

Thesis or Article

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1 Introduction

Through the development of applications such as augmented and virtual reality, object / scene reconstruction and visual effects, the process of generating images from an arbitrary vantage point can be found in a variety of applications. In this Thesis (or Article) I will discuss various methods for Image Creation from an arbitrary vantage point, which can be accomplished by two main methodologies of Geometric Construction and Image Synthesis. While both methods use stereo correspondance of multiple images, they differ in the way information is stored and used.

Geometric Construction (GC) contains information about the real-world spatial properties (Coordinates in space, Color), thus viewing results are non-constrained in vantage point. Image Synthesis (IS) relies on image properties (pixel displacement) and is thus viewing results are limited in the possible vantage points.

2 Background

Change of Reference

Fundamental Matrix

Intrinsic Calibration Matrix

Essential Matrix

3 Process

The system in question contains 3 main components

1. Image Acquisition System

- Webcam / Kinect set-up
- If Webcam should also contain Image-Processing module for:
 - Feature Identification
 - Point-correspondance
 - Sub-Pixel interpolation

2. Point Cloud Processing

- Should take inputs
- Should produce point-clouds as one of the output
- (Possible) Options for Surface Reconstruction include:
 - Calculation of surface Normal through PCA
 - Mesh construction through Delaunay triangulation
 - Parametrization of Bezier surface through linear-least squares.