

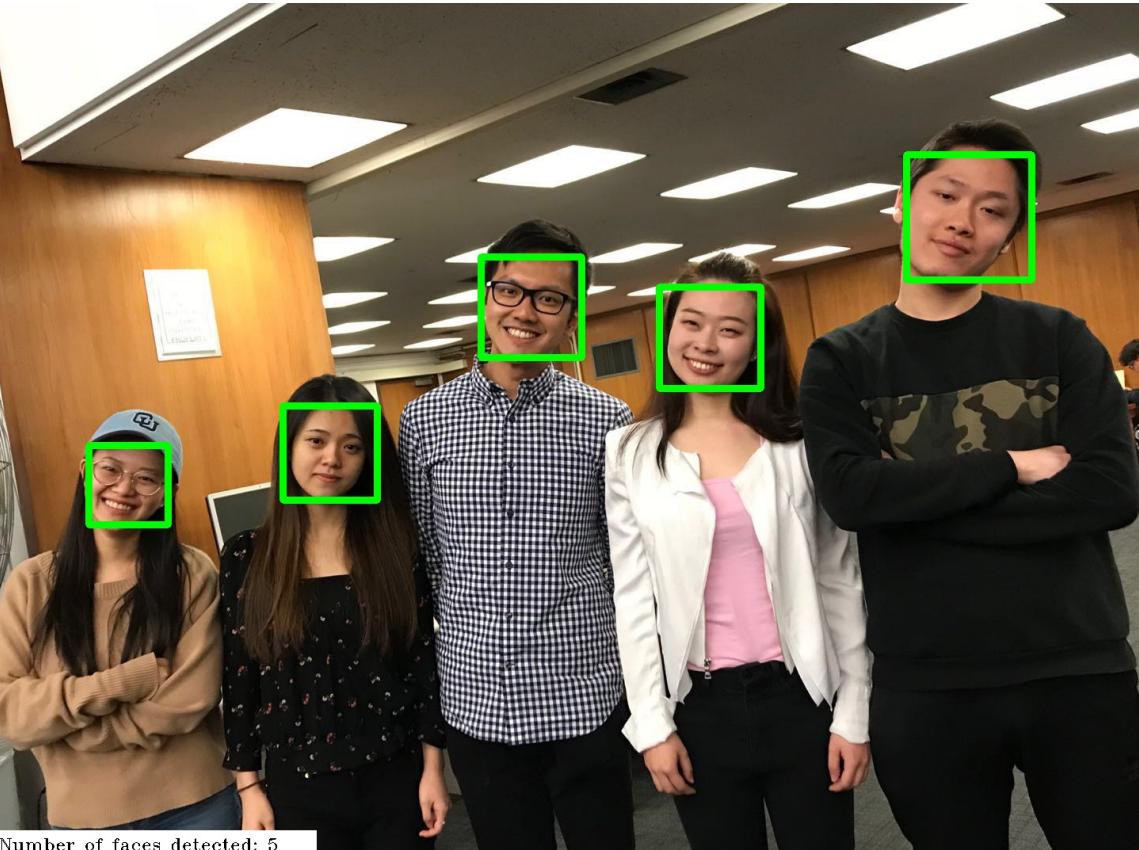


Face Detection

Group 9



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OUTLINE

- 01 Motivation
- 02 Business Insights
- 03 Methods
- 04 Results



MOTIVATION

Everyday actions are increasingly being handled electronically, instead of pencil and paper or face to face. This growth in electronic transactions results in great demand for fast and accurate user detection and identification.

The objective of our project is to design a process to detect human faces and count the number of them from an image or webcam



