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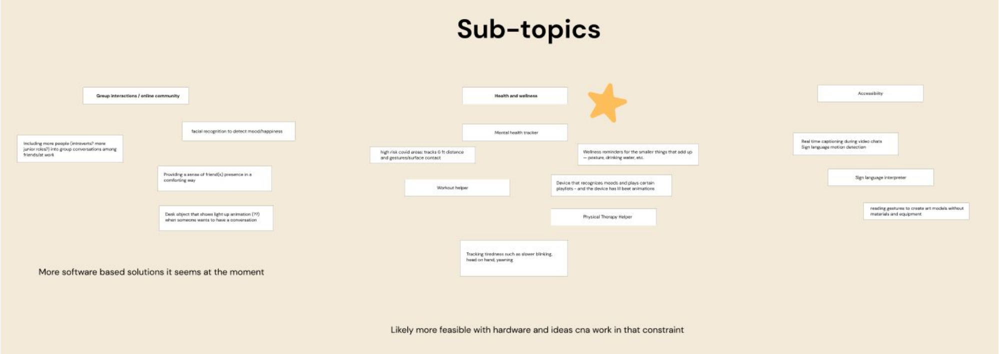
Weekly Lab Report

1. What did you plan to do last week?
    - Our team planned to brainstorm ideas on what kind of topics we want our project to look like
    - We also wanted to choose a platform where we would store all of our documentation and project details
    - Personally, I just planned to do the first lab assignment.
2. What did you end up doing last week?
    - Group
        1. Using Figma, we jotted down the topics we were interested in which were “Health and wellness”, “Group communication”, and “Accessibility”
        2. We ended up picking “Health and wellness” as our main goal and will meet together again on Oct 6 to discuss details about implementing our project
    - Individual
        1. For the lab assignment, I ran into some problems with Task 4 Part 4 using K means to determine the dominant color, since it seemed that the computation for each frame was taking too long to execute. This caused the webcam live feed to lag and it was just not feasible. The tutorials linked were just for static images so the time to execute didn’t matter as much, but applying it to video was a challenge.
        2. Some successes were that I was able to understand other people’s code a bit better and apply sample code to what I needed for the assignment.
    - 

Sub-topics

Group interactions / online community

facial recognition to detect mood/happiness

Including more people (introverts? more junior roles?) into group conversations among friends/at work

Providing a sense of friend(s) presence in a comforting way

Desk object that shows light up animation (??) when someone wants to have a conversation

More software based solutions it seems at the moment

Health and wellness

Mental health tracker

high risk covid areas: tracks 6 ft distance and gestures/surface contact

Wellness reminders for the smaller things that add up — posture, drinking water, etc.

Workout helper

Device that recognizes moods and plays certain playlists - and the device has lil beat animations

Physical Therapy Helper

Tracking tiredness such as slower blinking, head on hand, yawning

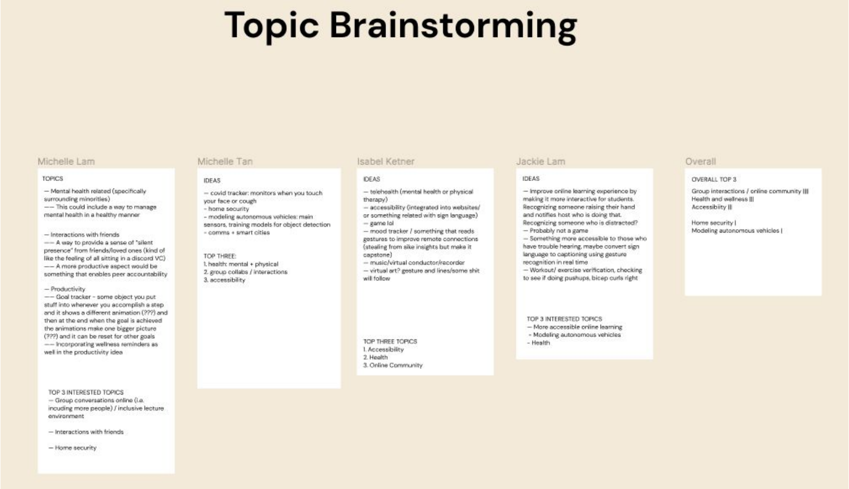
Likely more feasible with hardware and ideas cna work in that constraint

Accessibility

Real time captioning during video chats
Sign language motion detection

Sign language interpreter

reading gestures to create art models without materials and equipment



Topic Brainstorming

Michelle Lam

TOPICS

— Mental health related (specifically surrounding minorities)
—— This could include a way to manage mental health in a healthy manner

