



# Real Time Face Tracking & Recognition

<http://rtftr.sourceforge.net>

Final Year Project's Mid Term Presentation

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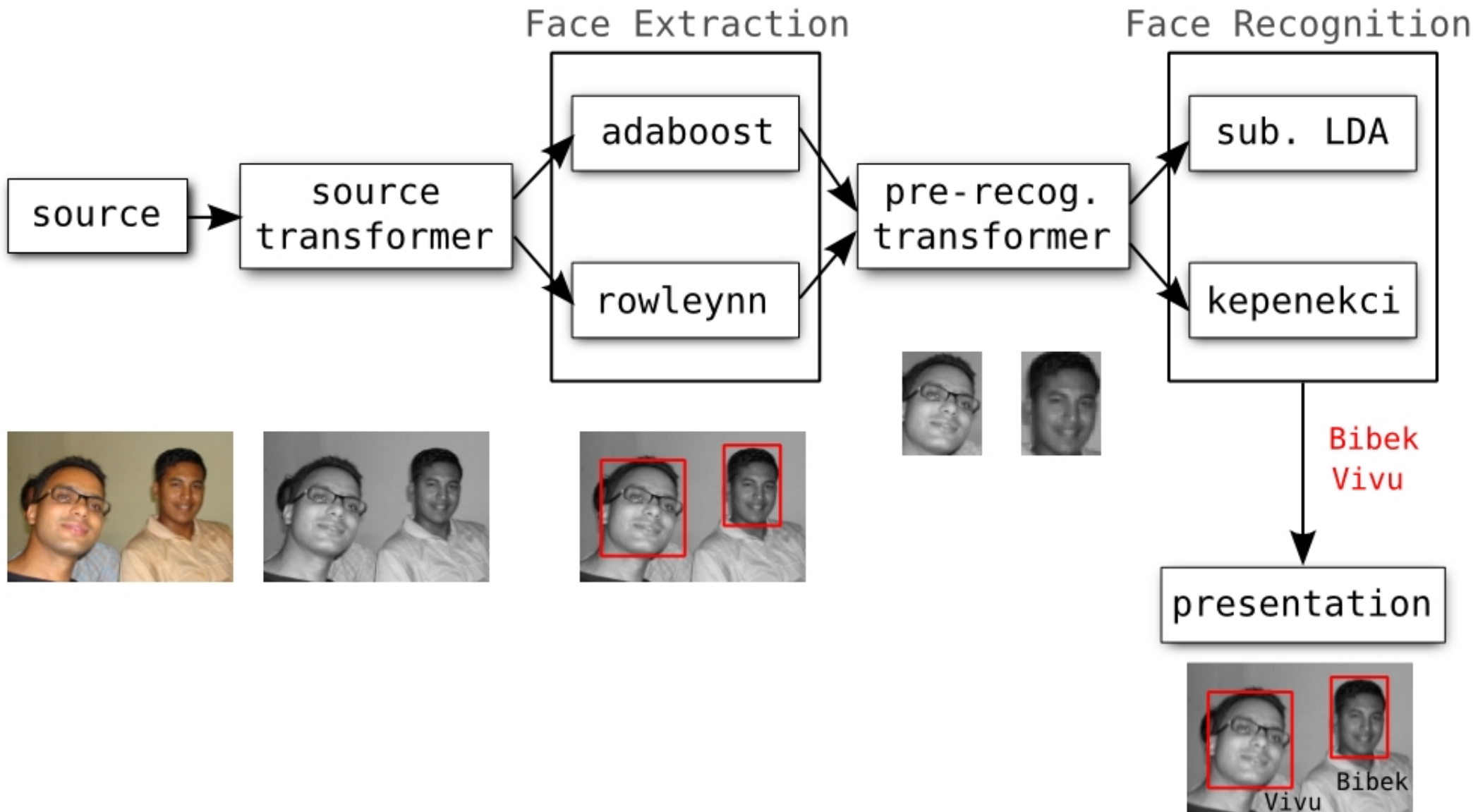
*DOECE, Pulchowk Campus*

# what RTFTR aims to achieve?

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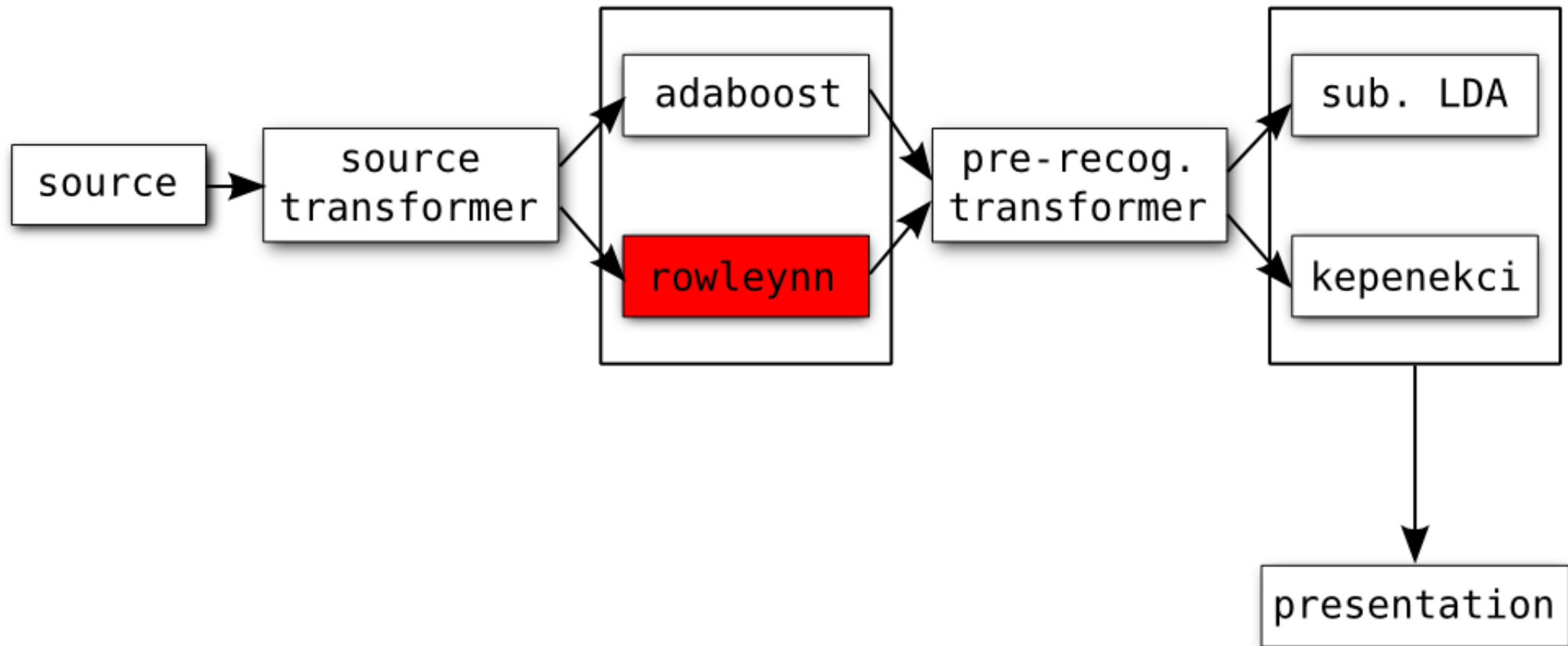
*Show a sample video of real  
time tracking/recognition of  
human face*