BUSINESS INSIGHTS

Commercial

- App Development
- Recruit

Social Media

- Photo tag

School

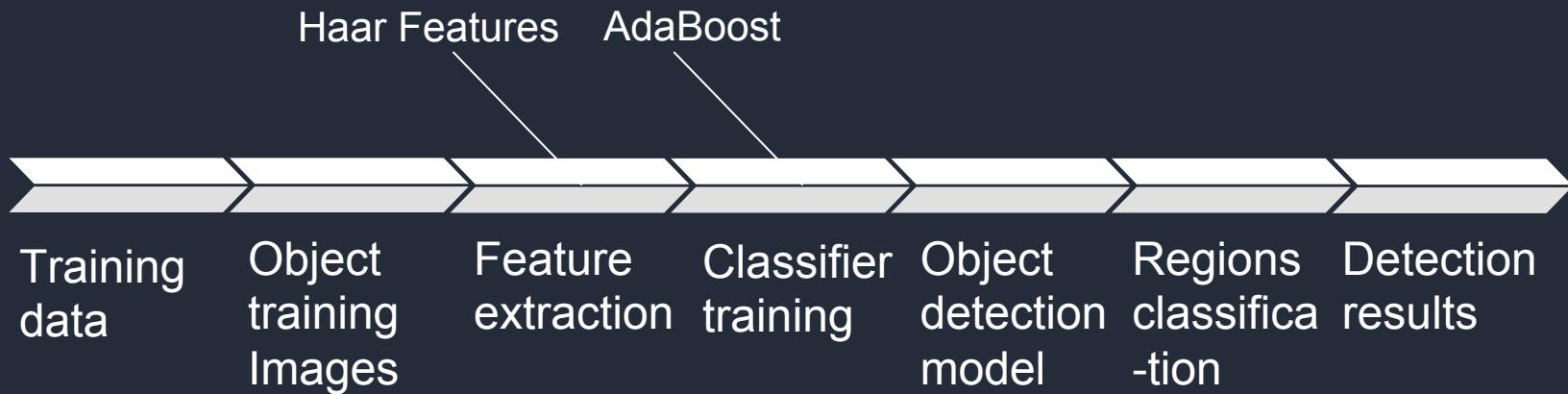
- Count the student in class

FACE DETECTION

Face detection is a computer technology that determines the locations and sizes of human faces in arbitrary(digital) image.

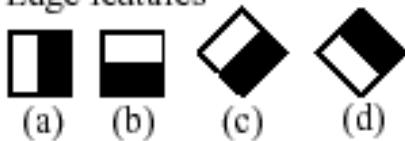


METHODS

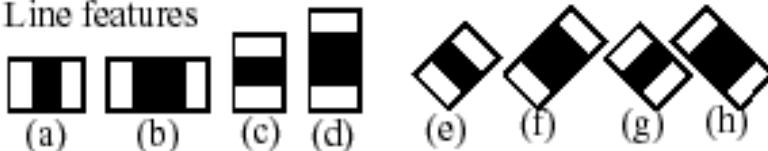


Haar Features

1. Edge features



2. Line features



3. Center-surround features



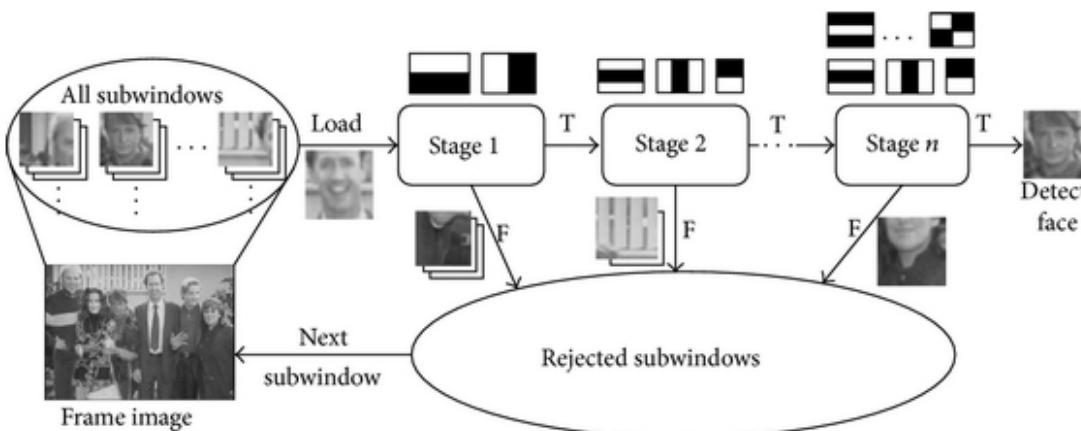
- Each feature is a single value obtained by subtracting sum of pixels under the white rectangle from sum of pixels under the black rectangle
- Each feature is related to a special location in the sub-window

Haar Features



- ✧ All faces share some common properties
 - The eyes region is darker than the upper cheeks
 - The nose bridge region is brighter than the eyes
- ✧ AdaBoost Feature Selection

