

Aerial Robotics Kharagpur Task Round 2022 Documentation

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Abstract—I have done task 2.2 and 3.1 of the Task Round 2022 of ARK and will be elaborating on it, in this document.

You will read about object detection, template matching and aruco detection

I. INTRODUCTION

I had to develop a depth map and find depth. To complete the tasks for ARK, I tried VS Code on Windows. But my laptop was heavily lagging. So I installed Ubuntu 20.04 and performed the depth map there

II. PROBLEM 2.1 IN ORDER TO FIND DISTANCES TO OBSTACLES WE NEED DEPTH INFORMATION, HOWEVER SOMETIMES WE DON'T HAVE DEPTH CAMERAS SO WE END UP USING TWO CAMERAS IN SPECIFIC ORIENTATION RELATIVE TO EACH OTHER TO GENERATE SLIGHTLY DIFFERENT IMAGES CALLED STEREO IMAGES. IN THIS TASK YOU ARE PROVIDED WITH A PAIR OF STEREO IMAGES. YOU NEED TO GENERATE A DEPTH MAP, FIND THE OBSTACLE AND CALCULATE THE DISTANCE. THE OBSTACLE IS A BLUE BIKE WHICH YOU HAVE TO AVOID CRASHING INTO. YOU CAN FIND THE STEREO IMAGES AND PROJECTION MATRICES HERE (LINK WAS GIVEN)

III. RELATED WORK

I had to get accustomed to the syntax of python, study about open cv and do some background work on depth maps.

IV. INITIAL ATTEMPTS

First I tried to use Windows but then I used Ubuntu. I switched to python because of the inbuilt functions.

V. FINAL APPROACH

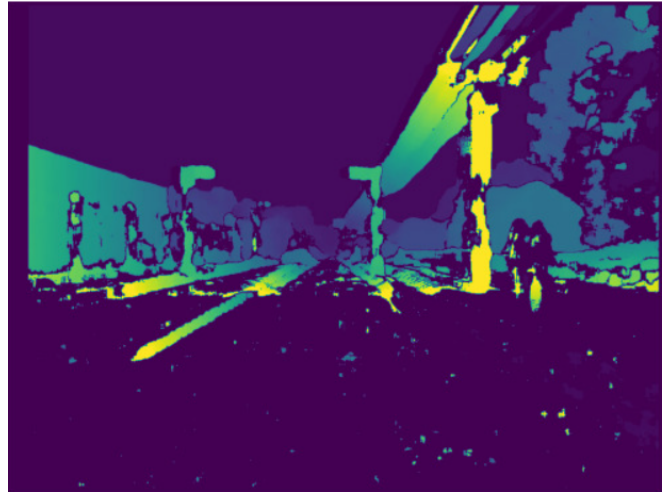
I uploaded the left and right image in the same folder as py file and used an inbuilt function to create a depth map. I also used template matching to detect the object, in this case the bike, whose image was also uploaded.

Depth can be calculated by the formula $(F_y * b) / \text{Disparity}$

VI. RESULTS AND OBSERVATION

I developed the following depth map which I have attached in my github repository as well

*Write anyone who might have helped you accomplish this eg any senior or someone



I also got it to match the template and locate the bike



VII. FUTURE WORK

I still need to read about the camera coordinates properly and implement the camera coordinate concept and projection matrix concept to get the actual depth of the bike using the formula I have mentioned above

CONCLUSION

It was essentially a task of generating a depth map, using the concept of template matching and then finding the depth of the required object. I have developed the depth map which can be used as a sample space (along with other submissions) to show the future aspirants. My code will also be available on github and can be used for generating depth maps and using template matching, in general.