# RTFTR system block diagram



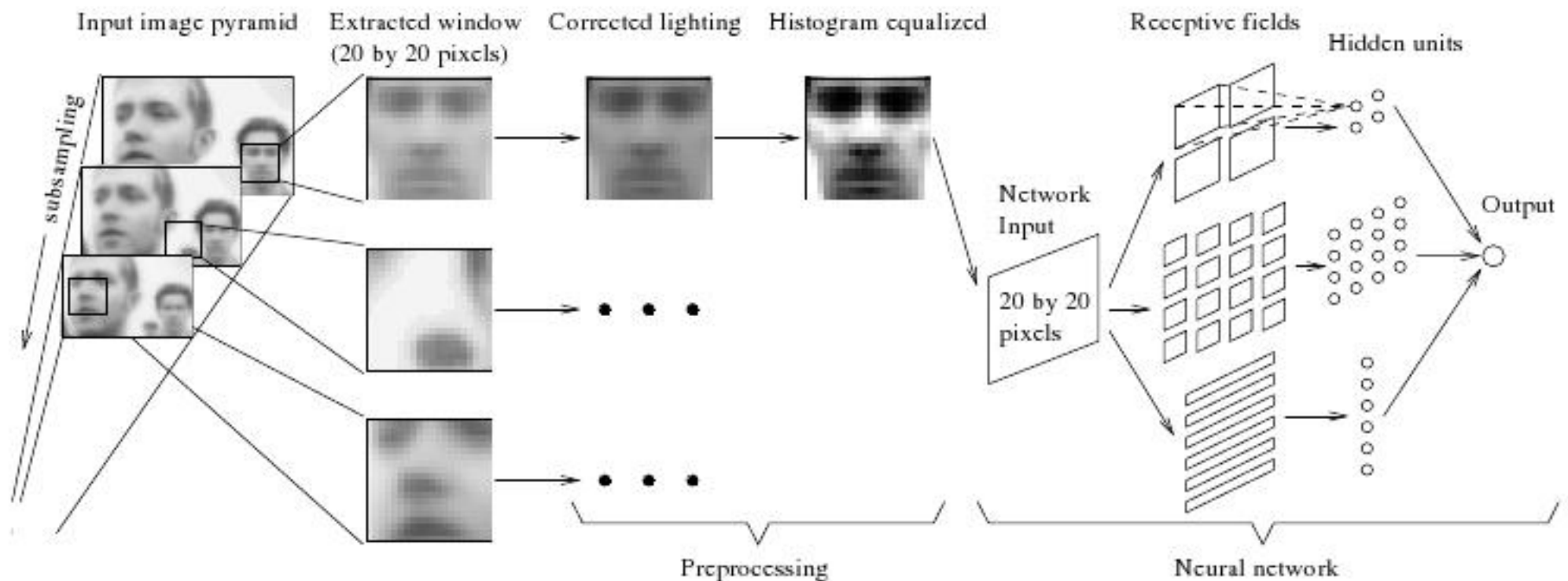
# neural network based face detection (rowleyenn)

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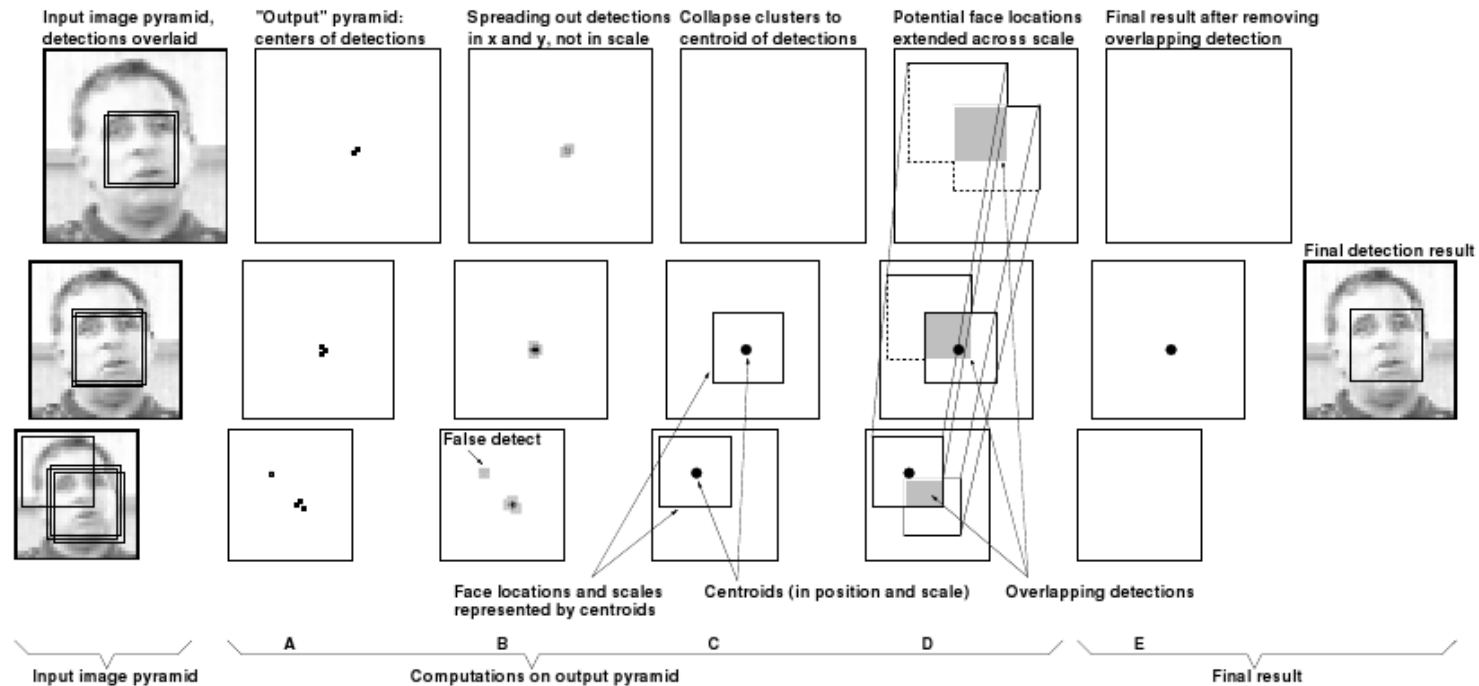
- Based on paper given by Henry A Rowley, Shumeet Baluja and Takeo Kanade, Nov 1995
- 20px X 20px face and nonface images
- Image enhancement using lighting correction and histogram equilization.
- Training using 1000 face images and 7000 nonface images.
- Face set using FERET database.

