



Height Calculator

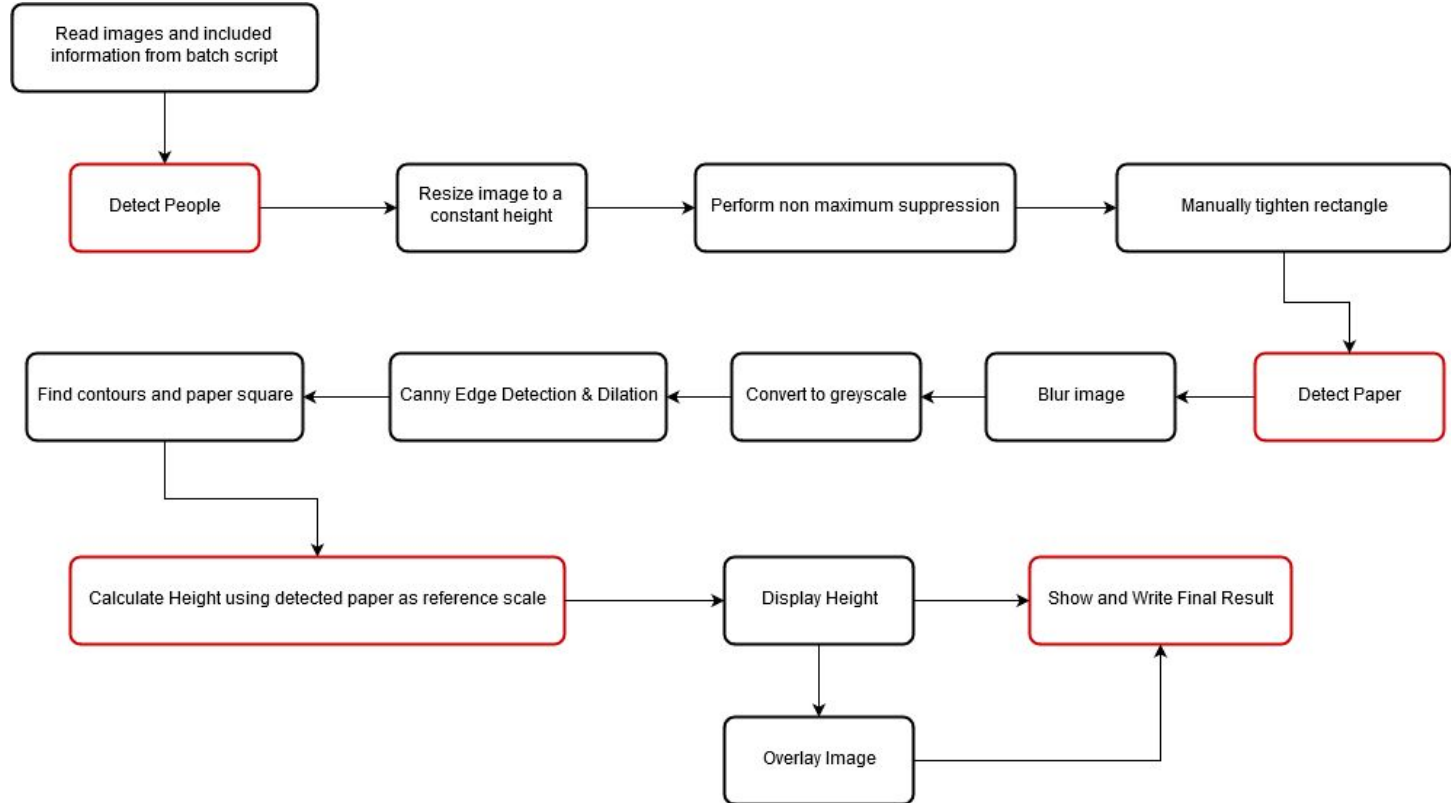
Sean Miles, Tung Dinh, Bradley Pratt

Overview

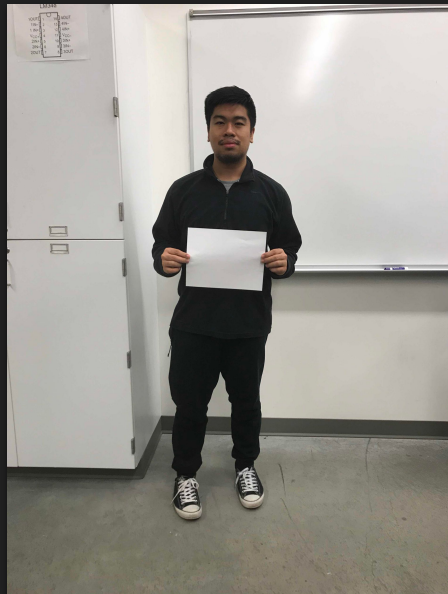
- Estimate the height of a detected person using a piece of paper in the image as a reference scale
- Display their height on the piece of paper, or overlay an image on the paper if given

