

Name: Ting-Yu Lan & Carrie Yuan

15494 Cognitive Robotics

HW6

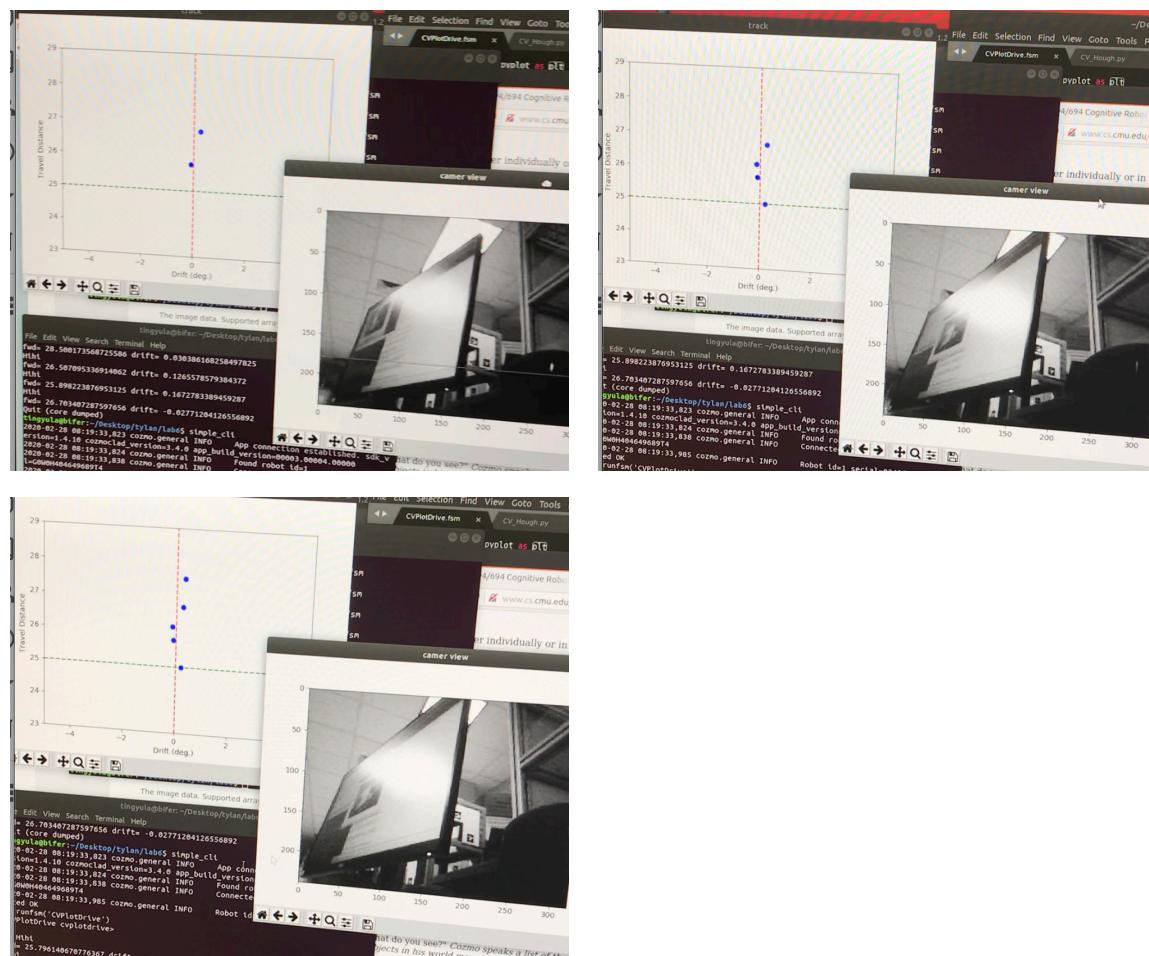
Problem 1: Camera view in PlotDrive

I add camera view based on PlotDrive.fsm. I add a function called “user_image”. It input camera’s image and use matplotlib to show gray scale camera’s image. It would only update shown image for every 10 call of user_image().

```
def user_image(self,image,gray):
    self.count = self.count+1
    if(self.count%5==0):
        plt.figure('camer view')
        plt.pause(0.1)
        plt.imshow(gray, cmap='gray')
```

The result is shown below. We can see that dots would add to graph while Cozmo move forward. Also, we can see Cozmo's current view on another figure.

Result video: <https://drive.google.com/file/d/176JHM4tpVdisBPEjKrevdHblqKy5GB8Y/view?usp=sharing>



Name: Ting-Yu Lan & Carrie Yuan

Problem 2: Shape Matching

My code can continuous show and capture Cozmo's camera view. Then find contours via provided do_contour() function. I add "Star.png" images, and compare it with all contours found. Then, print out the smallest similarity value (smaller value means more similar).