— Interactions with friends
—— A way to provide a sense of "silent presence" from friends/loved ones (kind of like the feeling of all sitting in a discord VC)
—— A more productive aspect would be something that enables peer accountability

— Productivity
—— Goal tracker - some object you put stuff into whenever you accomplish a step and it shows a different animation (???) and then at the end when the goal is achieved the animations make one bigger picture (???) and it can be reset for other goals
—— Incorporating wellness reminders as well in the productivity idea

TOP 3 INTERESTED TOPICS
— Group conversations online (i.e. incuding more people) / inclusive lecture environment

— Interactions with friends

— Home security

Michelle Tan

IDEAS

— covid tracker: monitors when you touch your face or cough
- home security
- modeling autonomous vehicles: main sensors, training models for object detection
- comms + smart cities

TOP THREE:
1. health: mental + physical
2. group collabs / interactions
3. accessibility

Isabel Ketner

IDEAS

— telehealth (mental health or physical therapy)
— accessibility (integrated into websites/ or something related with sign language)
— game lol
— mood tracker / something that reads gestures to improve remote connections (stealing from sike insights but make it capstone)
— music/virtual conductor/recorder
— virtual art? gesture and lines/some shit will follow

TOP THREE TOPICS
1. Accessibility
2. Health
3. Online Community

Jackie Lam

IDEAS

— Improve online learning experience by making it more interactive for students. Recognizing someone raising their hand and notifies host who is doing that. Recognizing someone who is distracted?
— Probably not a game
— Something more accessible to those who have trouble hearing, maybe convert sign language to captioning using gesture recognition in real time
— Workout/ exercise verification, checking to see if doing pushups, bicep curls right

TOP 3 INTERESTED TOPICS
— More accessible online learning
- Modeling autonomous vehicles
- Health

Overall

OVERALL TOP 3

Group interactions / online community |||
Health and wellness |||
Accessibility ||

Home security |
Modeling autonomous vehicles |

3. What do you plan to do this week?
    - This week, I plan to do the next lab assignment involving the Raspberry Pi and try to clarify some questions I had about using K means.

Task 4:

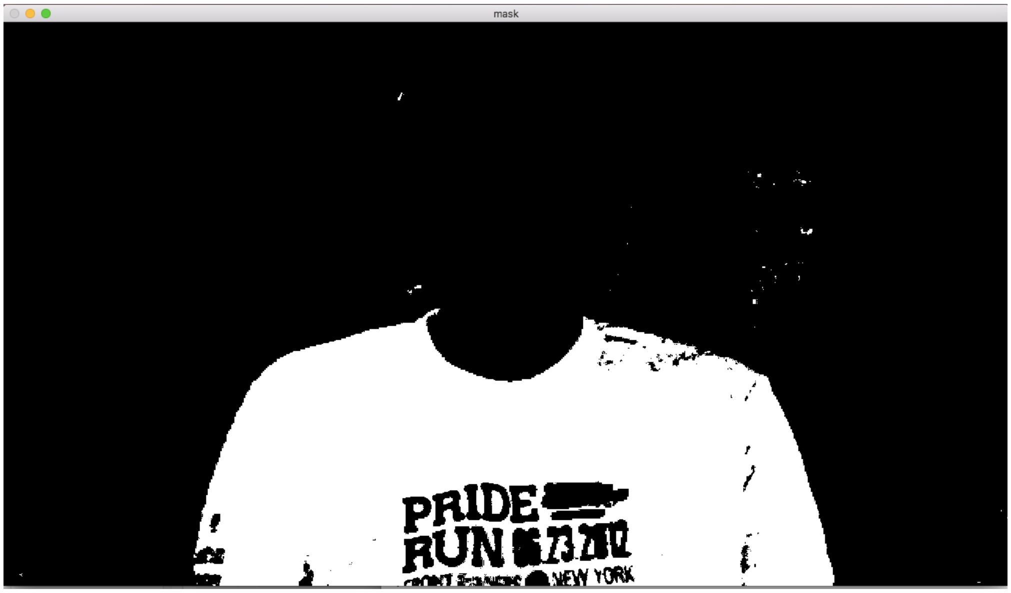
Do this task individually. You can share your results with your teammates to see if their results are similar to yours.