Process

Process Flowchart



Detecting People



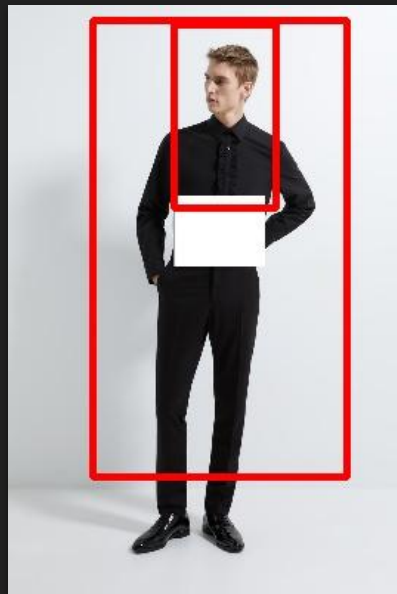
Histogram of Oriented Gradients: Set Default People Detector SVM,
Resize image to a constant height but maintain aspect ratio

Detecting People



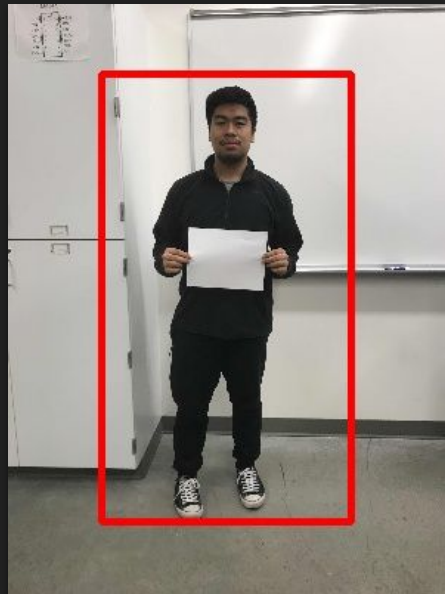
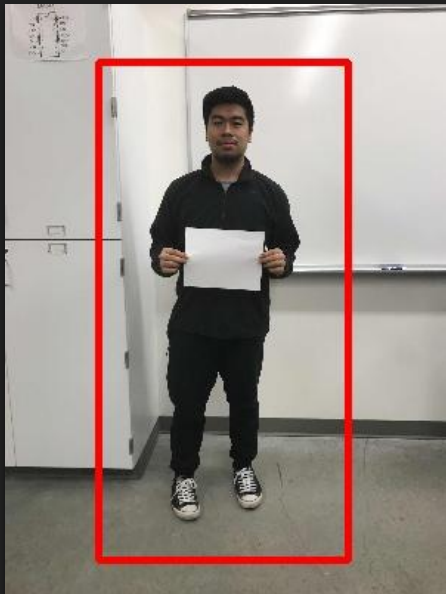
Detect at multiple scales:
Specific window stride and scales to check

Detecting People



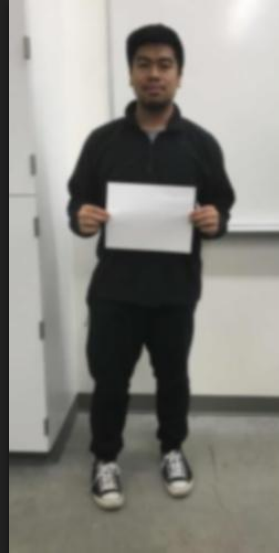
Perform Non-Maximum Suppression
(not always necessary)

Detecting People



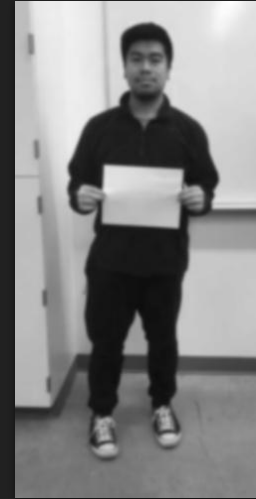
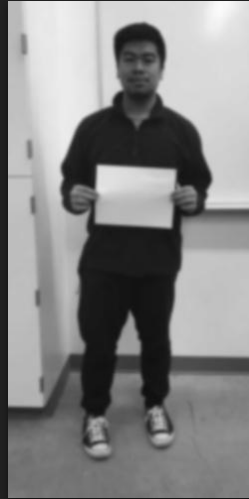
Resize to compensate for overestimation