# neural network based face detection (rowleyenn)



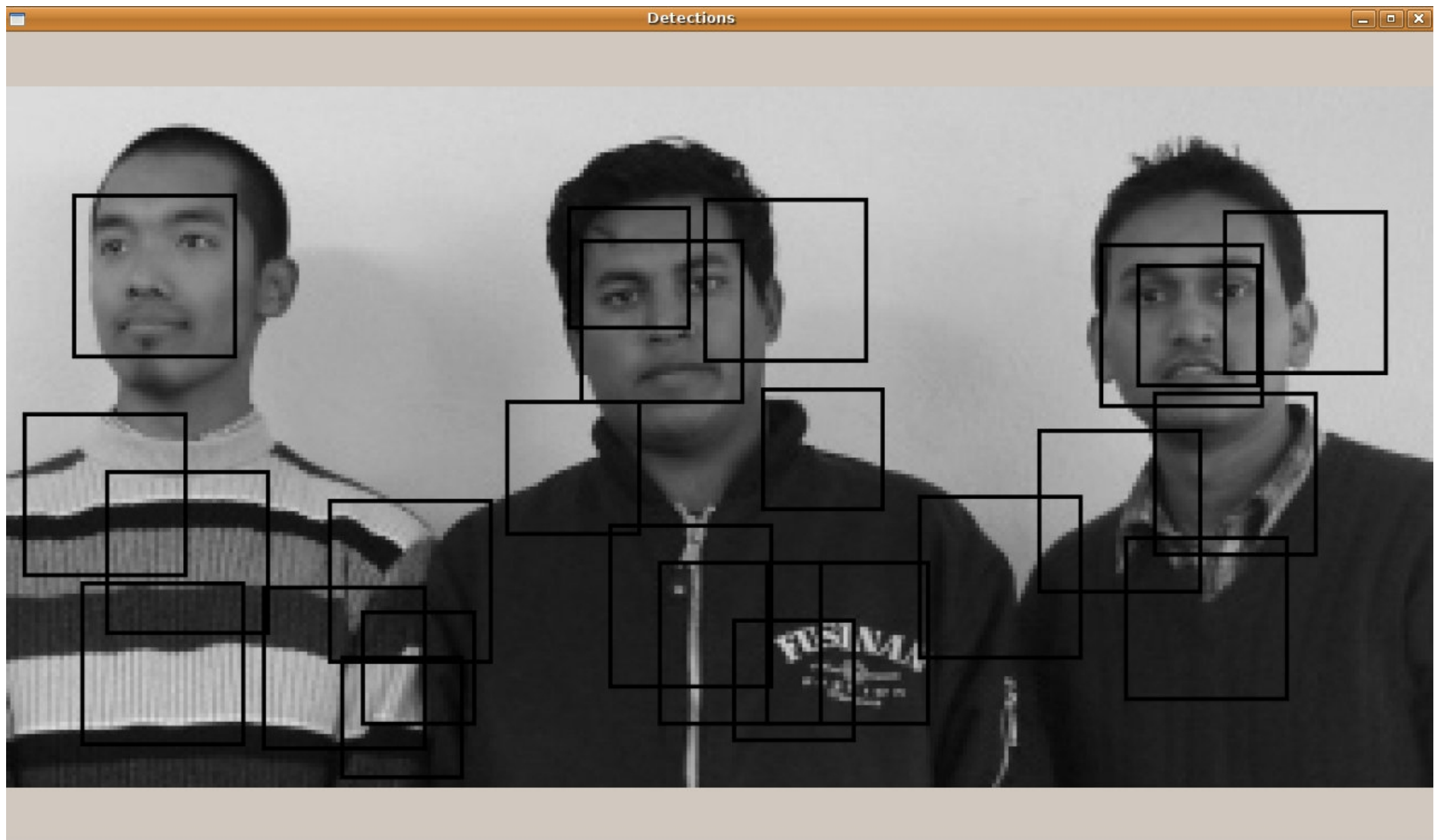
**Fig. 1.** Overview of algorithm for frontal, upright, face detection. Taken from [10].

# Arbitrator (rowleyenn)



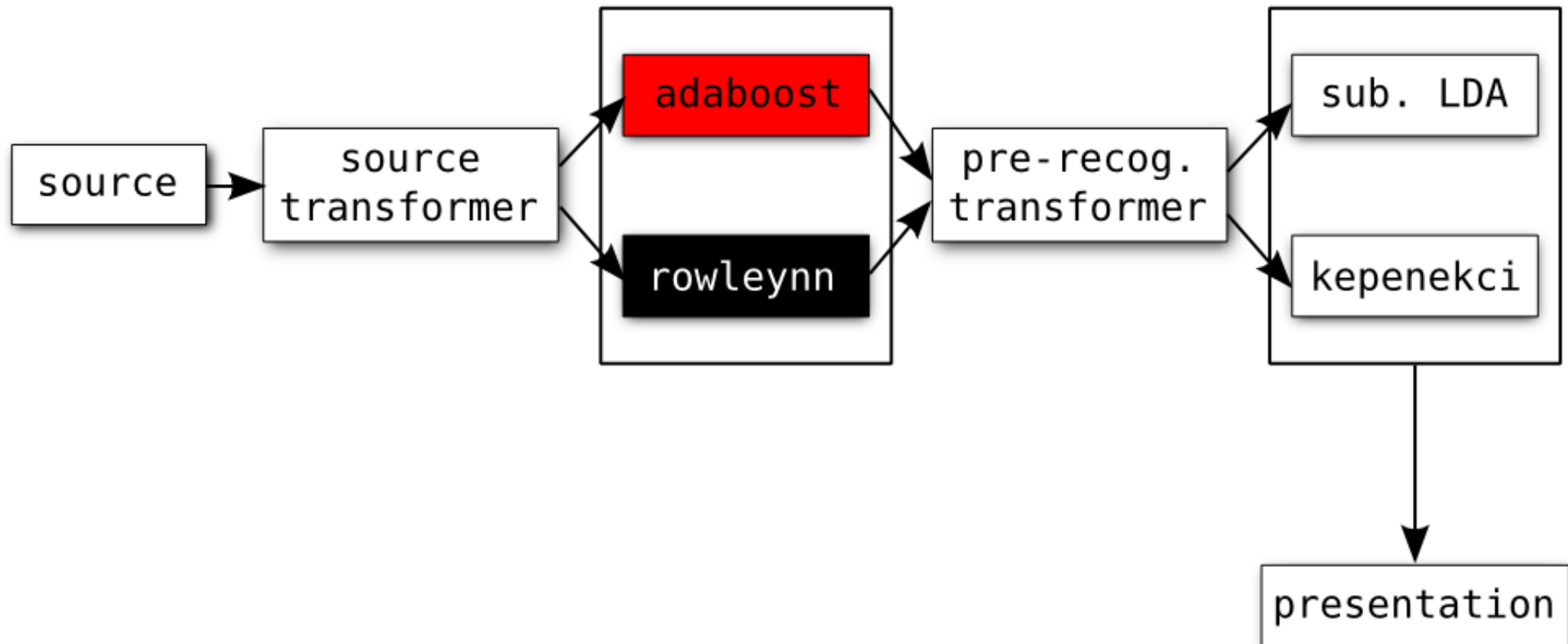
# result from rowleynn module

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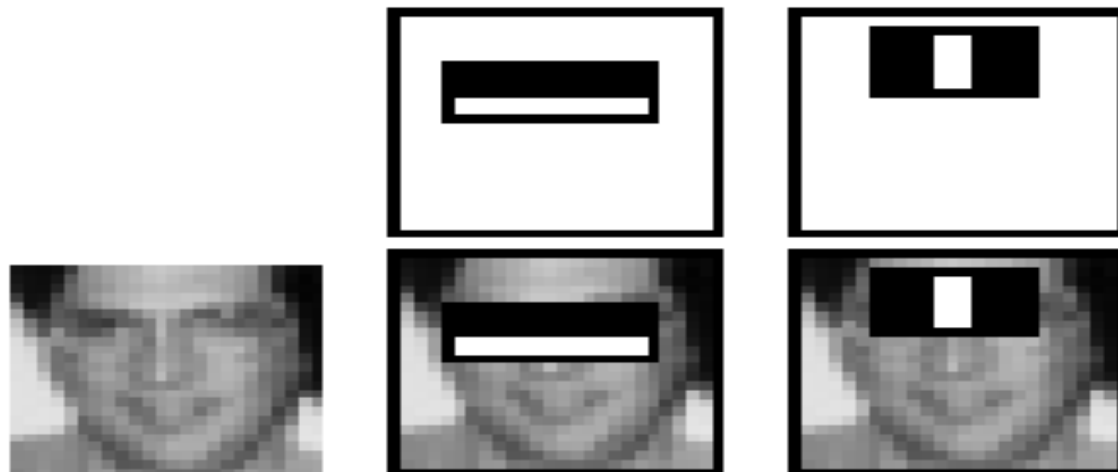
# adaboost algorithm



- Algorithm by Viola and Jones to build a face detector
- Very fast detection rate compared to other algorithms
- But the training time is very large
- Feature based algorithm
- Supervised learning so faces and nonfaces have to be provided by labeling



- Haar-like features used for weak classifiers
- Features are convoluted on the training faces and non faces
- The difference between the pixel at white region and black region gives feature value

