

HOG Human Detection

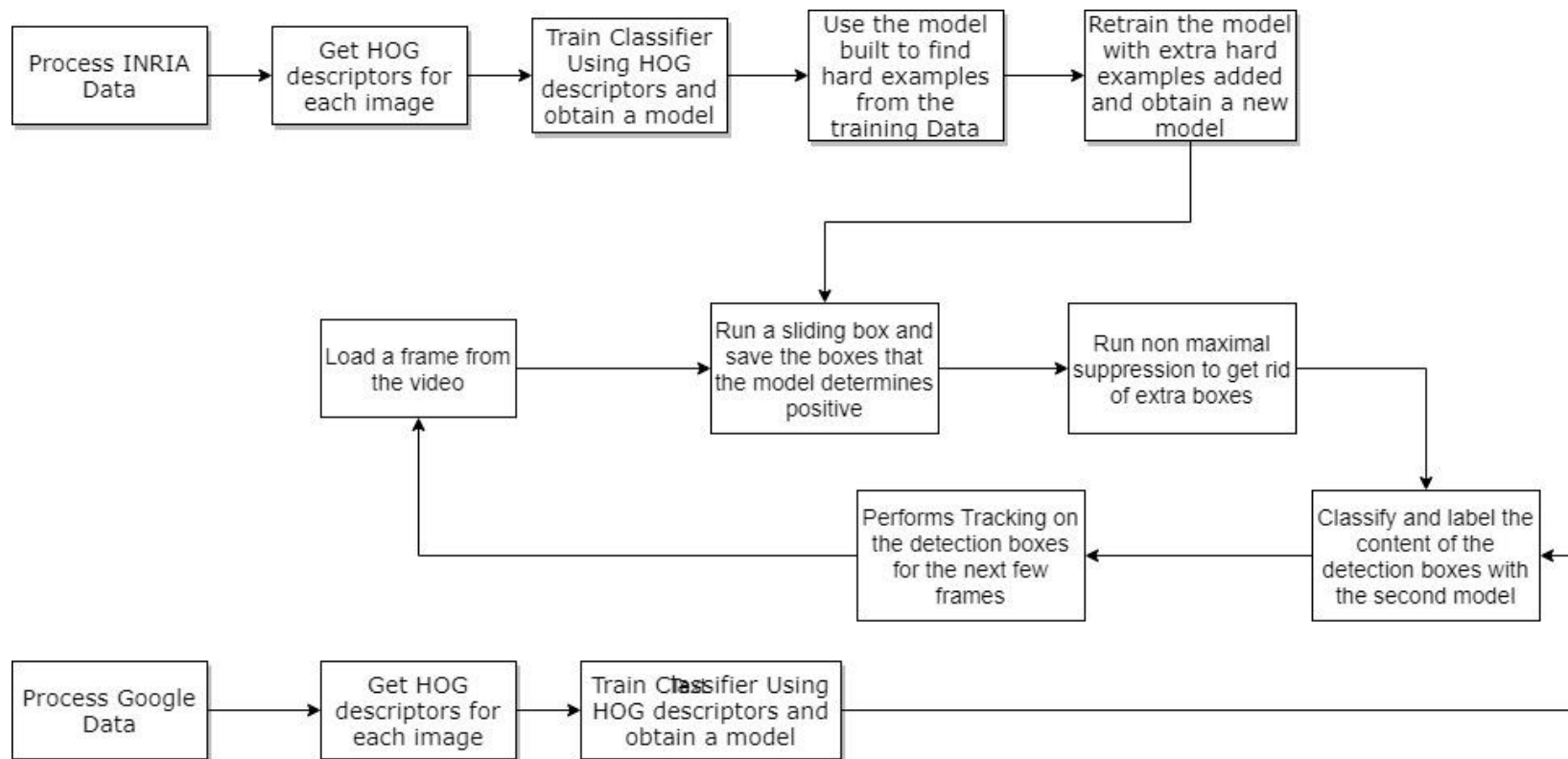
Zizhuang Fan

Problem Description

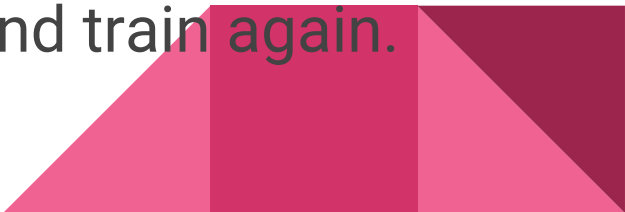
- Pedestrian awareness in autonomous driving
- Surveillance alarms
- Automatic Gathering of consumer information
-
- and.....
- “I’m bad at FPS games”



Methods



Retraining the Model

- Find random negative windows from each negative image
 - Train Model
 - Examine failed false positives
 - access the negative image with the false positive
 - Do a extensive search for false positives on that image over a image pyramid
 - Add the hard examples to training set and train again.
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Sliding Window

- Box of fixed size 64x128
 - Slides from left to right, top to bottom
 - Person or not? Use the trained model
 - Scale down using a gaussian pyramid and slide the box from beginning again
 - Save the boxes that contains a person
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- One larger layer, 6 smaller layers with scale of 1.3
 - Can detect pretty large person in a image with reasonable dimension