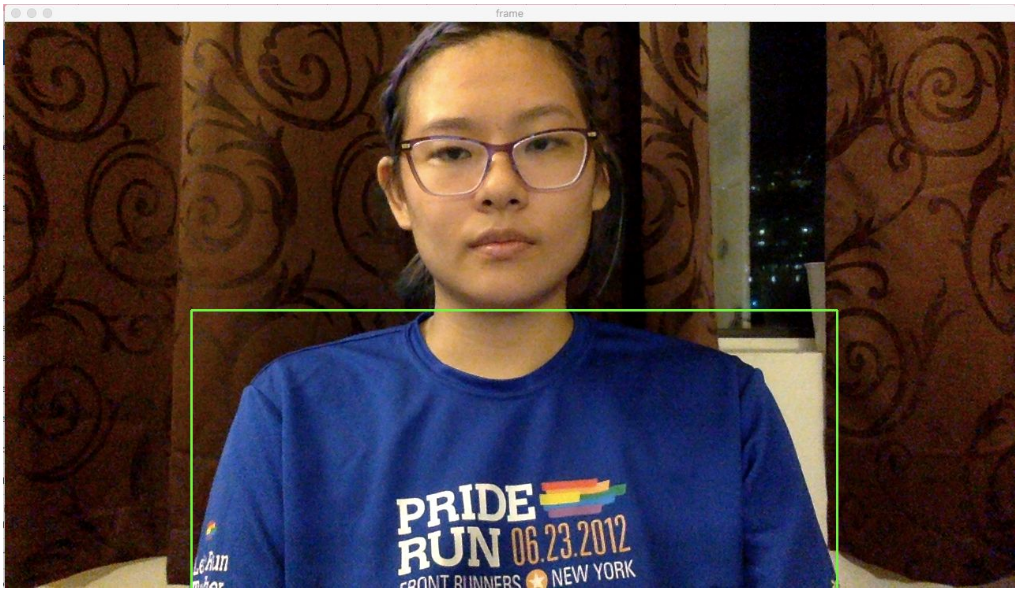
1. Choose something that is relatively monochromatic with a color fairly different from your background surroundings (a water bottle, a piece of clothing). Try to create a video stream where you track this object with a bounding box surrounding it by thresholding HSV or RGB values. Is HSV or RGB typically better? How large is the threshold range that you need to track the object?

HSV is typically better than RGB since HSV is more robust towards external lighting changes. This means that in cases of minor changes in external lighting (such as pale shadows,etc.) Hue values vary relatively less than RGB values and would be better for object detection.

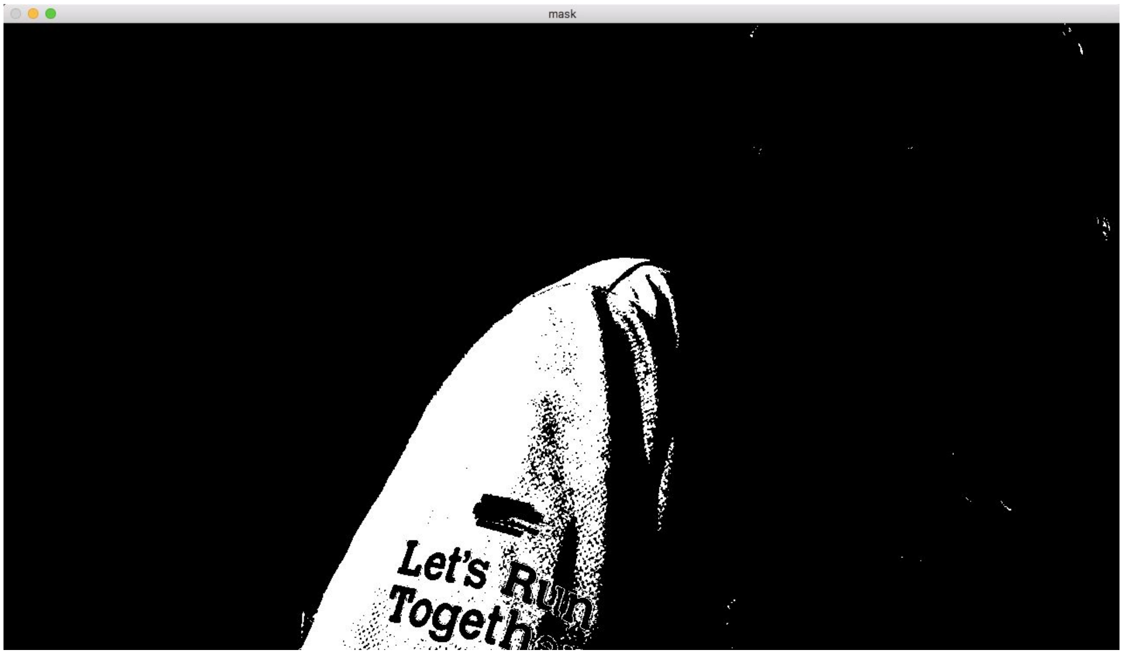
The threshold range for HSV was about 20 for just the hue value and spanned a lot of the S and V values. For RGB, it was larger in the R, G, and B, since it had to take into account the slightest changes in lighting.