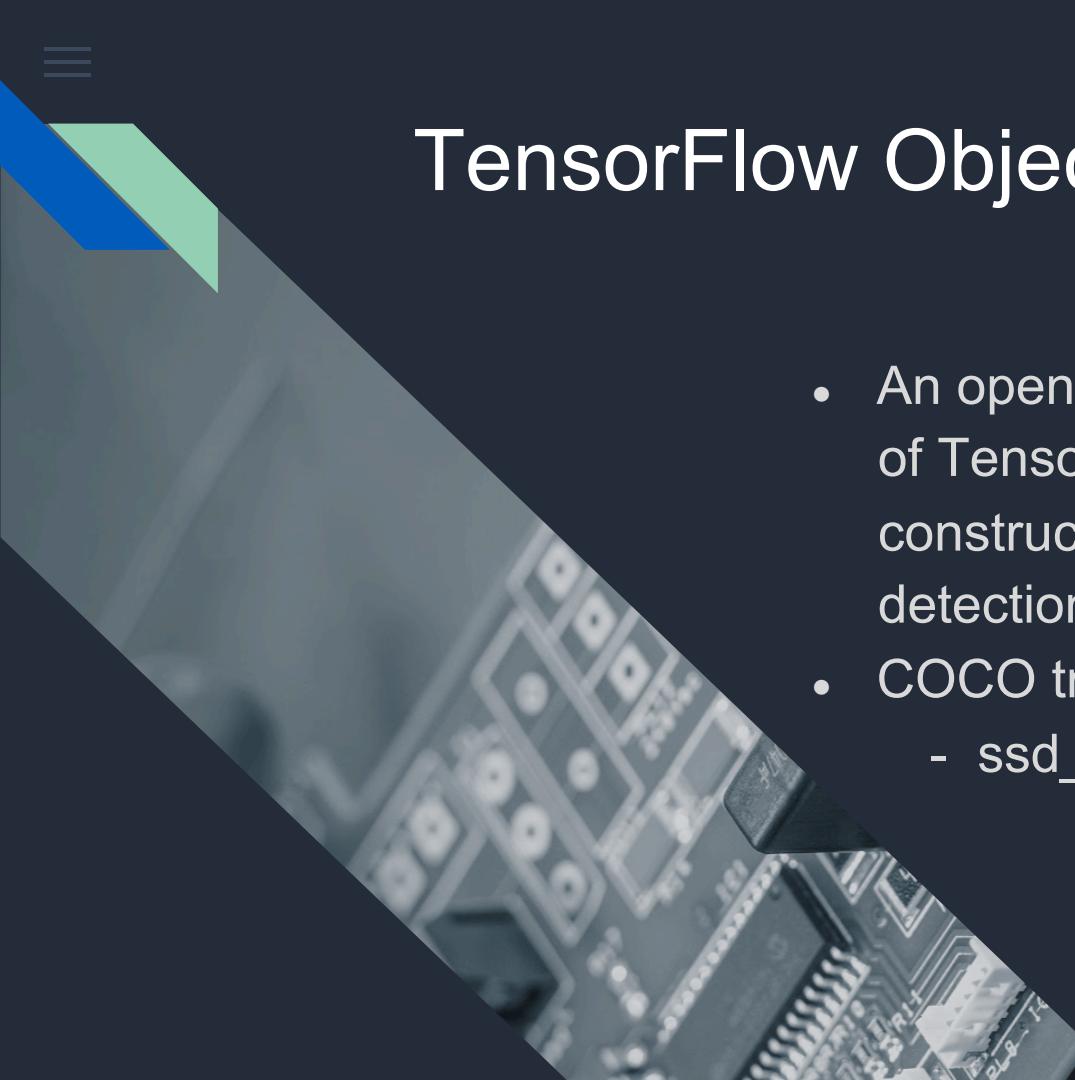
Cascade Structure For Haar Classifier



- Group the features into different stages of classifiers and apply one-by-one.
- If a window fails the first stage, discard it. We don't consider remaining features on it.
- If it pass, apply the second stage of the features and continue the process.
- The window which passes all stages is a face region

