3D RECONSTRUCTION OF OBJECTS FROM RGB IMAGES AND DEPTH INFORMATION USING DEEP LEARNING

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This dissertation submitted in partial fulfillment of the requirements for the Degree of MSc in Computer Science specializing in Data Science and Analytics

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October 2022

DECLARATION

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The above candidate has carried out research for the Master's thesis under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of the supervisor: Dr. Charith Chithraranjan

Signature: Date:

ACKNOWLEDGMENTS

I owe my deepest gratitude to my supervisor, Dr. Charith Chithraranjan of Department of Computer Science and Engineering, Faculty of Engineering, University of Moratuwa for the supervision and advice given throughout to make this research a success.

Further, my sincere appreciation goes to my family for the continuous support and motivation given to make this thesis a success. I am also thankful to the management and the staff of LiveRoom (Pvt.) Ltd for supporting me in balancing my workload which allowed me to spend time on this research.

Moreover, I would like to thank all my colleagues for their help in finding relevant research material, sharing knowledge and experience and for their encouragement. Last but not least, I also thank my friends who supported me in this whole effort.

ABSTRACT

Object reconstruction is the manner of producing a computer model of the 3D appearance of an object from two-dimensional photos. It's the opposite procedure of obtaining 2D photos from 3D scenes. 3D reconstruction of objects from their digital pictures is a time-efficient and convenient manner of analysing the structural features of the item being modelled. Currently there may be an essential need for 3D content for computer graphics, virtual reality and communication, triggering an alternate emphasis for the requirements. Many present methods for constructing 3D objects are built round specialized hardware resulting in a high fee, information scanning barriers due to environment conditions which can't satisfy the requirement of its new programs. The art of three-dimensional reconstruction of objects and scenes has been a broadly researched topic.

In this Master's thesis, I proposed to address the above problems by developing a Deep Learning approach to reconstruct the object. This type of approach does not depend too much on the environment condition and the cost is low. However, the proposed method mostly targets the reconstruction of objects other than reconstruction of scenes. This research attempts to develop a Deep Learning based 3D reconstruction method for objects to avoid the limitations of the current 3D reconstruction approaches.

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LIST OF ABBREVIATIONS

SFM	Structure from Motion
MVS	Multi View Stereo
SLAM	Simultaneous Localization and Mapping
DIP	Dots per Inch
CNN	Convolutional Neural Network
DVR	Differentiable Volumetric Rendering
3D-R2N2	3D recurrent Reconstruction Neural Network
DRC	Differentiable Ray Consistency
PSR	Poisson Surface Reconstruction
MLP	Multilayer Perceptron
NV	Neural Volumes
SRN	Scene Representation Networks
LLFF	Local Light Field Fusion
2D-CNN	2D Convolutional Neural Network
LSTM	Long Short Term Memory
3D-LSTM	3D Convolutional Long Short Term Memory
3D-DCNN	3D De-Convolutional Neural Network
FID	Frechet Inception Distance
AR	Augmented Reality
GAN	Generative Adversarial Network
3D-R2N2	3D Recurrent Reconstruction Neural Network
IoU	Intersection over Union
SDF	Signed Distance Function
FC	Fully Connected
DVR	Differentiable Volumetric Rendering
ED	Euclidean Distance
SPSR	Screened Poisson surface reconstruction