Detecting Paper



Scale down, scale up

Detecting Paper



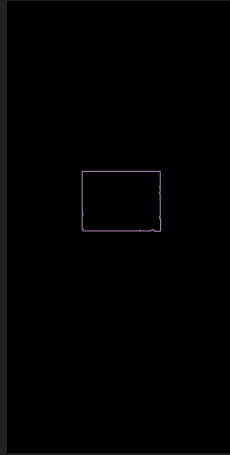
Convert to grayscale

Detecting Paper



Canny Edge Detection & Dilation

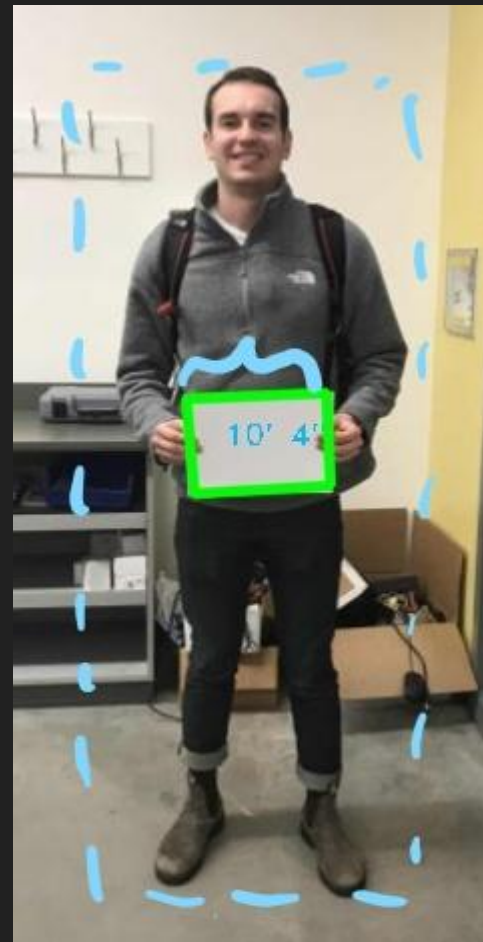
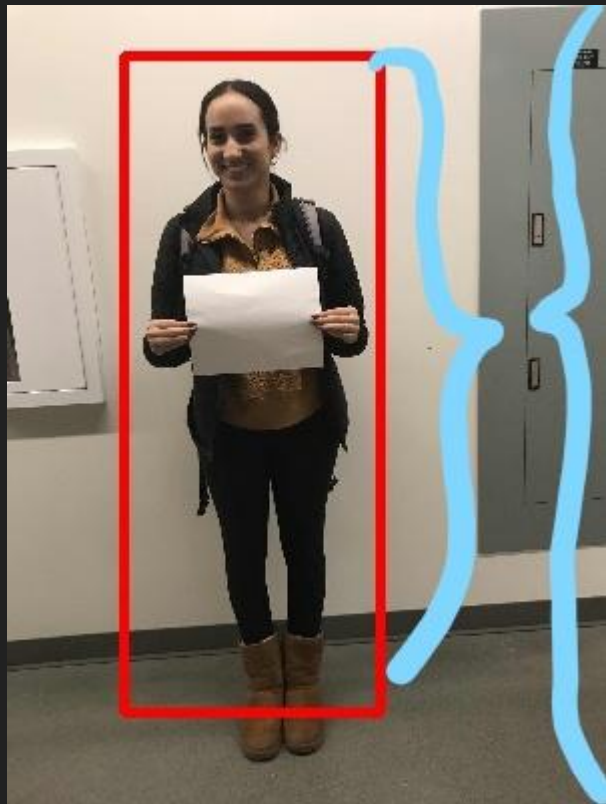
Detecting Paper



Find contours and the paper square

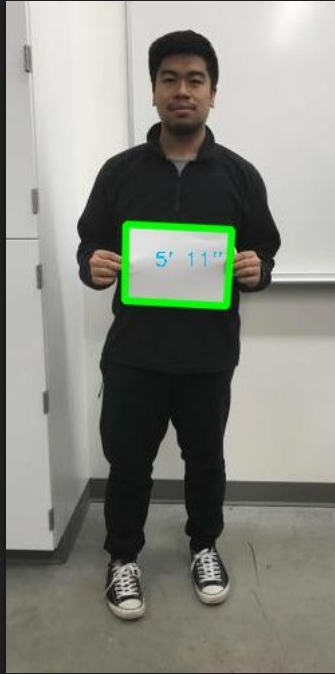
Overlay Image (Optional)





Calculating Height

Calculating Height



Estimated: 5' 11"
Actual: 5' 4"



Estimated: 6' 1"
Actual: 5' 11"

Challenges

- Sliding windows were too small/large - resized image to a constant height but maintained aspect ratio
- People detections are too far above their head - resized to be very slightly smaller and moved down slightly
- The more objects inside the people detection rectangle, the harder it is to recognize the paper - only checked the square box for paper

Limitations



- Does not work with images that are too narrow - insufficient space for the sliding window
- Shoes pointing down/towards the camera are within the rectangle and will increase height slightly
- Height calculations depend on functionality of the other classes - small changes can throw off calculations
- Most photos are taken at eye level, so person size is slightly distorted in pictures

Things We'd Like to Add (Time Dependent)

1. User input paper dimensions
2. Auto-recognition of paper size based off most commonly available options
3. User input measurement preference (imperial or metric)
4. Multiple people height calculation (at the same or different fields of depth)

Questions?