

Light Field Photography: A Survey

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Abstract: In this survey, author will be discussing about light field photography, its importance, techniques used in it to have an excellent output from the normal cameras. Light field photography has become an emerging area due to its refocusing of digital image and 3D reconstruction. Reconstruction of image tells us about its high resolution and refocusing is used to clear the blur image.[1]

INTRODUCTION:

Light field photography have introduced a new path for the users to have improved photographs & videos after they have been taken from the camera by the introduction of new viewpoints or changing focus.[2] With the introduction of micro lens in the conventional camera new range of cameras came into being and those are light field cameras. The light field cameras introduced the concept of digital refocusing and recovery of objects. Light field cameras also introduced the design of depth of field (DoF).[1]

EXISTING CAMERA DESIGNS & ALGORITHMS:

EXISTING CAMERA DESIGN	DESCRIPTION
Plenoptic Cameras by Adelson & Wang	It consists of single lens, lenticular array at its focal point and a lens to form image on sensor. It works well but it has some limitations i.e. the refocused image has low resolution from the sensor image. [1]
Programmable aperture cameras	It captures the image light field data by multiplexing views of scenes. It helps in recovering images at full sensor resolution. Static images can be achieved at low SNR but cost may increase.[1]
Heterodyne camera by Veeraraghavan et al	By modulating light field and using the attenuating mask near to the sensor plane we can get a high resolution image.[1]

All these designs have problems and issues. Now they are some algorithms in light field photography those are:

ALGORITHMS	DESCRIPTION
Computational refocusing[3]	In this algorithm photographs will be edited using different software tools in computers. It will ease the photographer to take photos even with blur can be removed up to some extent [1] . Sometimes the pictures lose its originality due to software editing effects.
Fourier slice refocusing[3]	There is an inverse Fourier transform process and extraction of 2D slice from the light field Fourier transform to get the image. It has limitations like roll off artefacts i.e. the darkening of edges, aliasing artefacts i.e. frequencies above band limits. [4] The approach used in this algorithm is much faster than previous ones It is quick in resampling.

CONCLUSION:

New cameras with less blur tolerance may be introduced. New methods have been introduced to overcome the issues of blur and depth of focus problems i.e. focal stack compositing for controlling the depth of field. It works very slowly; further work can be done on it to increase its efficiency. Emerging area for future work will be 4D Fourier light field in which research can be done. [4, 5]

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