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ECE 66100: Computer Vision Project 4 Report

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ECE 66100

Problem Statement

Depth map approximation using Stereo Vision. As we humans can perceive the depth of an object using two eyes we have, we can do the same using cameras using the concept of stereo vision.

Design Methodology

There are two images captured by two cameras positioned on the left and right side of the plane. This can be thought of as the images captured by the eyes of humans. Using a 1-D search we can extract features and using that we can generate a disparity map which can be used to generate the approximate depth map.

Procedure

The images are downloaded from the website. There are two images for one image because of the left and right view of the image. Using the images, the disparity map is generated which can be used to calculate the depth of the object in the image. The resultant disparity map is used to calculate the Mean Square Error, Root Mean Squared Error and the absolute difference between the provided and calculated disparity maps. This can show us the efficacy of the applied algorithm and how effective it is when used to calculate the depth.

Implementation

The images are downloaded from the repository. The images in the format of the left and right image analogous to the left vision and the right vision of the humans. The images are converted into grayscale images so that computation can be possible. Using the OpenCV library, a disparity map is generated from the images. A comparison is made between the generated and the one which is already given to check for the performance of the algorithm applied. Measures such as Mean Squares Error, Root Mean squared error and Absolute Difference between images are calculated to check for the performance.
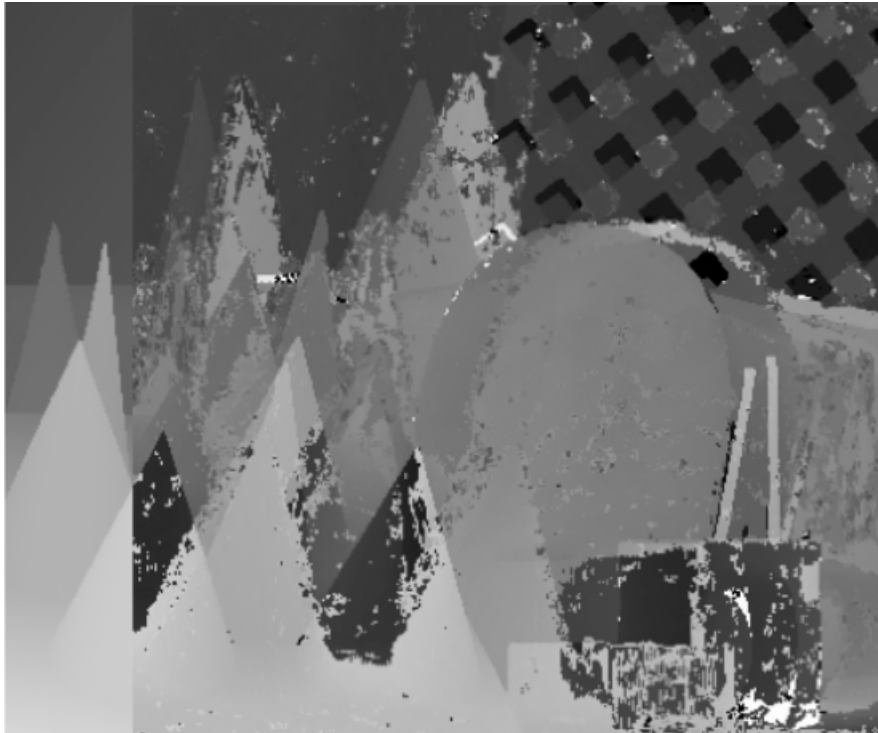
Results

The results of the project are as follow

Figure 1. Generated Disparity Map of Cones Image

```
RMSE: 10.609273092703173
MAE 112.55667555555556
```
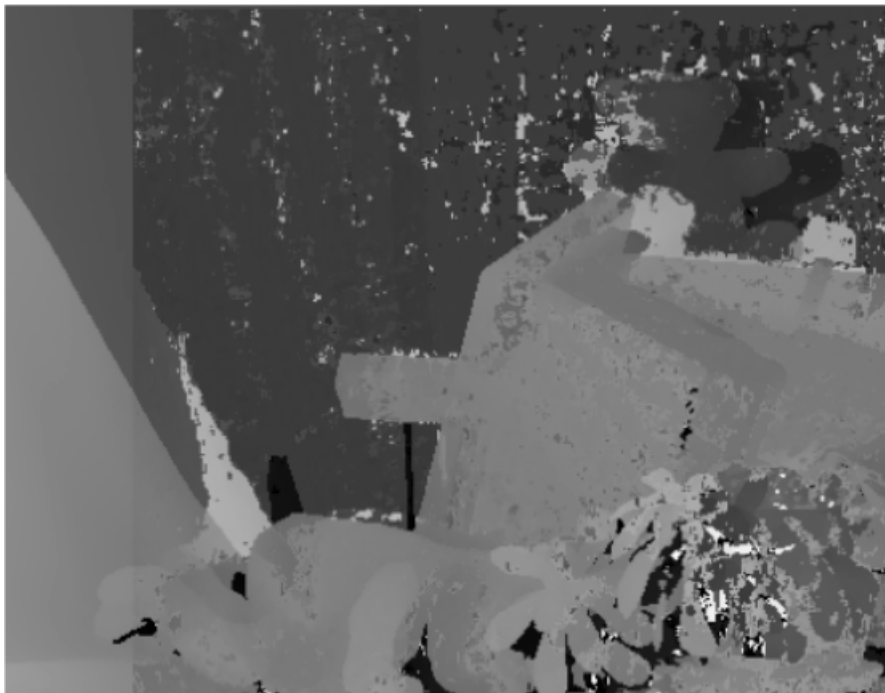
Figure 2. RSME and MSE of the Cones Image

Figure 3. Disparity Map of Teddy Image

```
RMSE: 10.036267861739871
MAE 100.72667259259259
```

Figure 4. RSME and MSE values of Teddy

Conclusions
- Mechanism of Human Depth Perception was understood.
- Basics about the calculation of Stereo Vision was understood.
- Basic measures such as Image Subtraction, Root Mean Squared Error, Mean Squared Error are calculated.

References

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