Non Maximum Suppression

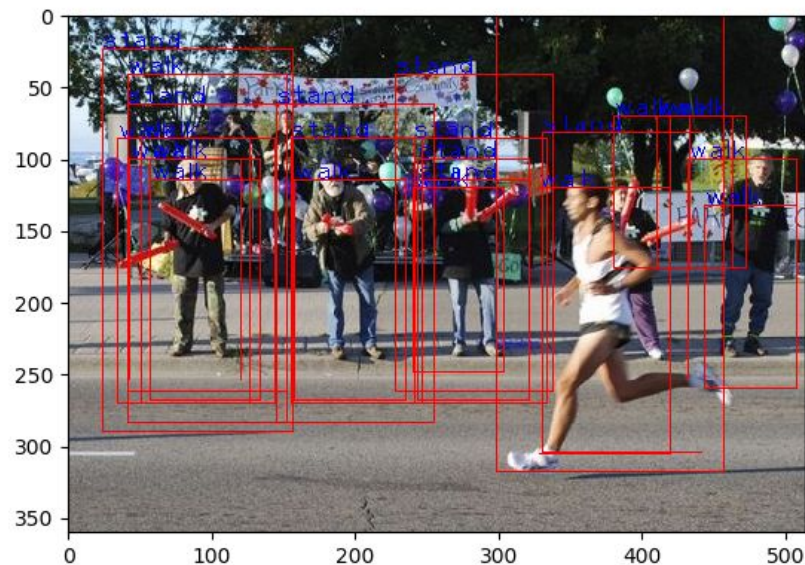
- Picks out the highest scoring box out of all proposed boxes
- Remove any box that has 50% overlap with that box
- Repeats until all boxes are removed
- The boxes that we pick out are the ones we are interested



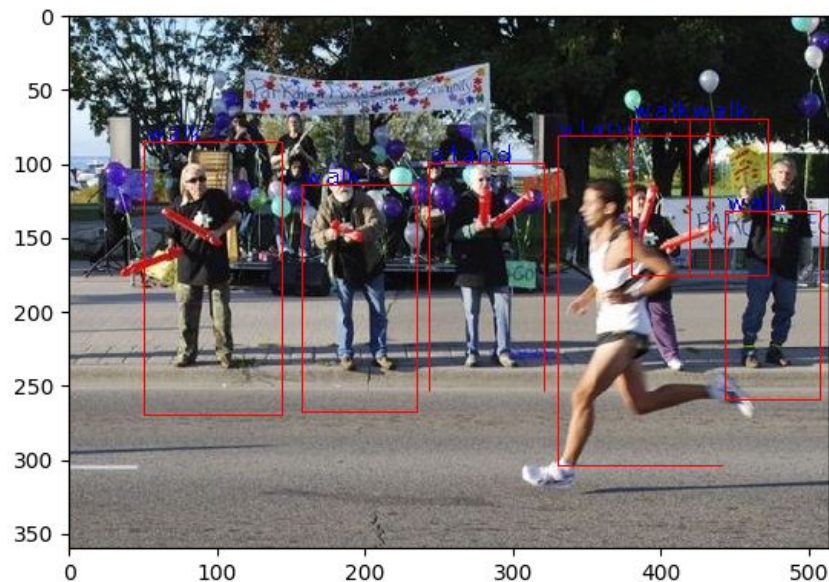
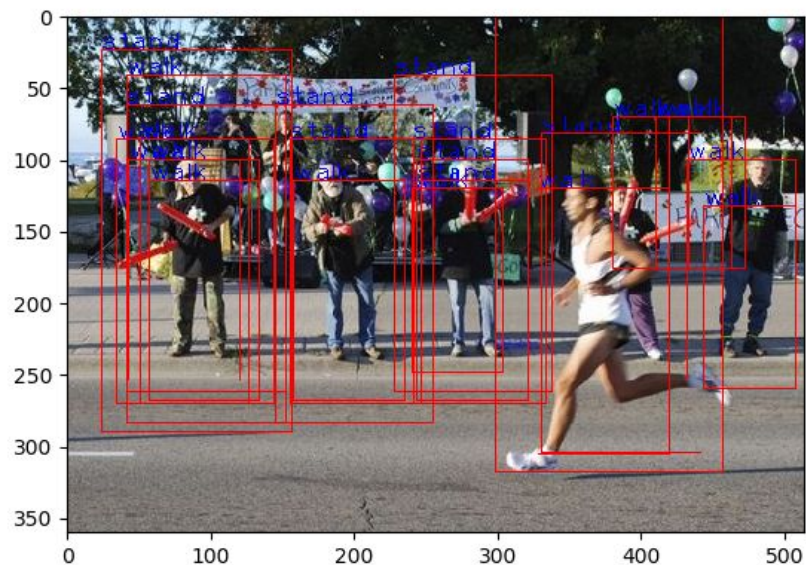
Some Results



Some results.... Not non maximum suppressed



Some results.... suppressed



Detection VS Tracking

- Problem: Detection is very expensive cannot do it for every frame
- Solution: detect the person, then track him across the screen
- Problem: What if a undetected person enters the scene?
- Solution: Do detection at set intervals and track for rest of the interval.

Tracking cost increases as number of objects tracked increases

Sliding box detection slides the same number of boxes at any frame

Some examples....



Topics

- Training the neural network (Deep learning)
- Hog feature descriptor (Features)
- Sliding box, non maximal suppression (Detection)
- Gaussian pyramids, tracking (Image processing)



Some Explanations

- Realized that my data was only monocular images and video, so 3d coordinate was omitted. Added tracking for compensation.
- My partner dropped the course a week before this was due, her part is significantly reduced. (not really working)
- The entire project is done individually.
- Have a Great Winter Break!

