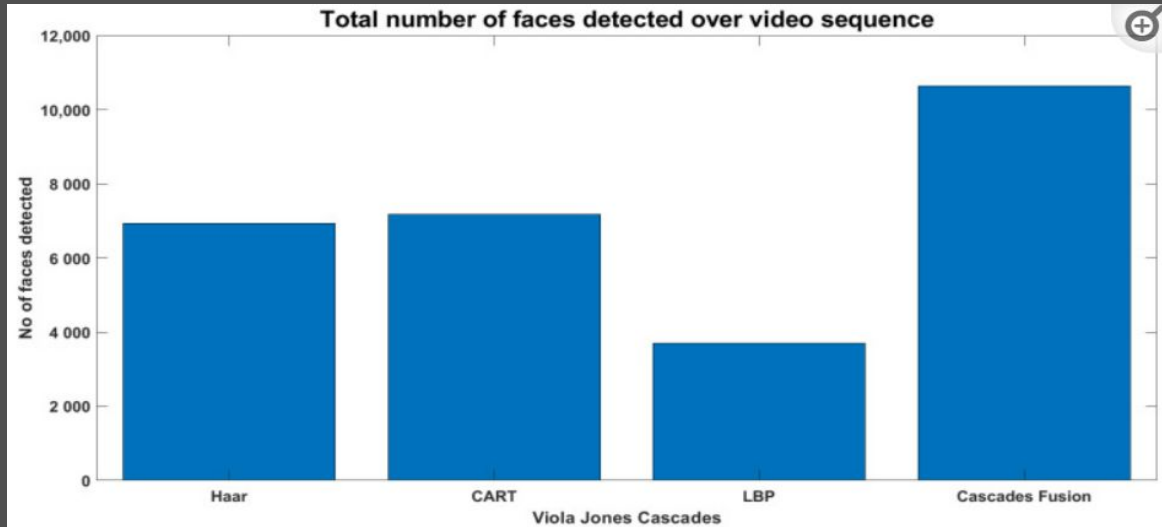
Face Detection Results

1. Haar Detector: 500 faces
2. CART Detector: 480 faces
3. LBP Detector: 400 faces
4. Combined: **700 faces**

False Positive Rates

- Haar Detector: 2%
- CART Detector: 1.5%
- LBP Detector: 2.5%

Solved with temporal considerations



Relationship with the Artificial Vision Course

Feature Detection
and Recognition



Classifier Cascades



Challenges in Recognition and Detection

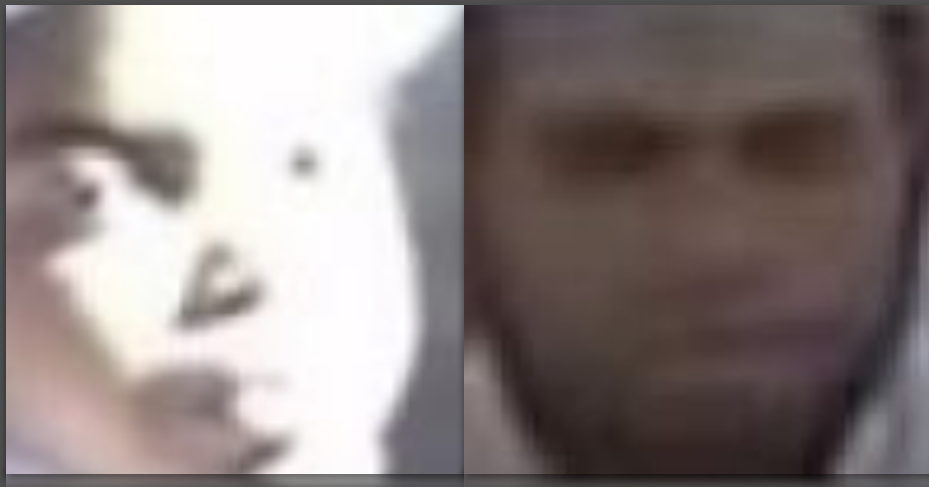


Texture Analysis and
Shape Recognition



Eigenfaces and
Dimensionality
Reduction

DIFFICULTIES with Facial Detection & Recognition



Facial Detection Challenges

Occlusion & Varying lighting conditions

Difficulties in Facial Recognition

Biometrics & Facial analysis.

POSSIBLE EXTENSIONS

Crowd Dynamics and Safety

Real-Time Data Analytics for Public
Safety

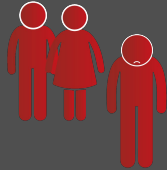
Integration with Other Biometric
Technologies

Advanced Algorithms for
Challenging Environments



RISKS

Infringement of
individual privacy?



Legal consequences for
innocent individuals?



Discrimination?

Exposed facial recognition
databases?



Abuse of power?

CONCLUSIONS



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