QUOTIENT DIFFERENCE BASED IDEAL MOTION PREDICTION FOR VIRTUAL SCENE

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Received on 18-08-2016
Accepted on 25-09-2016

Abstract

Objectives: Smooth dense depth for virtual reality is essential for stable and accurate identification of object present in implicit scenes.

Methods/Statistical Analysis: Every point in real world is computed from Difference between left and right image by using sum of absolute difference algorithm. Apparent motion for a virtual world is calculated from differential methods.

Findings: In this paper we have computed motion field for virtual scene from stereoscopic image. Consequent Images of dynamic environment are captured at different times for a scene.

Applications/Improvements: Advance sophisticated assistance for Robots require more details about virtual scene in current scenario. This method allows Resilent discernment of dense motion field present in the scene.

Keywords: Depth, Scene, Difference.

1. Introduction

In the recent years Computer Vision is a fast growing field. Scene flow is one important field in Computer vision which has wide range of applications. A 3D scene can be constructed from 2D if we know the motion properties of the scene. Two different views of a scene taken at additional time steps helps us to compute dense 3D motion. Scene flow calculates dense motion and dense 3D geometry at each and every Pixel. Application of scene flow includes augmented reality, motion analysis and driverless vehicle. Optical flow and disparity estimation is one of the essential parameters to capture scene motion. Popular constraint describes the relation between scenes captured from two different observer. Depth problem and aperture constraint in scene flow computation can be solved by using geometrical methods.
Intensity and depth map in image domain provides computation about scene flow with the help of Depth cameras. 2D motion estimation infers the depth of the scene. Local as well as global approach helps us to solve problems regarding motion discontinuities. Real world data can be modeled in virtual world with same features by using three dimensional motion field vectors and apparent motion pattern. Various applications of computer vision is Augmented Reality, autonomous driving, virtual reality, robotic surgery, motion analysis and estimation.

2. Related Theory

2.1 Disparity: The discrepancy between different regions denote disparity. Correspondence values and parameter specification values adds control to disparity algorithm. The Knowledge of stereoscopic image is required to calculate discrepancy in region of interest. The relation between intrinsic and extrinsic parameters of the involved cameras is matched by rectification process. Various methods such as semi global, block matching, sum of absolute differences, feature based, Block based, Energy based, Phase based, parametric model methods. In feature based methods feature points of stereo image pair gives sparse maps. The Comparison of one image block area with shifted region block of another image constitutes block based methods. Energy based methods estimate minimization and regularization of correspondence in an iterative solution. Gabor Transform is applied in Phase based methods. Several parameters express parameter optimization to the shape of disparity map in parametric model methods. These can be used to calculate difference discrepancy. Complete estimation is possible by using Sum of absolute difference. Contrast in image can be measured using appropriate filters. Two image blocks original block and neighboring blocks are compared. Each pixel and its absolute difference are difference summed to create a single block. With the help of accurate dense depth map real time disparity is found with accurate performance and high quality. Standard middlebury calibrated datasets are considered for calculation. Corresponding pixel displacement field arises for consecutive frames t, t+1. Iterative solvers convergence will take time than multigrid methods. I_1 and I_2 are left and right stereo pair of images and a, b be the displacement of the left and a_1, b_1 be displacement of the right. Figure 1 to Figure 3.

![Figure-1. Left view.](image-url)
The depth value for \((x, y)\) in real world is \((X, Y, Z)\). Line that connects two centers \(I_1\) and \(I_2\) is given by following equation.

\[
Z(x, y) = \frac{fB}{d(x, y)} \quad (1)
\]

Where \(d(x, y)\) is given by \(a_1-a\).