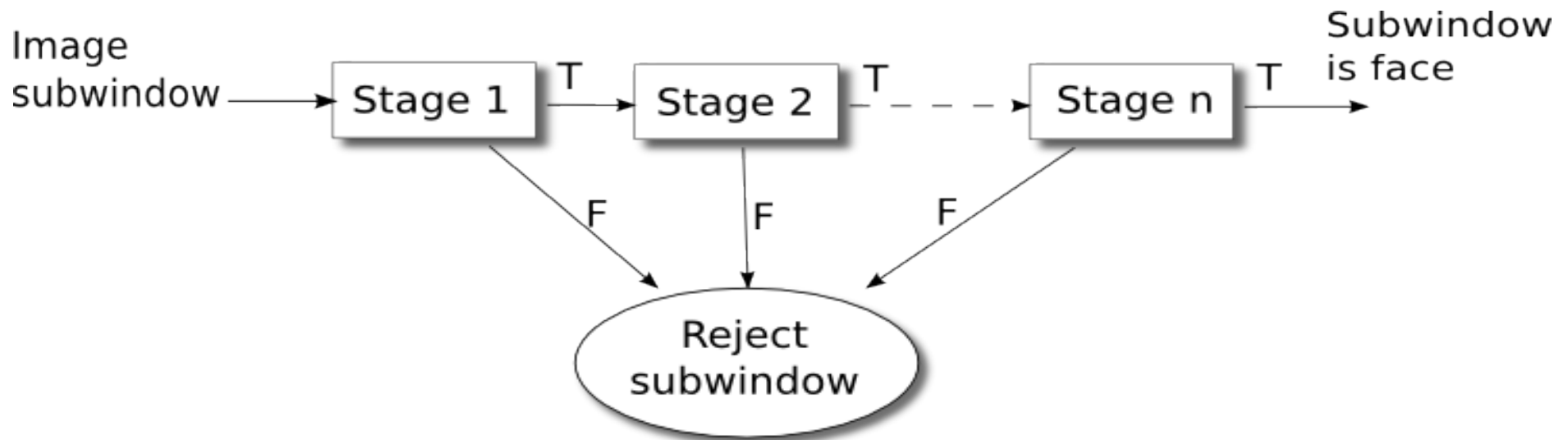


- Finds the feature from more than 160000 features which best classifies the training faces and non faces
- Finds the threshold for the selected feature
- Combination of feature and threshold forms a weak classifier
- Single weak classifier not efficient to classify at significant level
- Several weak classifiers are combined to form a strong classifier (stage)

# Cascade generation algorithm

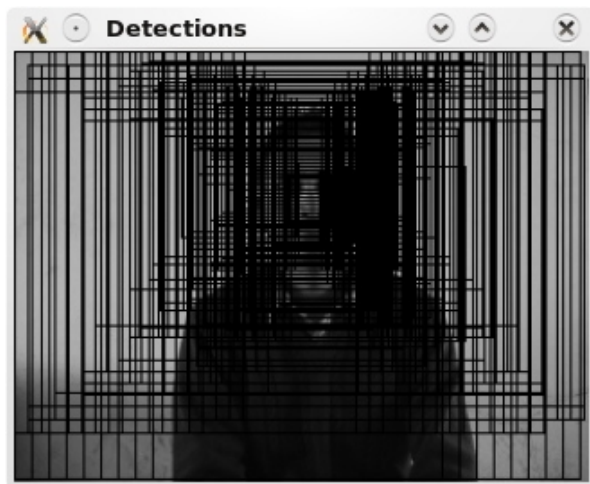
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- Combines the stages formed by adaboost to form a cascade
- False detection from the previous stage is used as non-faces to train next stage by adaboost
- The training time and the number of weak classifiers in later stages is larger



- More than 50% of the total sub-windows rejected at the first stage
- More time is given for classifying promising face-like regions

# adaboost's performance



Stage 2 – 680 detections



·Stage 6 – 142 detections



·Stage 8 – 16 detections

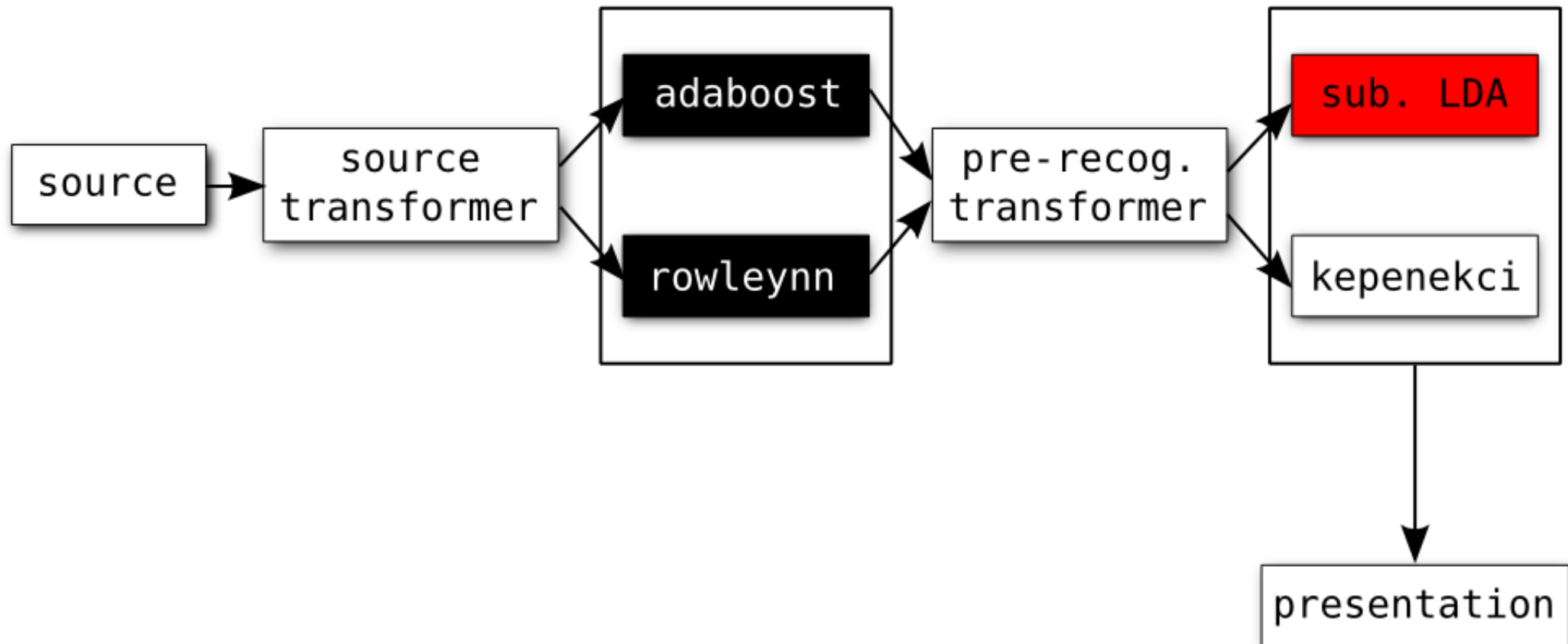


·Stage 10 – 1 detection  
·Detection time = 0.9 sec.