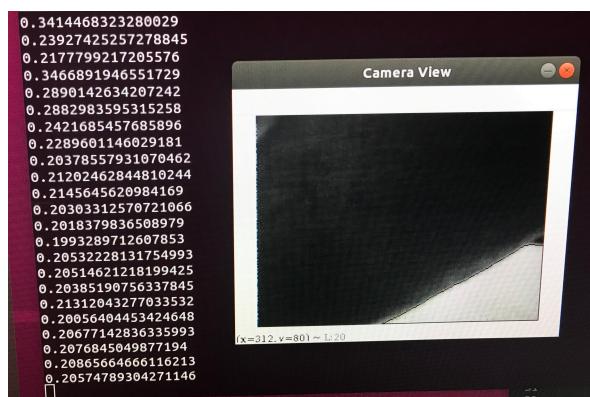
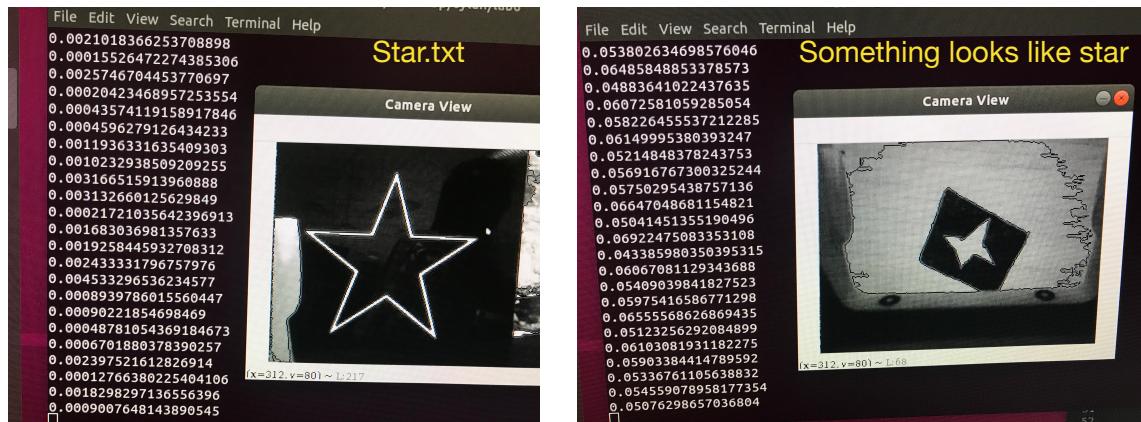
As the code below shown, my code would compare all contour with cnt1, which is my own "Star.png". Then, return min similarity value.

```
for area_entry in areas:
    if area_entry[1] < minArea:
        break
    temp = index = area_entry[0]
    depth = -1
    while temp != -1 and depth < len(colors)-1:
        depth += 1
        temp = hierarchy[0,temp,3]
    contour = contours[index]
    cv2.drawContours(image, [contour], 0, colors[depth], 1)
    result.append(contour)
    score.append([cv2.matchShapes(cnt1,contour,1,0.0)])
```



```
cv2.namedWindow("Camera View")
cv2.imshow("Camera View", image)
return min(score)
```

Terminal would continuous update the smallest similarity value for different Cozmo's camera images. We can see that if Cozmo see "Star.png", it would have smaller similarity value. If it does not see things look like star, it would have higher value. Moreover, if it see something looks like star but not "Star.png", it would have medium value.



Name: Ting-Yu Lan & Carrie Yuan

Problem 3: Speech Recognition

1. "Cozmo, what do you see?" Cozmo speaks a list of the visible cube and wall objects in his world map.

I extract the cubes and walls that Cozmo can see using `world.world_map.objects`, and add each of them into a list, then substitute the list into the spoke string.

2. "Cozmo, please grab cube1/cube2/cube3." Cozmo grabs the cube if he knows where it is. If not, he tells you that he doesn't know where it is.

I define a statenode class `CubeCheck` to save the corresponding cube number Cozmo heard, then save it to an attribute of the parent class `See`. If the cube is visible, post success and transition into a `PickUpObject` node to grab the corresponding cube; otherwise, pose failure and transition into a `Say` node to tell that he doesn't know where the cube is.

3. "Cozmo, please drive through doorway number N." Cozmo drives through the doorway if he knows about it, otherwise he complains.

I use python regular expression (i.e. `[0-9][0-9]`) to match the doorway number I say to Cozmo. I extract the doorway number using `event.words` of `SpeechEvent` and save it as an attribute of the parent class `See`. Using `world.world_map.generate_doorway_list()` to generate a doorway list in view. If the doorway is in view, it posts success and transitions into a `DoorSuccess` node, which sends a data event to `DoorPass()`; otherwise, it posts failure and transitions into a `DoorFailure` `Say` node, which complains.