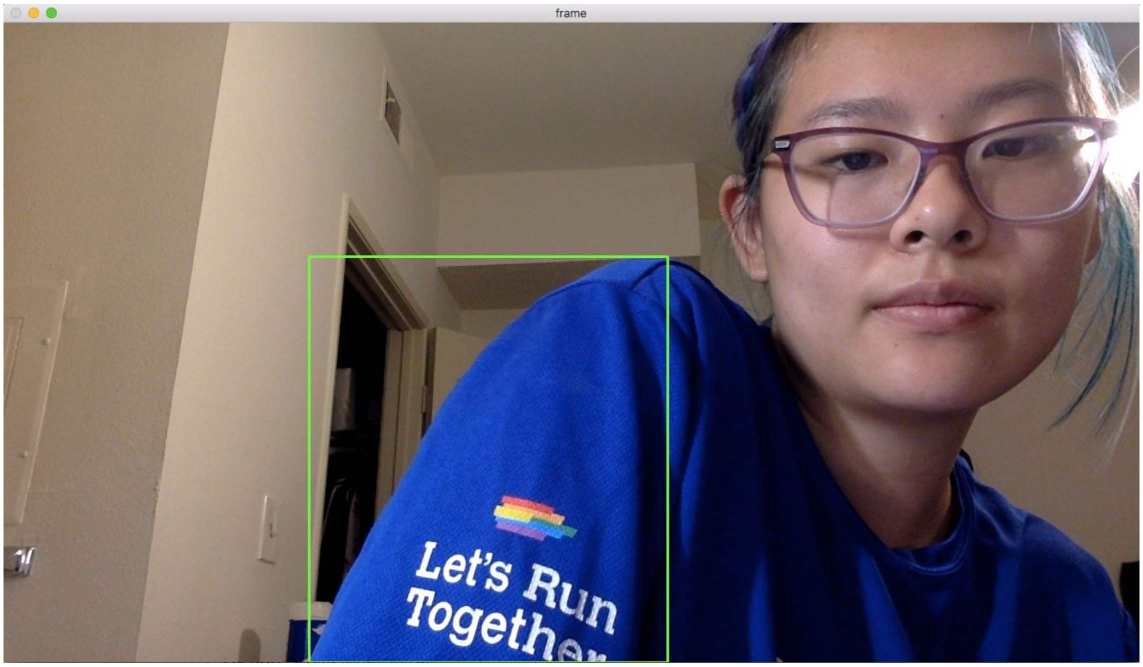
HSV threshold values:





BGR threshold values:





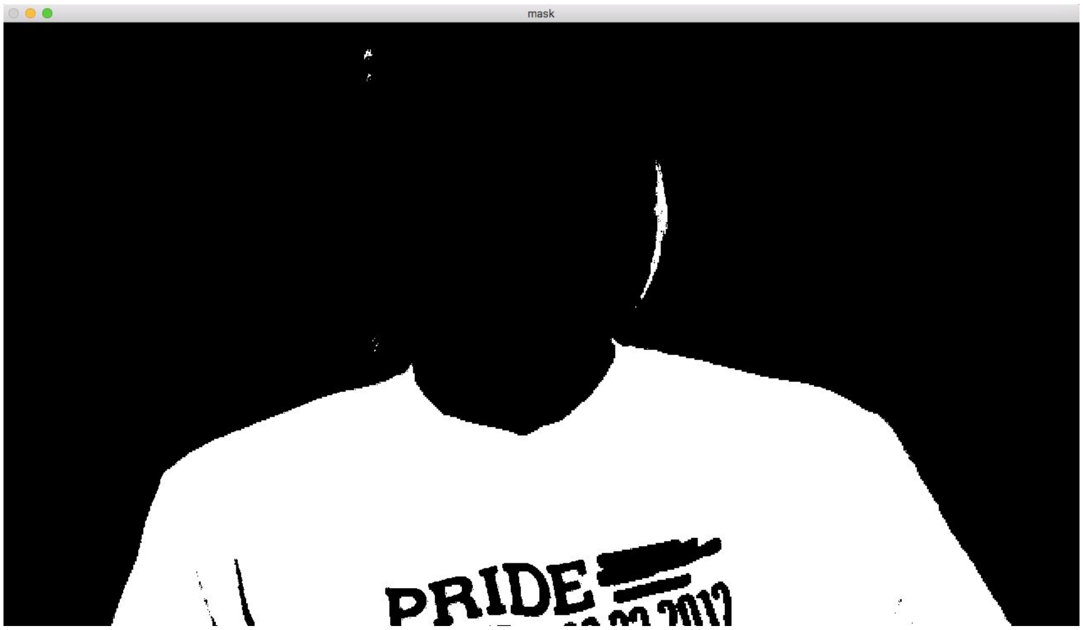
2. Now change the lighting condition (turn on or off the lights or turn on your phone flashlight on the object). Is there a major difference in the tracking ability of your object?

