COMP39/9900 Computer Science/IT Capstone Project
School of Computer Science and Engineering, UNSW

Project Number: P32

Project Title: 3D motion capture from RGB images

Project Clients: Rahm Ranjan and Sensory Processes and Innovations Lab (UNSW) and The Livability Lab (UNSW)

Project Specializations: Software development; Computer vision.

Number of groups: 3

Background:

Background: human motion capture is required for many industries such as healthcare. Current gold standard relies on expensive 3D motion capture equipment such as Opti track systems. Use of human pose estimation algorithms on 2D images can allow for cheaper and more portable methods of capturing human motion such as video data.

Goals: Develop software that takes the input of two synchronized videos of a human and reproduces 3D coordinates that can be visualized using 3D modeling program such as Blender or Unity.

Requirements and Scope:

In-Scope:

- Algorithm Development:
  - Research and implement coordinate reconstruction algorithms.
  - Optimize for accuracy over real-time performance.
- Video Input Handling:
  - Accept synchronized video input.
  - Extract relevant frames for processing.
  - Calibration of cameras or hardware setup for video synchronization.
- Coordinate Export:
  - Visualise reconstructed 3D coordinates as data formats such as pkl and csv files.
- Integration with 3D Modeling Software:
  - Ensure compatibility with Blender and Unity.
  - Provide clear instructions for users on importing the data.
- Out-of-Scope:
- Advanced Features:
  - Any additional features beyond basic coordinate reconstruction and visualization.
  - Features that significantly extend the project timeline.
- User Training:

- In-depth training or tutorials for using Blender or Unity.

Our goal is to develop software that takes input from two synchronized videos of a human subject and reconstructs 3D coordinates. Code is in Python/C++. These coordinates can then be visualized using 3D modeling programs such as Blender or Unity. The project duration is 10 weeks.

Required Knowledge and skills:

Students have prior experience in software development and computer vision. They are able to use python/c++.

Expected outcomes/deliverables:

• The software successfully reconstructs accurate 3D coordinates from synchronized video input.

• Users can visualize these coordinates in Blender or Unity.

• The user interface is intuitive and straightforward.

Supervision:

Rahm Ranjan

Additional resources:

This project will be used for the Sensory Processes Research Lab (School of Optometry and Vision Science) and Livability Lab (School of Built Environment) for current and future research projects in health and movement science.