Title:	Virtual camera effects and depth estimation Using light fields
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Keyword(s):	Depth estimation Light fields
Subject(s):	Computer vision
Abstract:	Abstract Light fields have been explored extensively as a means of quickly rendering images of 3- dimensional scenes from novel camera positions. Because a light field models the light rays permeating a scene, rather than modelling the geometry of that scene, the process of render- ing images from a light field is fast, with a speed which is independent of scene complexity. The light field itself is a 4-dimensional data structure, representing the values of the light rays permeating a scene as a function of their positions and directions. Because a light field can be used to model a real-world scene, and because the resulting model contains a wealth of information about that scene, simple and robust techniques may be applied to light fields to accomplish complex tasks. In this thesis, we have developed a method to create the camera effect used in movies called dolly zoom virtually. We develop techniques of zoom interaction to generate at selected locations in the scene. Virtual dolly is created using a set of neutral point views which is balancing True zoom and Tele zoom effects. The virtual dolly is distinguished by the fact that it requires no physical motion of the equipment to create virtual dolly effects, and the effect is produced purely by computation on the light field data. This is demonstrated on a synthetic dataset, which is taken as input either created using 3dsmax or taken from online sources. All the output novel views are created using ray tracing. A brief study of the geometrical properties of the loci of neutral points us presented. Finally, this thesis proposes a method for Depth estimation by using size cues. Depth is estimated just by using true zoom of a scene. This may be considered as an interesting alternative approach to generate quantitative depth, given a robust correspondence algorithm, from any light field data.

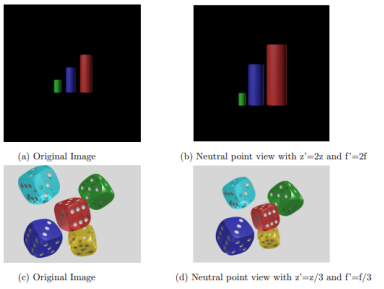


Figure 2.9: Novel view of Neutral point

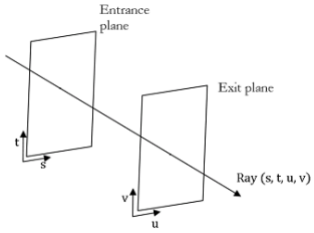


Figure 1.1: Two-plane parameterization of light fields

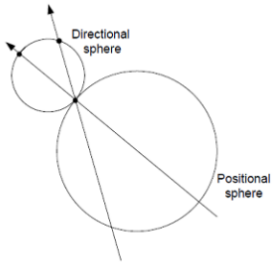
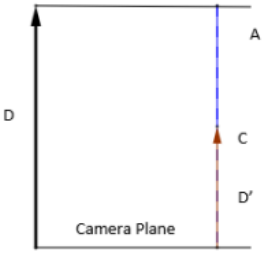


Figure 1.2: Spherical Light field Representation



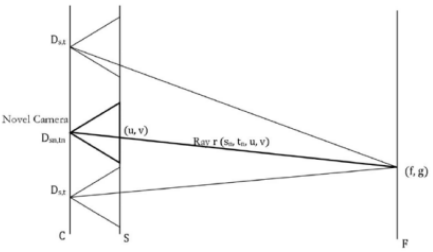


Figure 1.3: Novel view generation using ray reconstruction

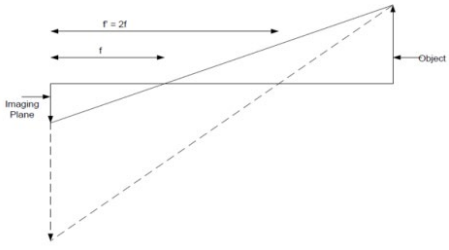


Figure 2.1: Optical Zoom


(a) Input 1 (b) Input 2

Figure 3.2: Two inputs: Original image and true zoom image