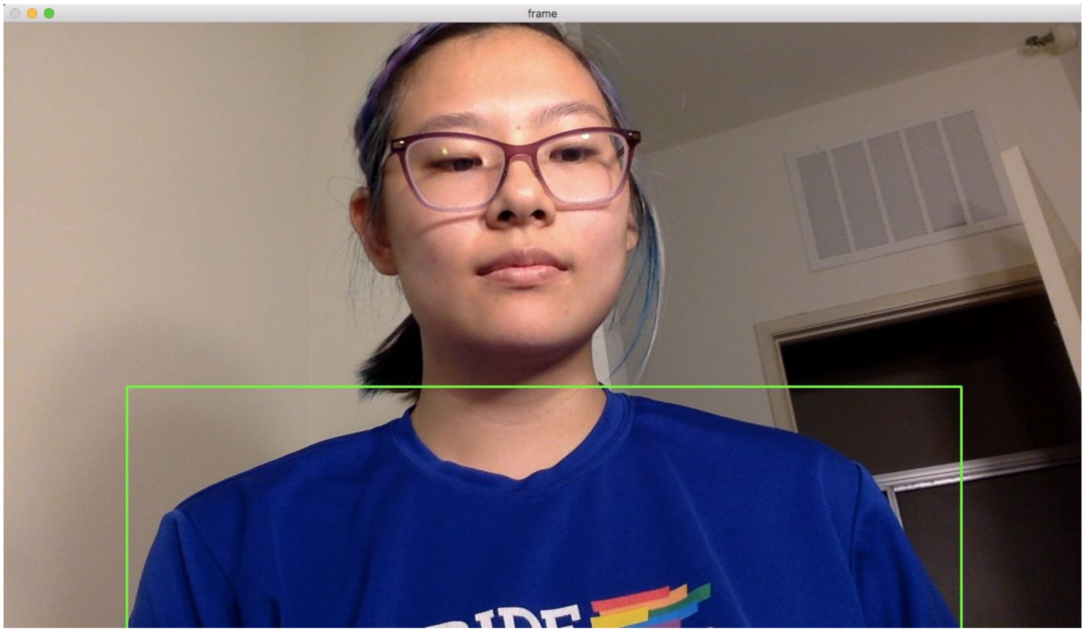
HSV: Despite the various light conditions, my blue shirt was still easily detected, although it is a much darker shade. This was expected since the HSV range takes into account the slight variations in light.

BGR: The tracking ability significantly goes down since BGR does not easily detect variations in light, but rather variations of the BGR spectrum.

HSV can be thought of as variations of a color's light spectrum, whereas BGR can be thought of as variations of colors in general.

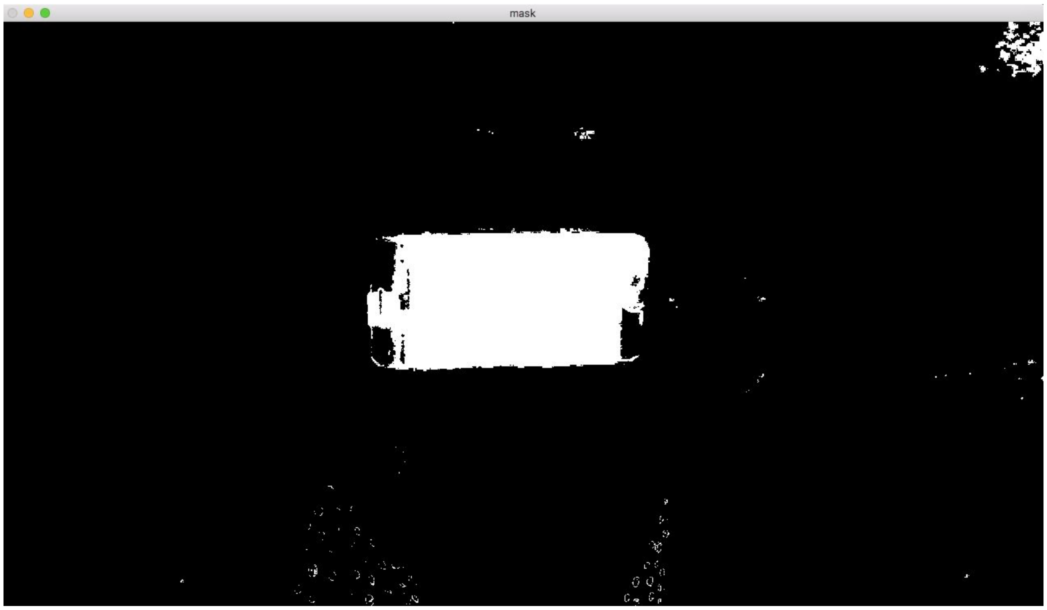
HSV:

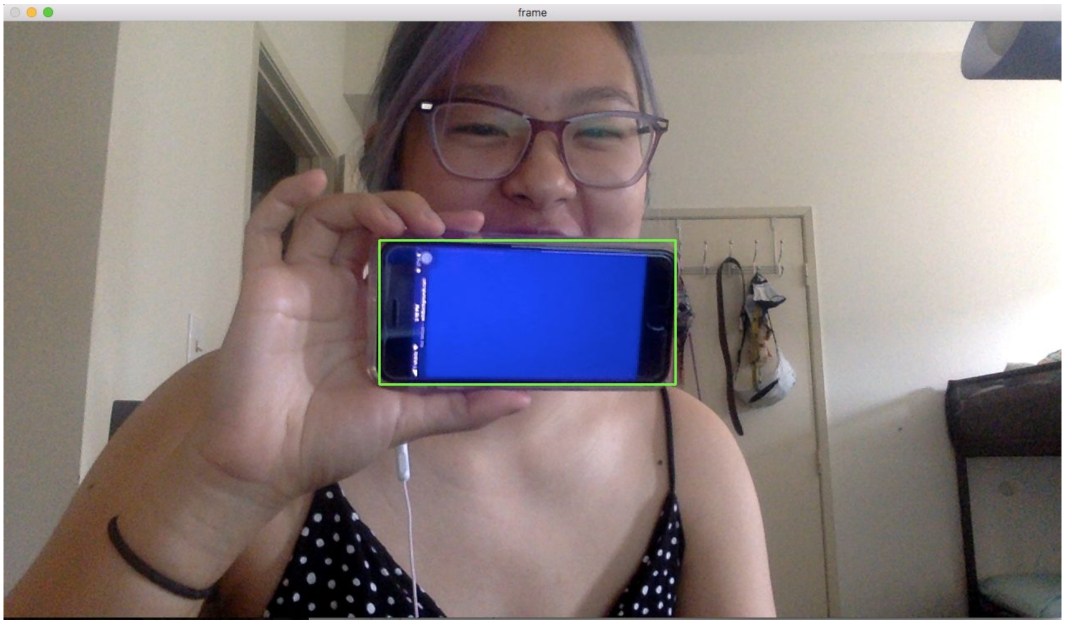




3. Now navigate to a Color Picker on your phone (Zoom into the color zone so that it covers a good portion of your phone screen). Since you can pick your color with the website, see if that is the color (with a small range) that you can pick up with your camera. Does changing your phone brightness help or hurt with how your code is able to track the color?

HSV:
Yes, the color I picked on the Color Picker is able to be detected by the camera. When the brightness is too low, the code isn't able to detect the blue as well. When it is at full brightness, the color seems to be detected pretty well. In general, if the range of brightness is too wide, it might be hard to detect the specific color I want since the range could encompass other objects even just slightly similar to the blue I want.