·Image Size = 300 x 225

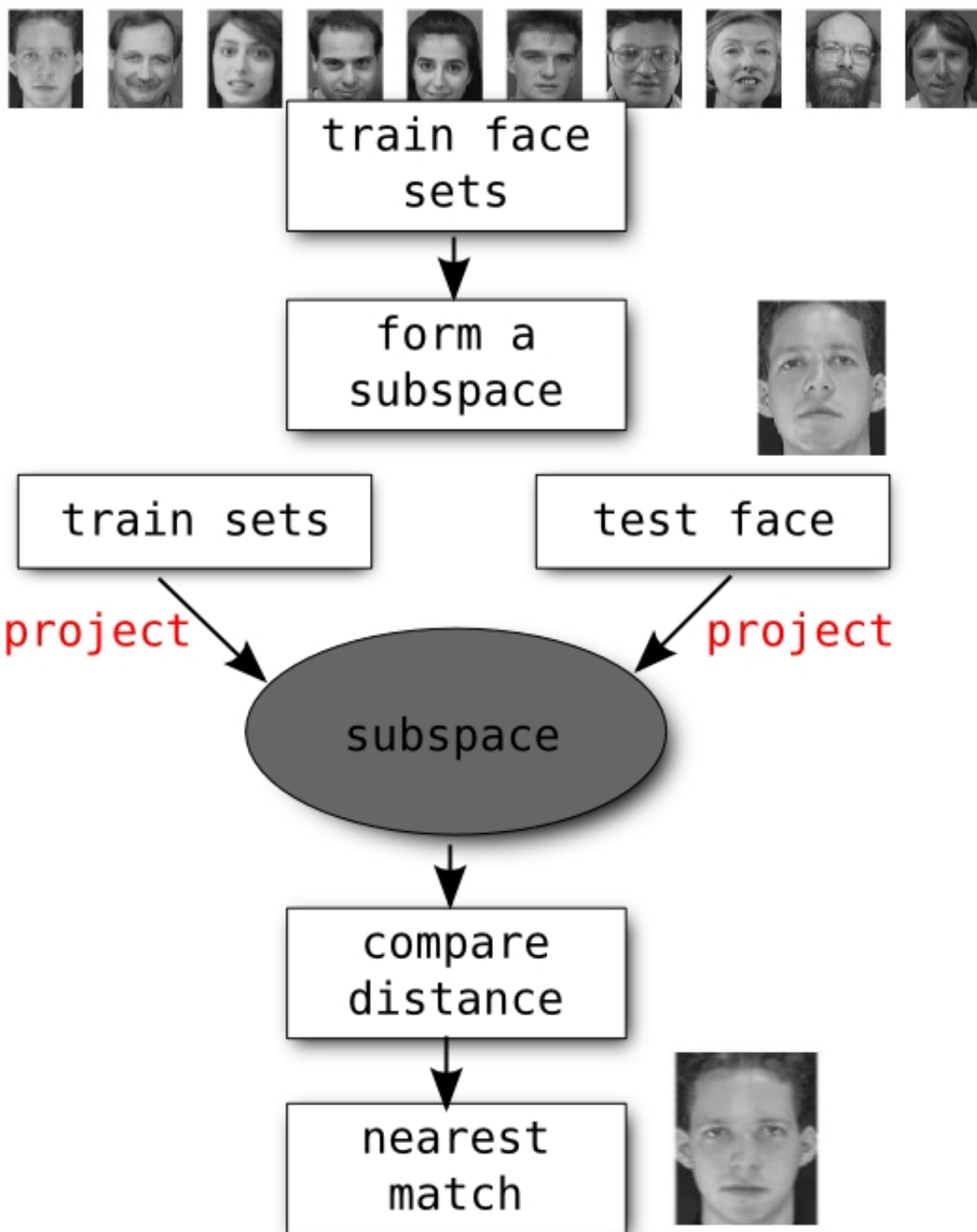
# subspace linear discriminant analysis (lda)

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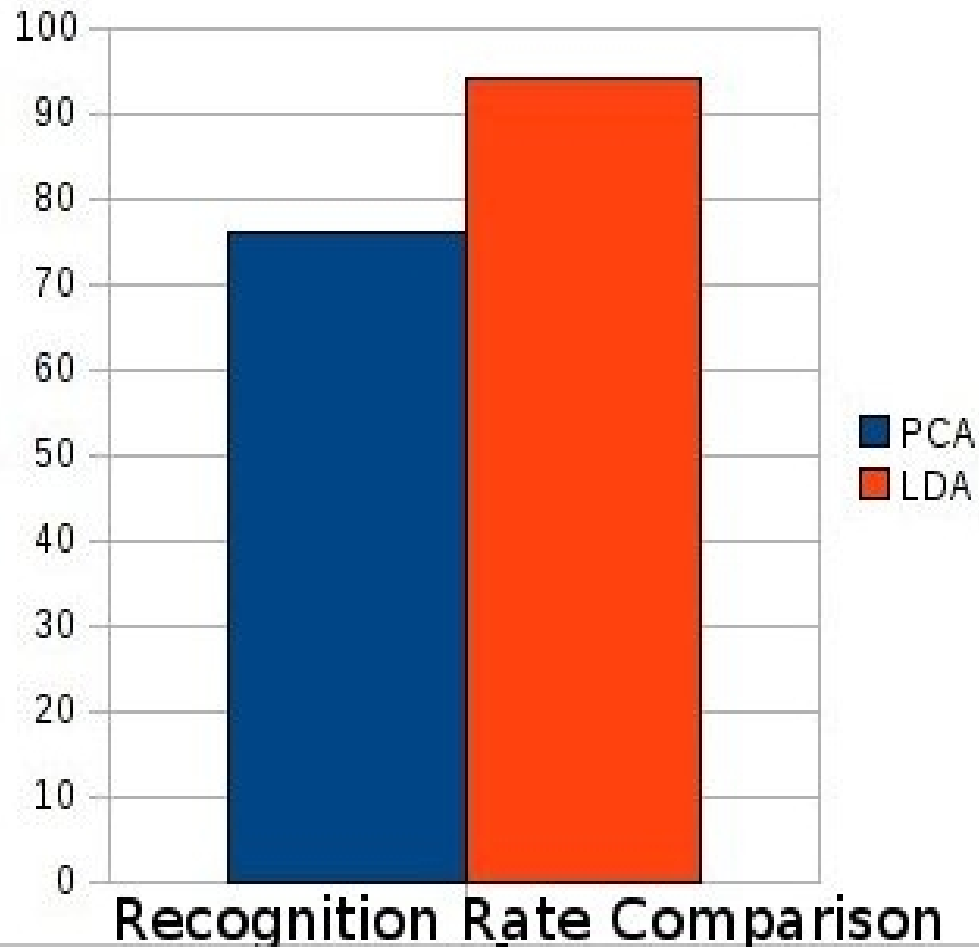


# subspace linear discriminant analysis (lda)



- Holistic approach
- Finds a subspace where faces are projected and their distances are measured for a match
- Consists of PCA (Principle Component Analysis) + LDA (Linear Discriminant Analysis)
- Uses PCA for dimension reduction and LDA as a classifier.

