# The Viola-Jones Algorithm

* Foundation of OpenCV, 2001
* Simplicity powerful
* Faces on image & real-time video
* 2 stages: training + detection

Started with Detection:

* frontal face
* 1st: grey scale (Simplicity); 2nd: box looking for a face; HOW?
* Rapid object detection using a boosted cascade of simple features(paper)

# Haar-like Features

* Haar wavelet
* Edge Features / Line Features / Four-rectangle Features
* Calculate sum / Threshold
* Just rectangle, mended by computational efficiency

# Integral Image

* A hack offers computational efficiency
* Add above + left

# Training Classifier

* When training, scale the image down to 24 X 24px; when detecting, scale the features up.
* Lots of Face + Non-Face images. For faces, mirror the face can double it.
* Face image 🡪 common features, Non-Face 🡪 drop false positive

# Hacks

* Adaptive Boosting (Adaboost) :

Strong classifier = sum (weak classifier )

* Cascading :

Sub-window