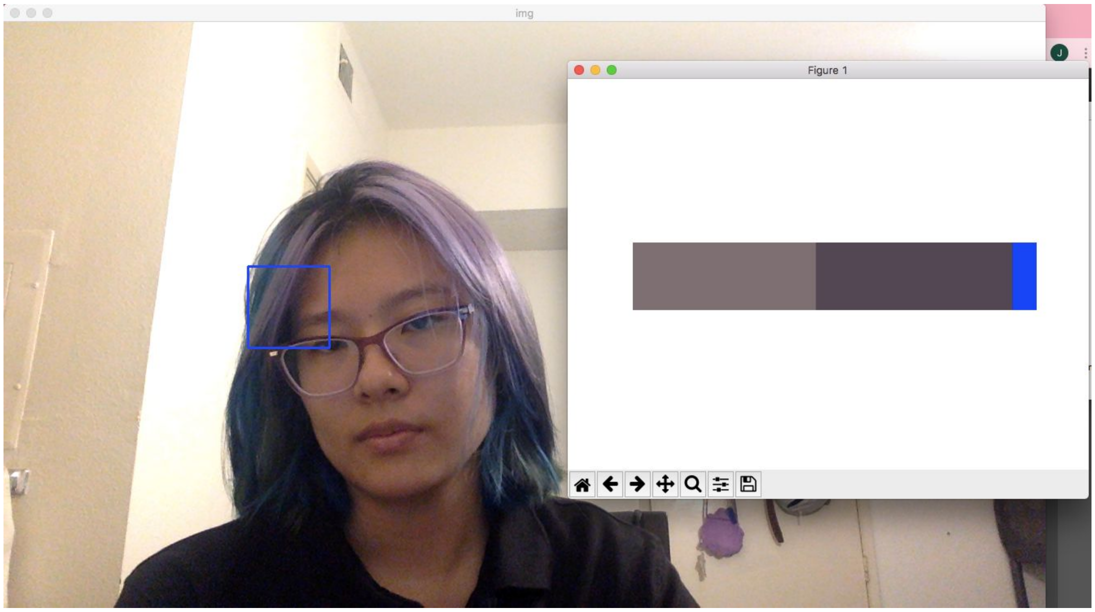


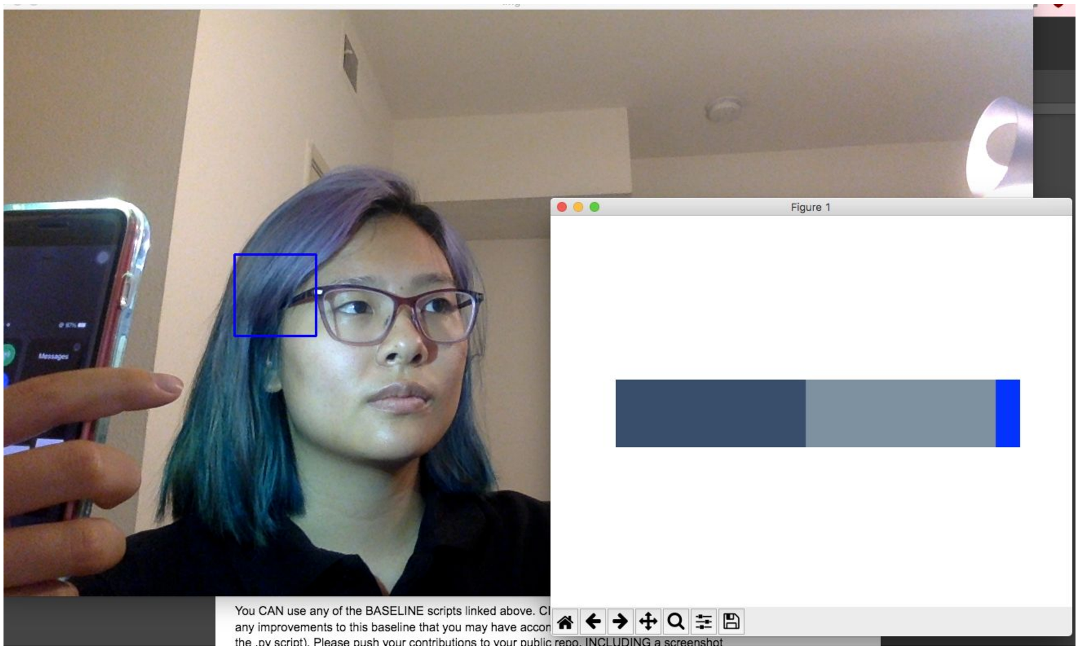


4. Create a new piece of code that can determine the “dominant” color in a designated (central) rectangle in your video feed (Use K-Means, see a tutorial to find an image’s dominant colors). Use your non-phone object and change the brightness of its surroundings. Note the change of the color. Do the same with your phone. Is one or the other more robust to brightness?

I would say both seem to have good results with determining the dominant color in the designated rectangle in the video feed. Even with changing the brightness, the color bar was able to reflect the changes in the color within the box.