# comparison of PCA and Subspace LDA algorithm

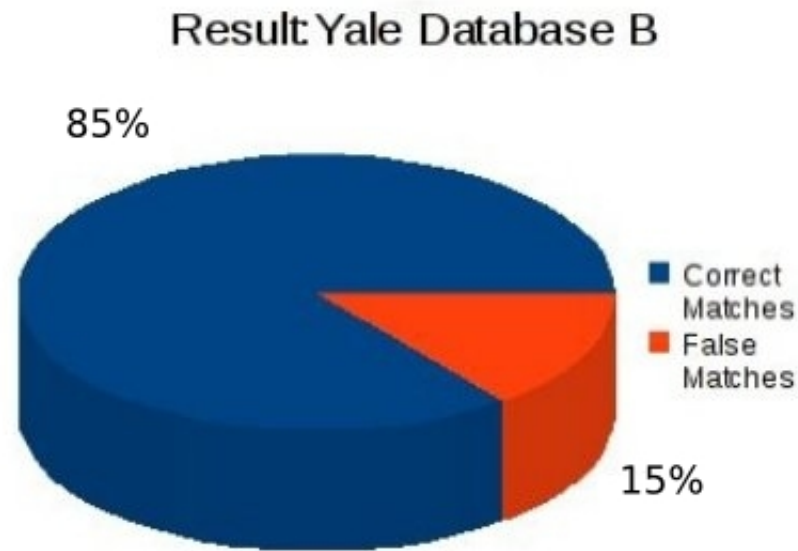


Total Training Faces = 49

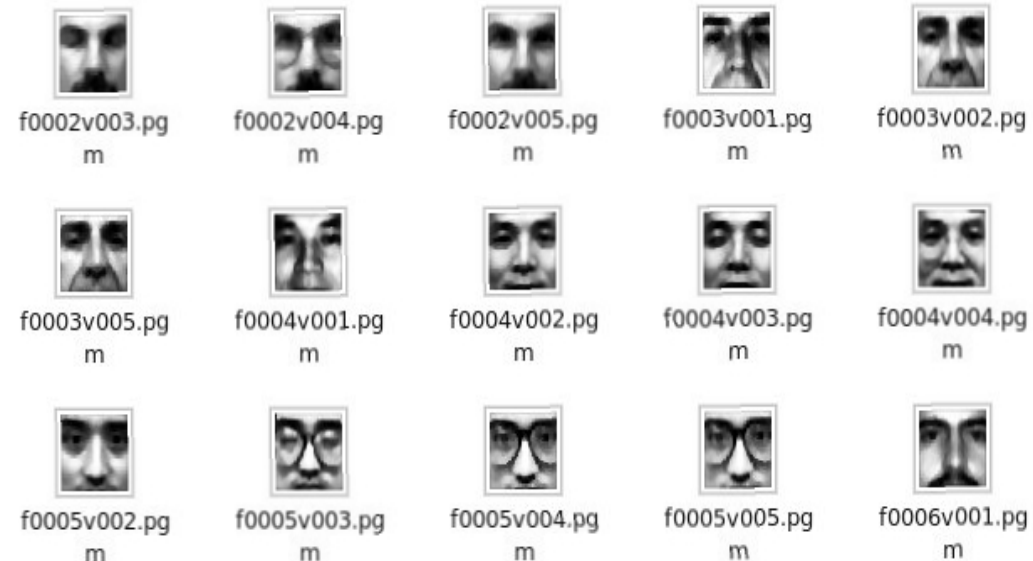
Total Test Faces = 17

	PCA	LDA
Correct Matches	13	16
False Matches	4	1

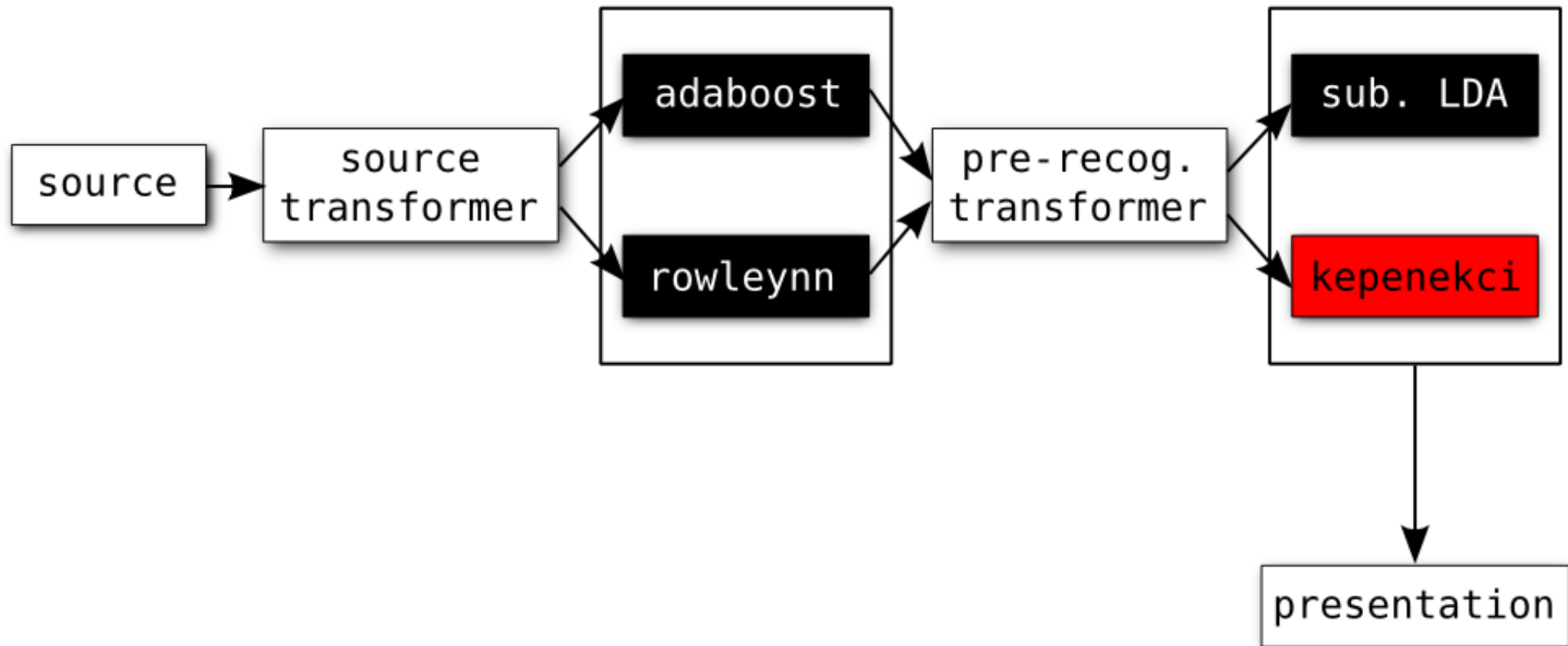
# performance of Subspace LDA on Yale B database



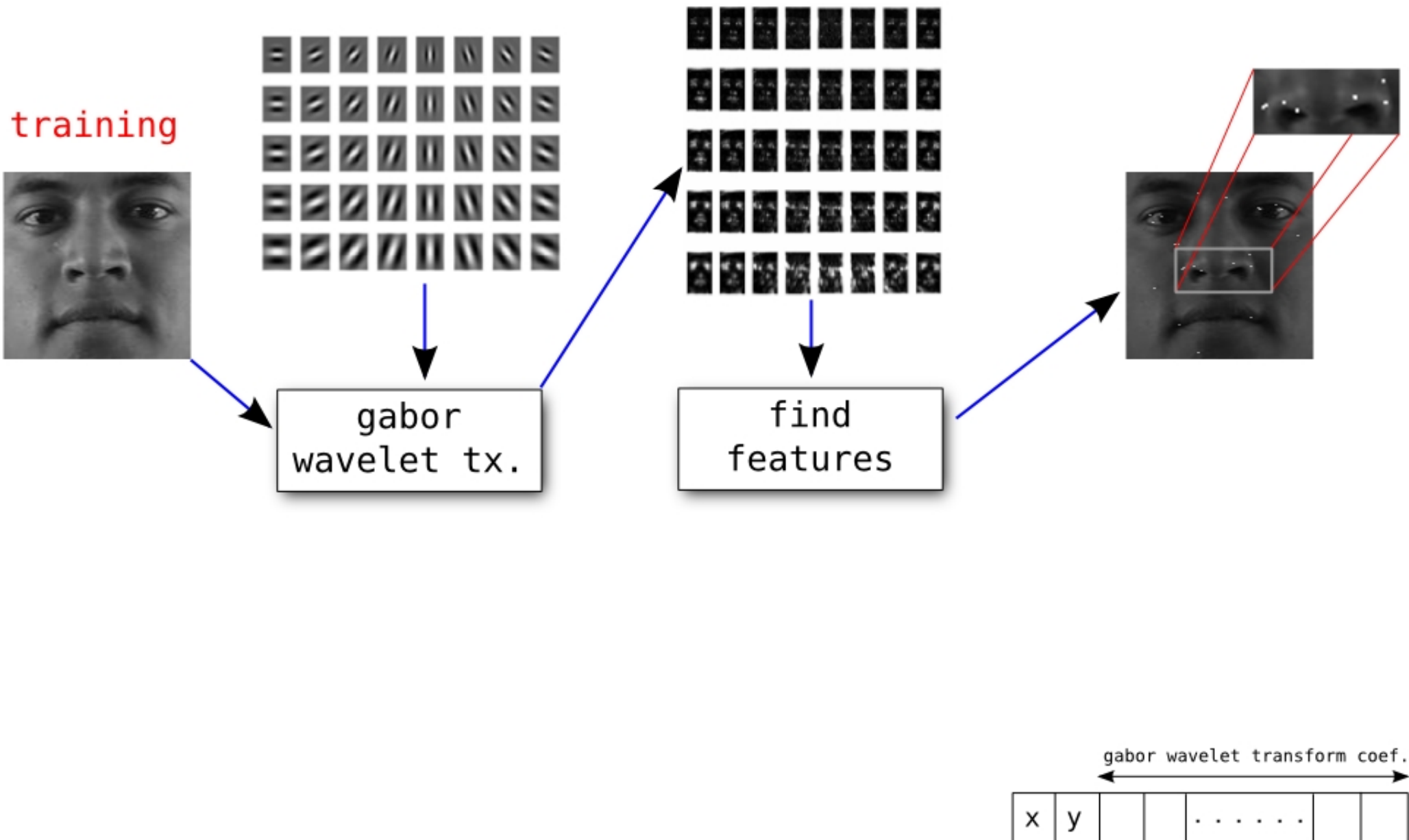
Total Train Faces = 45  
Total Test Faces = 38  
Distance Metric = Cosine  
Dropped Eigen vectors = 10  
Correct Matches = 32  
False Matches = 6

