Project Proposal Template

Project Management and Software Development
for Medical Applications

General Info

Project Title: Annotation tool for people detection in OR

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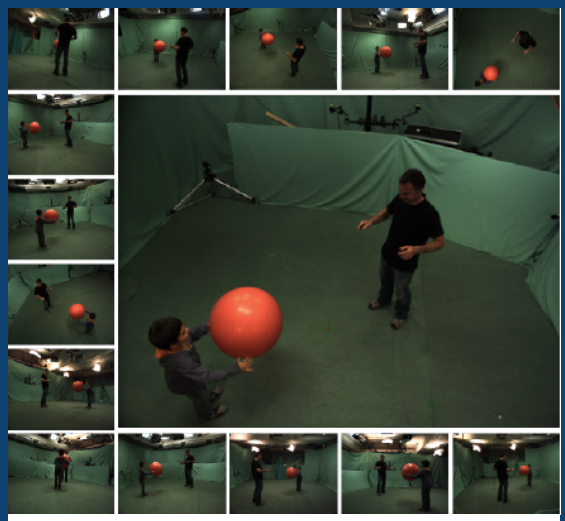
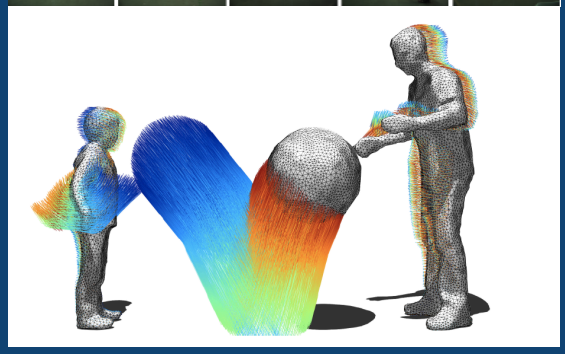
Project Abstract

The goal of this project is to build an annotation tool based on spatio-temporal models of people performing some activity in multiple-camera videos. Spatio-temporal model corresponds to 3D model of a person that deforms in time. In practice it consists of multiple meshes, where every mesh instance corresponds to the shape of the person in one frame. In addition multiple calibrated videos are given and they correspond to the observed 3D model. Moreover, spatio-temporal model has previously been reconstructed from these multiple videos.

The annotation tool should provide a user a possibility to select the body parts on the given loaded 3D mesh. These parts correspond to particular vertices in the 3D model. Given this labeling of the body parts on 3D model the tool has to output image pixels belonging to these body parts in the multiple videos that are already provided. In addition, the same has to be done for any virtual camera viewpoint simulating that 3D model is seen from cameras that were not used for reconstruction. This can be done by re-projecting the 3d model to the multiple images. For virtual viewpoints some interpolation of the pixel values from known camera views have to be done.





Background and Motivation

Recent object detection methods mostly rely on classification or regression techniques. The algorithms require training data which have to be annotated in order to provide the ground-truth. The annotation process is usually done manually, by the user. The user has to spend time on labeling a big amount of training and testing data. On the other hand, there are approaches where the training data can be produced synthetically or using 3D models with a combination of motions and shapes. Producing training data from models

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allows the user to add larger variability compared to the real images and avoid the tedious process of annotating data.

Student's Tasks Description

The student will accomplish the following tasks:

- Write an application based on OpenGL and QT that will allow loading and viewing the model.
- In the same application a tool for labeling of body parts has to be provided. This means that a vertex or group of vertices of the model has to be selected to belong to the specific to a specific object part.
- Project the model in images for every camera and predefined virtual cameras in order to get the body part labels in images.
- The model partitioning has to be saved into the files both for 3D models and images.

Technical Prerequisites

The student should be familiar with multi-view geometry terms and object oriented programming concepts. In addition, the student should have experience with C++ and OpenGL and OpenCV.

Administrative Info

Working Time: ~120 programming hours

Project Location: Home, working in the university is not mandatory.

Required Equipment: A personal computer

Timeline and Milestones

There will be three milestones (including presentations) and weekly meetings.

References

Articulated People Detection and Pose Estimation: Reshaping the Future, L. Pishchulin, A. Jain, M. Andriluka, T. Thormaehlen and B. Schiele, CVPR 2012

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