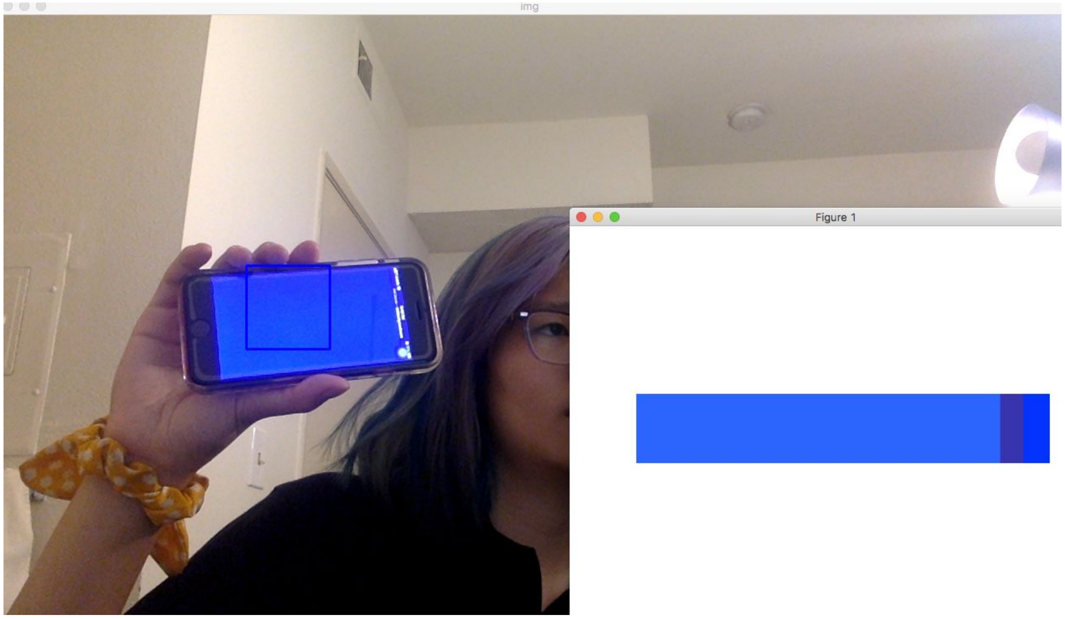
Non Phone Object

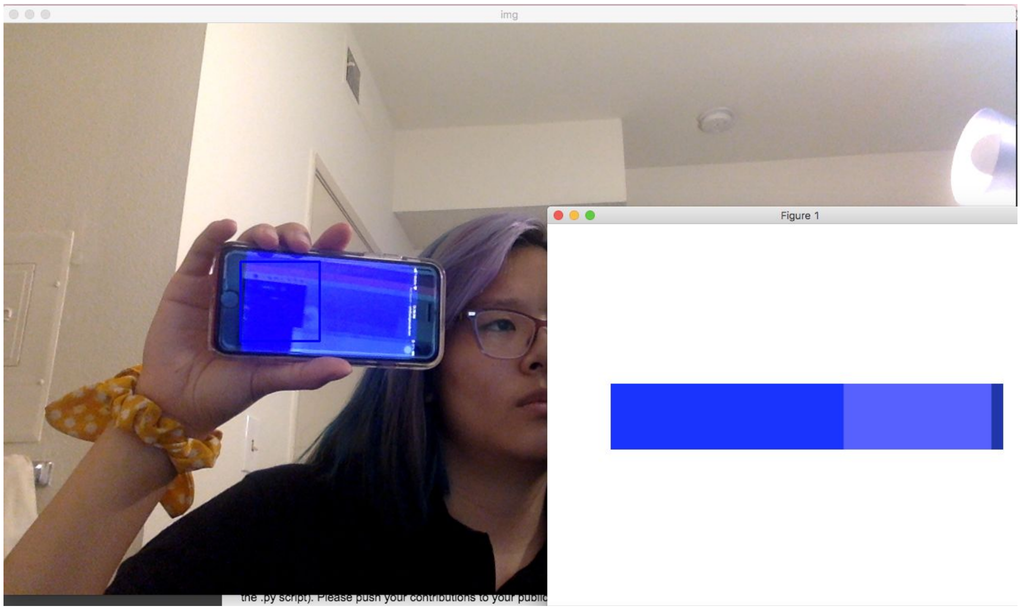




You CAN use any of the BASELINE scripts linked above. Cl
any improvements to this baseline that you may have accon
the .py script). Please push your contributions to your public repo. INCLUDING a screenshot

Phone





the .py script). Please push your contributions to your public

You CAN use any of the BASELINE scripts linked above. CITE the references AND provide any improvements to this baseline that you may have accomplished (IN a header comment in the .py script). Please push your contributions to your public repo, INCLUDING a screenshot of the results.

Helpful links:
Kmeans:

- https://docs.opencv.org/3.4/d1/d5c/tutorial_py_kmeans_opencv.html
- http://opencvpython.blogspot.com/2013/01/k-means-clustering-3-working-with-opencv.html
- https://opencv-python-tutroals.readthedocs.io/en/latest/py_tutorials/py_ml/py_kmeans/py_kmeans_opencv/py_kmeans_opencv.html#kmeans-opencv
- https://code.likeagirl.io/finding-dominant-colour-on-an-image-b4e075f98097
- https://fossies.org/linux/opencv/samples/python/gaussian_mix.py