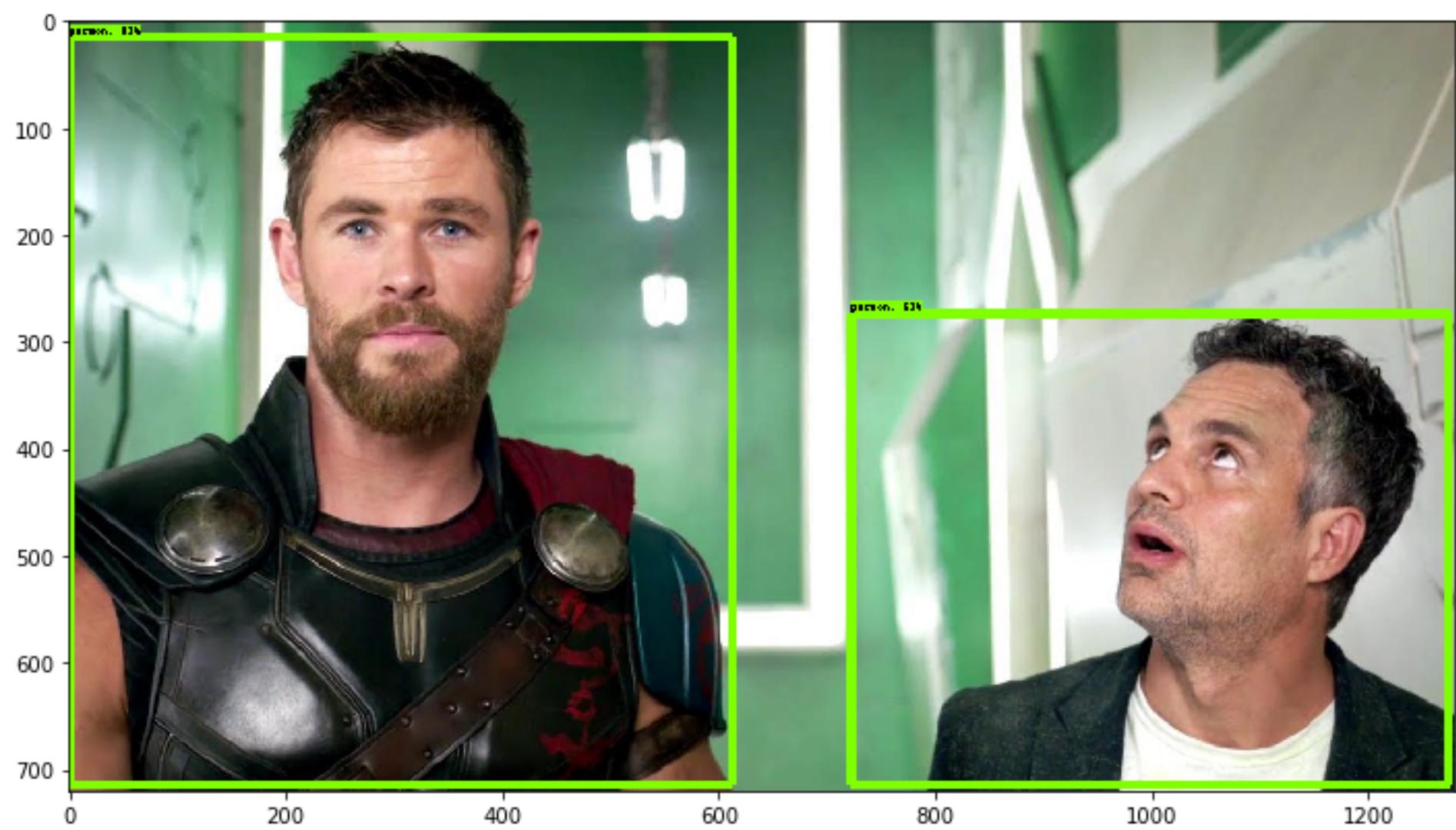


Number of faces detected: 50



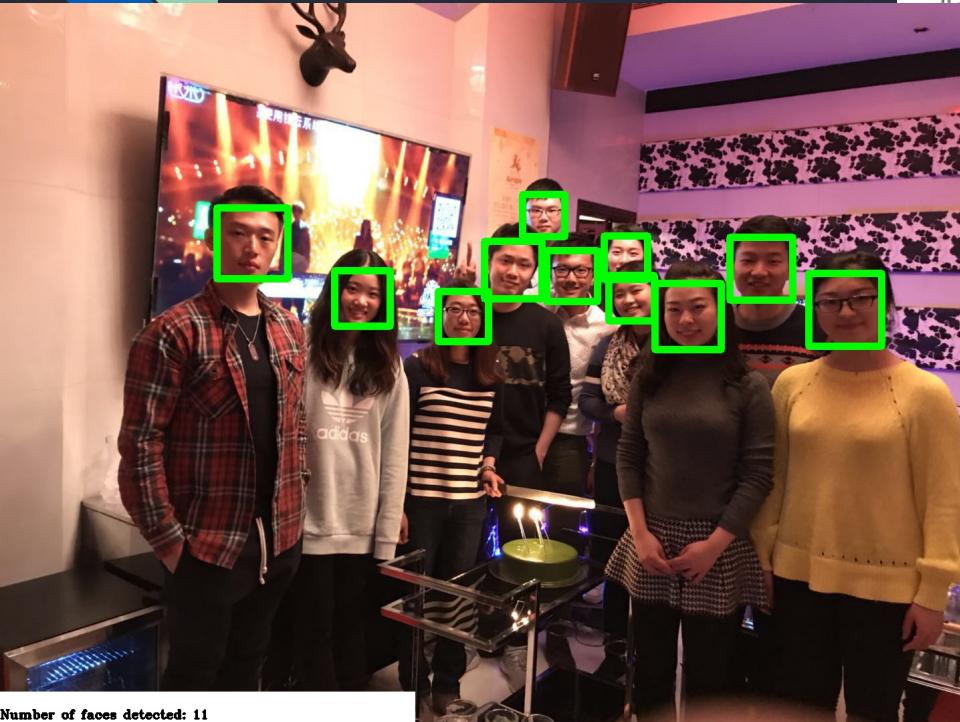
TensorFlow Object Detection

- An open source framework built on top of TensorFlow that makes easy to construct, train and deploy object detection models.
