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Base Paper on Estimation of Vehicle Orientation Using Stereo Vision

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Abstract: ***Nowadays, image processing is among rapidly growing technologies. Image processing basically includes the following three steps: Importing the image via image acquisition tools, Analyzing and manipulating the image, Output in which result can be altered image or report that is based on image analysis. In this paper we are going to estimate the pose of vehicle with stereovision. With stereo vision, we can see where things are in relation to our own bodies with much greater harshness --especially when those objects are moving toward or away from us in the depth component. Stereoscopic vision is what gives us the ability to see things with height, width, and depth.The estimation of attitude of a vehicle closely depends on the 3D correspondences or triangulation. This implies obtaining the correct estimate of the 3D point in space, which are used to obtain the correct estimate of the attitude. Hence an effort was made in order to minimize the triangulation error further.***

A video sequence from a stereoscopic system, image features are detected and matched from the initial stereo pair and then reconstructed into 3D space and stored as 3D landmarks after outlier elimination. After that key features are tracked in the subsequent images and used to estimate the camera motion. Considering the two algorithms for which the optimization is performed, it has been found that the triangulation is far better than the disparity method. Observing the results, we may conclude that problem of local minima has affected the output that has led to the convergence of the method onto some other point.

Indexed Terms: Stereo vision, Triangulation, Visual Odometry, RANSAC, Vehicle Orientation.

I. INTRODUCTION

There are two types of methods used for image processing namely, analogue and digital image processing. Analogue image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. Digital image processing techniques help in manipulation of the digital images by using computers. The three general phases that all types of data have to undergo while using digital techniques are pre-processing, enhancement, and display, information extraction.

With stereo vision, we can see where objects are in relation to our own bodies with much greater stillness--especially when those objects are moving toward or away from us in the depth section. Stereoscopic vision is what gives us the skill to see things with height, width, and depth [12]. Stereo vision system is used to calculate the actual range or range of things of interest from you because the 3-D information can be found from a couple of pictures, also known as a stereo pair [6].

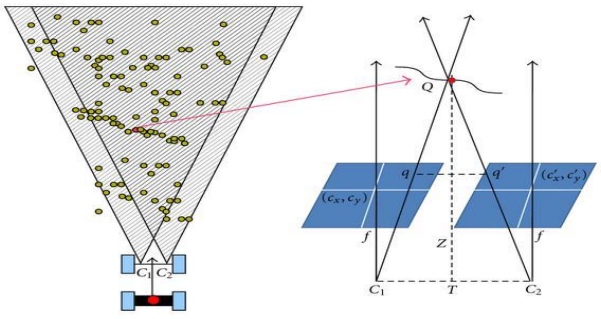

Figure 1.1 Ideal stereoscopic System.

In the field of computer vision, attitude evaluation of an instrument (vehicle, human or robot) is one of the most examined-after tasks [4]. The term that closely relates to attitude estimation using vision based method is Visual Odometry (VO) which refers to the process of estimating pose using a single or multiple cameras mounted on the vehicle. The term VO was given by [3] and was chosen due to its similarity with wheel odometry, which in turn incrementally rates the particular movement of the car or truck by means of developing the number of spins on the trolley wheels after some time. VO also works effective incrementally, but by means of calculating the relative changes inside create on the adviser (any autonomous vehicle) by means of paying attention to the particular changes inside photographs purchased by the camera installed on the machine.

II. PURPOSE OF IMAGE-PROCESSING

The purpose of image processing is divided into 5 groups. They are:

1. Visualization - Observe the objects that are not visible.

2. Image sharpening and restoration - To create a better image.

3. Image retrieval - Seek for the image of interest.

4. Measurement of pattern – Measures various objects in an image.

5. Image Recognition – Distinguish the objects in an image.

III. VISION BASED APPROACH

There can be two methods for Visual Odometry: feature-based strategy which relies on unique features that are