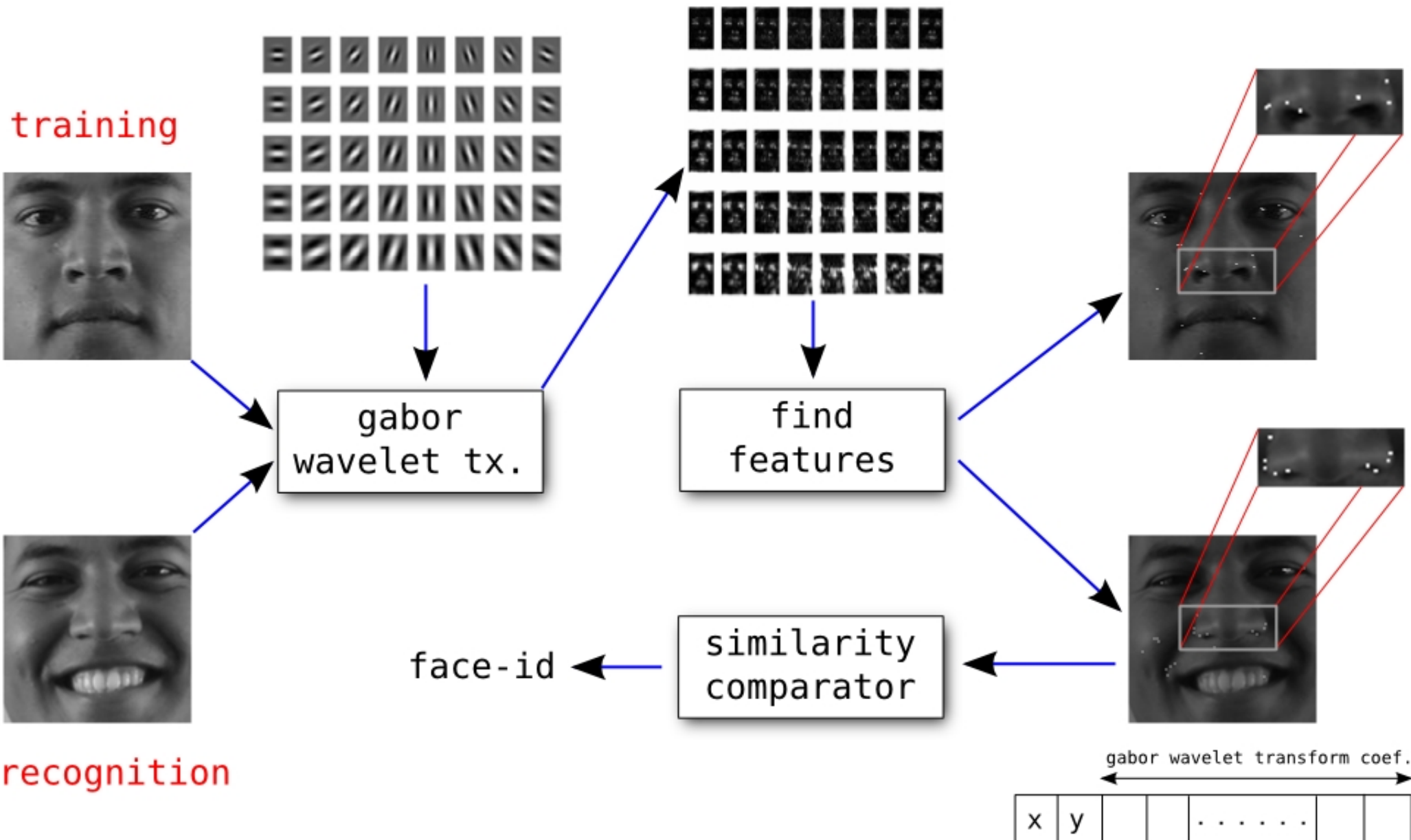


# face recog. using gabor wavelet tx. (kepenekci)

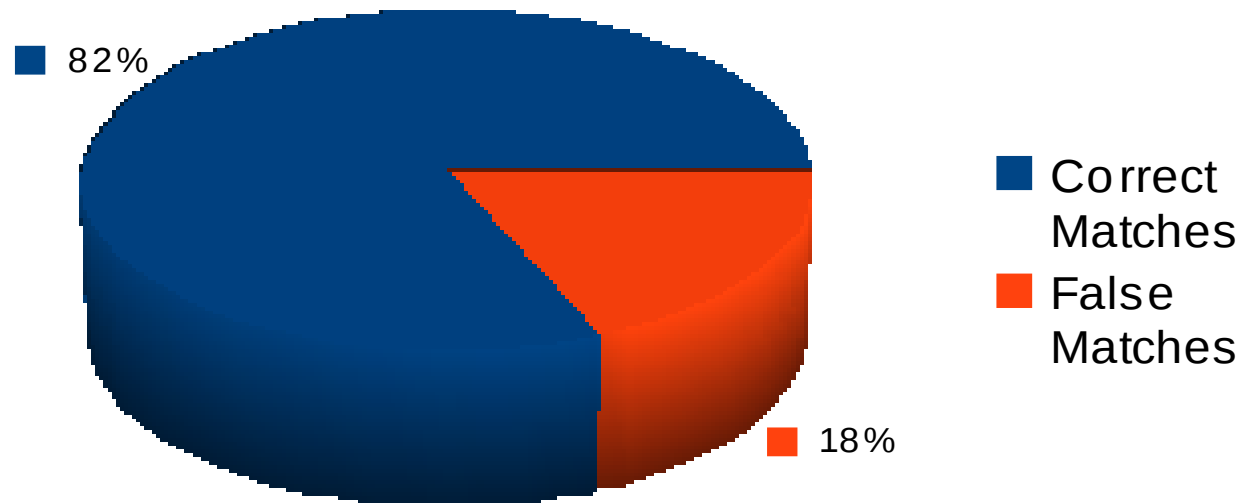


# face recog. using gabor wavelet tx. (kepenekci)





# performance of kepenekci on Yale B database



Probe faces that resulted  
in false matches

Window Size = 5x5

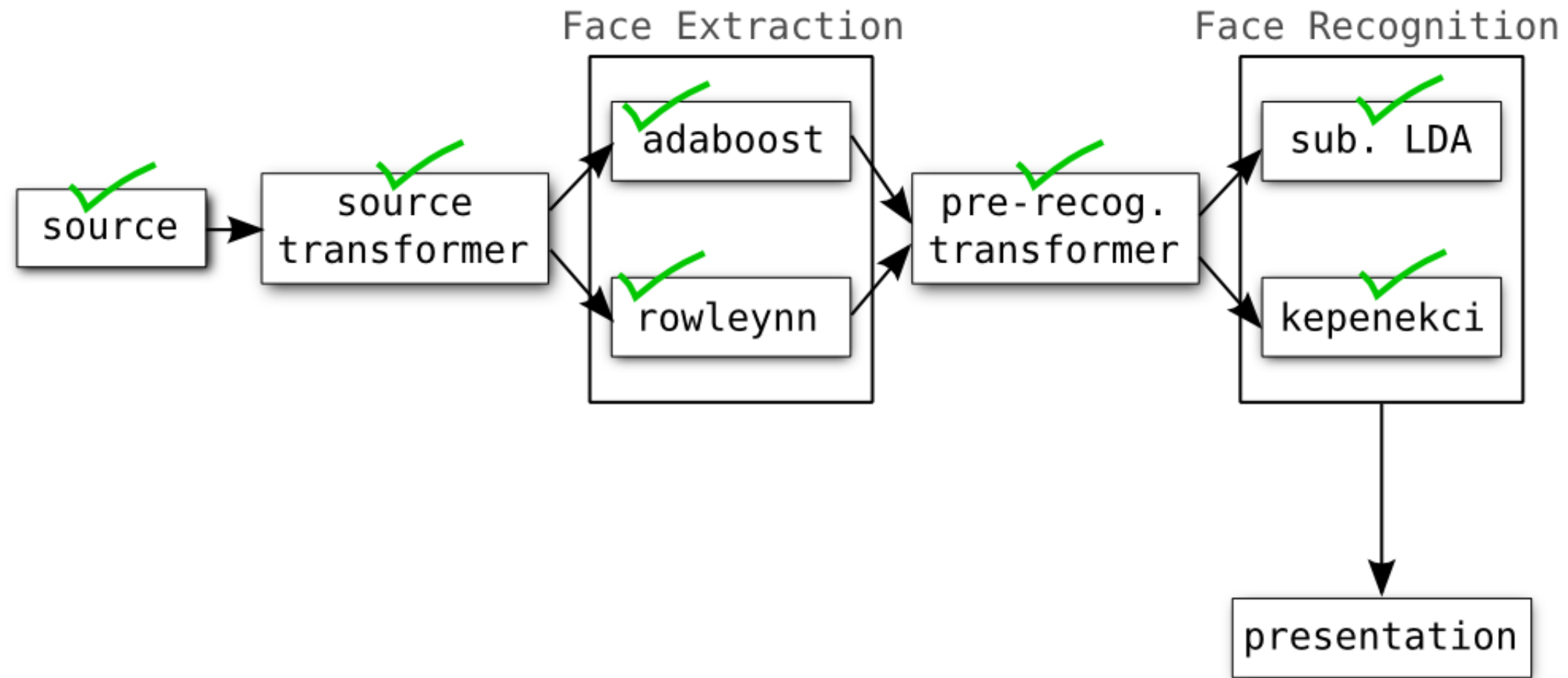
Total training faces = 45

Total probe faces = 38

Correct Matches = 31

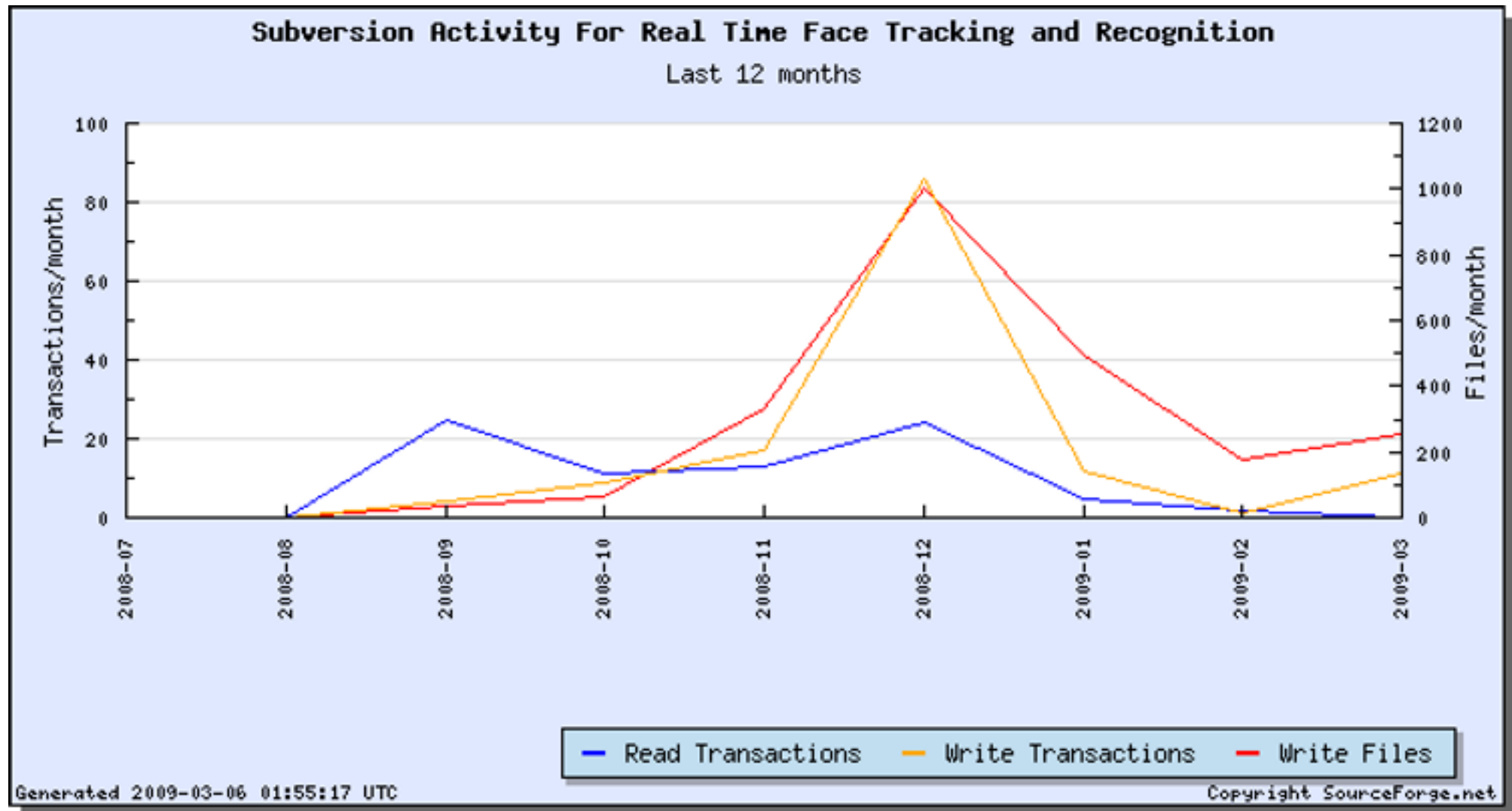
False Matches = 7

# mid term progress for RTFTR





# our subversion activity graph tells the whole story



# management of RTFTR project

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Subversion (svn) was used to manage rtftr's source code

Trac helped us with issue tracking

Mediawiki was used for collaborative development and management of project documents

Mailing list facilitated communication among rtftr developers



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Thank You