Figure 4 to Figure 6.
3. Methods

In our method difference map are predicted for time $t$ and only for a single publicly available datasets. Efficient matching is done only with a proper similarity measure. This measure is calculated by taking a square window surrounding the pixel of interest in reference image. Homologous pixel of the target image is found out within the same window by moving along corresponding scan line. The formulation of sum of absolute difference algorithm is given by

$$
\sum_{(i,j) \in \Omega} |I_r(i, j) - I_t(x+i, y+j)| \tag{2}
$$

Before applying maps at pixel region level segment stereo estimation is modeled as hard constraints. Soft constraints modeling has been done$^6$. Segmented region border artifacts which affect efficiency is improved by textureless segmentation of input data. Non parametric feature space technique and undirected graphical model are used for graph cuts the occlusions. In a stereo match model mapping of segmented stereo images are done with hard constraints. Consistent object borders are ensured by smoothness temporal and segment cost. In certain cases
Truncated model and correlation model are used to mask left and right images. Reconstructed field velocity if image measurement and its change are known. Image

\[ E(x, y, t)_{app} = E(x + u, y + v, t + 1)_{app} \]  

\[ E(x + d, y, t)_{app} = E(x + d_1, +u, y + v, t + 1)_{app} \]  

(3)

(4)

Measurements represented by \((x,y,d)\) and change measurements by \((u,v,d_1)\) then estimating constraints for change measurements \((u,v,d_1)\) is given by intensity of stereo image and pixel position \(E(x,y,t)_{left}\), \(E(x,y,t)_{right}\) and \((x,y)\). Here \((a, b)\) represents pixels of the image. Difference is estimated at sub pixel accuracy. World coordinates contain 3D points in which the interest points are delineated. Initial Rectification is done to make flow equal in both directions. Using this equation (3) and (4) if we know the difference we can solve for three dimensional motion fields. Two dimensional motion fields for apparent motion are derived from differential methods. Estimation of flow field starts with resolution multidimensional technique. Apparent motion is better for public dataset by using horn Schunck method. Figure 7 to Figure 9.

**Figure-7. Continuous image.**

**Figure-8. Apparent motion of a continuous image.**
The equation representing this model is given by

$$E_{nt} = \int_0 \left( \lambda, r(u, v)^2 + (\nabla u)^2 + (\nabla v)^2 \right) \, d\omega$$

(5)

The error can be minimized by using minimization energy problem. Sensitivity and over propagation can be reduced by using regularization of two dimensional motion field. Two rectified left and right image computes apparent motion and difference, we surmise that difference at time t is known. For time t+1 motion field is elucidated as (u, v, w) where u, v is left view apparent flow and w is difference. Every element in a virtual scene is a function of scalar expounded with respect to a reference point. $I_l(x, y, t)$ we know each pixel (x, y) from reference view, correlation of other images can be perceived. Functional global energy data term presumes color permanence assumption between the images for even flow field,

$$I(u, v, w) = I_{dew} + \alpha I_{smooth}$$

(6)

Where $\alpha$ Parameter regularization, and it comprises of three data’s from apparent flows and stereo differences at time t+1.

$$I_{dew} = I_{right} + I_{left} + I_{disp}$$

(7)

From the above process we get a nonlinear equations. Using energy equations and minimization of energy equations flow field for virtual scene is estimated. Image virtual scene can be converted to real world flow by two metrics that expel that a pixel is not stationary. The two metrics are variance and standard deviation. In Multiple cameras with known scene geometry tenancy of virtual field voxel is determined by coloring voxel algorithm. The reconstruction of motion field and clustering of flow field is done.

4. Results and Conclusion

In considered that Artificial Intelligence and problems in vision can be resolved within a time but vision problem has intrinsic challenges. That’s the reason for international Conferences, summer projects, numerous Publications. These
efforts will play a major role in future generation technology. We have used publicly available data to compute our output. SAD algorithm is implemented for two stereo datasets, hard constraints, Non parametric feature space technique and undirected graphical model are used in our case, apparent motion estimated by horn stunk, motion field estimated by mathematical method which makes use of total energy minimization concepts Figure10 And Figure 12. All the data have been computed using scilab software. The simulation results obtained looks good similar 13-17.

Figure-10. Virtual scene input.

Figure-11. Motion field of virtual scene.

Figure-12. Apparent motion of virtual scene.

5. References


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