- COCO trained model
 - `ssd_mobilenet_v1_coco`

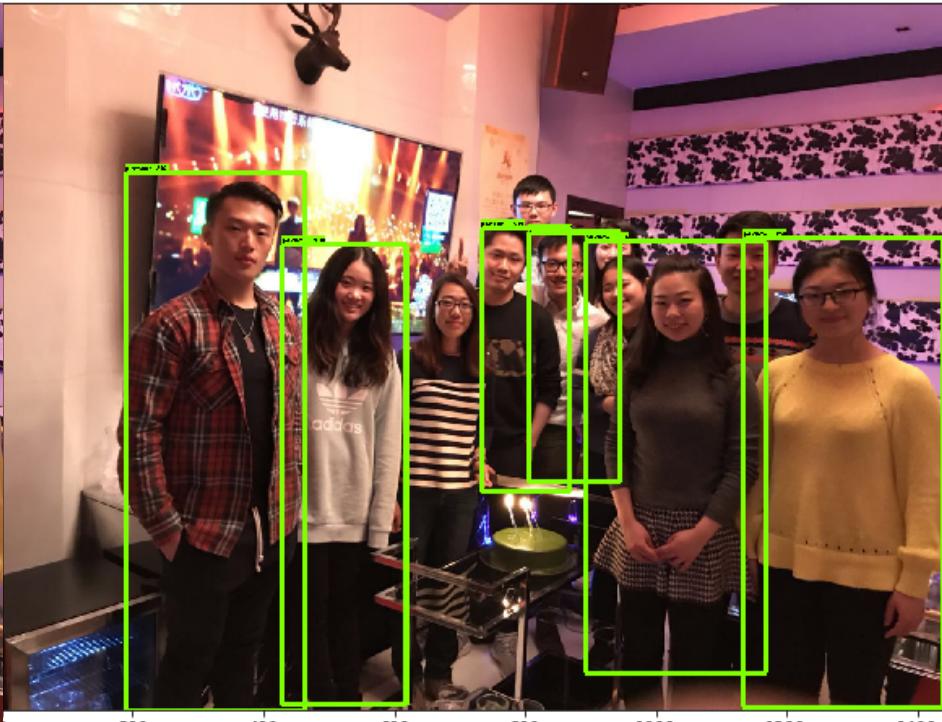


person: 100%

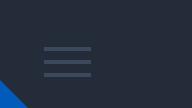
Cascade VS TensorFlow



Specificity



Generalizability



Webcam



THANK YOU!