

DeepReal - A Deep Learning Based 3D Advert Integration System

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Abstract— This research project aims to provide an AI enhanced productivity tool for media generation to video editors and producers. The goal is to improve productivity among producers and artists in terms of augmenting video content with new objects or effects, in a natural and appealing way. Furthermore, the project aims to bridge the gap between offline augmented reality technologies, occlusion handling, and camera tracking.

1. INTRODUCTION

Recent advancements in mobile hardware and position tracking technology enable consumers to experience Augmented Reality (AR) directly on their smartphones. Most of these devices are currently equipped with Google’s ARCore and Apple’s ARKit which utilise Simultaneous Localization and Mapping (SLAM) to track a few dozen scene points in 3D and compute the 6-DOF trajectory of the device. The sparsity of these tracked points, introduces a high level of uncertainty in interaction between the scene geometry and the AR technology. One of the crucial and unresolved issues of the existing AR technologies is that the virtual objects can never be occluded (blocked) by real objects. The absence of occlusion handling is often jarring and can break the illusion of reality. In this project, we aim to solve this challenge by proposing a deep-learning based 3D advert integration system. We propose DeepReal – a cloud-based intelligent AR technology enabling advertisement or product and branding implantation in the form of 3D computer graphic objects in videos.

The short-term commercial applicability of this technology is to provide AI-supported productivity tools for video editors and producers responsible for product placement and advertising insertion [1] in video. This will facilitate the process of media generation and improve the productivity of craft editors in terms of their capacity to produce more work in a given time frame. The application will also enable producers, with less developed craft editing skills, to achieve excellent levels of artistry in their work. Furthermore, the technology will make video editors and post producer more productive across a range of other activities. These activities include TV content, movies, social media content, visual effects, gaming, and motion graphics. For the gaming and media sectors, the technology can similarly be used to improve productivity for producers and artists. In addition, it has the potential to offer new functionality to dynamically augment video with new objects [2] or effects, in a natural and appealing way.

2. DEEPREAL SYSTEM

The DeepReal research project aims at bridging the gap between the offline AR technologies and occlusion handling [3]. This technology is built upon 5 core operations:

1. A Convolutional Neural Network (CNN) based method to estimate the depths of layers in the scene from monocular videos.
2. An interactive CNN based system to mask and track the occluding object in a video.
3. A CNN based system to reconstruct the background image by removing the occluding object (foreground).
4. A Generative Adversarial Network (GAN) to accurately estimate the alpha mattes of the occluding object using the information from steps 2 and 3.
5. Virtual object integration with respect to the alpha mattes and 3D geometry of the scene.

Figure 1 illustrates the overview of the framework proposed by our DeepReal system and Figure 2 illustrates the user interface of the system.

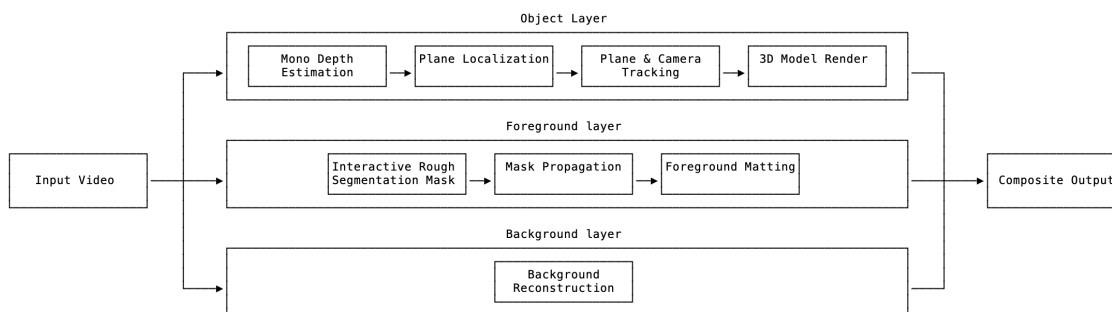


Figure 1: Overview of the DeepReal system



Figure 2: DeepReal system user interface with 3D object inserted

3. CONCLUSION

Online video advertising gives content providers the ability to deliver compelling content, reach a growing online audience, and generate additional revenue from online media. Current advertising solutions for online streaming applications are disruptive to the user experience (eg. overlay, pre-roll, mid-roll or post-roll). In this project, we investigate techniques for automatic in-scene placement of 3D advertisement objects in videos. The aim is for the user to select a 3D advertisement object, and identify a placement to place this object from the video scene. Inserting advertising as if it was part of the original video would not detract from the viewer’s experience of the programme but would enable ‘retroactive’ product placement and the possibility to deploy highly personalised ads.

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