Technical University of Munich | Computer Aided Medical Procedures

Project Management and Software Development

Automatic Pose Synchronization

Final Presentation – 8 February 2017

Development and Presentation by Charalampos Papathanasis (harispap83@gmail.com)

Supervisor: Benjamin Busam
Project’s Goal

Synchronize different pose streams in time automatically

+ Minimize lag due to sampling

Requirements and Specifications

- Communication with tracking system
- Use of Quaternionic Upsampling
- Alignment of different tracking streams
- Visualization Framework
- Implementation in Matlab

Synchronization Problem

- e.g. 1 Dimension

Stream 1

Stream 2

Different Sampling

Quaternionic Upsampling gives the continuous line (—)
Synchronization Problem

- e.g. 1 Dimension

Stream 1

Stream 2

$\Delta t$
Synchronization Problem

- e.g. 1 Dimension

![Diagram showing synchronization problem with two streams: Stream 1 and Stream 2. The diagram illustrates a time delay \( \Delta t \) and two time points \( t_1 \) and \( t_1' \).]
Upsampling

• e.g. 3 Dimensions (translation and rotation)
Tasks and Achievements

- Communication interface
- Quaternionic Upsampling
- Prototype – Synchronization of artificial data streams
- Debugging
- Live Demo

*future work*
Prototype Design

Data Preparation Routines

- Convert rotations to quaternions
- Quaternionic Upsampling
- Translations: linear interpolation
- Convert back to homogenous transformation matrices

Communication

IGT Link Server

1st Stream

Pi(1)

2nd Stream

Pi(2)

Collect 2 x n Poses

Output

Correction of poses and visualization

Core Algorithm

- Minimization
- Acquisition of Δt
- Synchronization

Δt
Time Schedule

Gantt Chart

- Project requirements presentation
- Communication Interface
- Upsampling
- Prototype development
- Intermediate presentation
- Evaluation + Testing
- Debugging
- Final presentation

February 8, 2017
Results

Original data

Synchronized data
In conclusion

- Project’s main goal accomplished
- Quaternionic Upsampling proved a good approach for interpolation
- Promising results
- Room for improvement
- Possibilities for integration with other applications

http://download.4-designer.com/files/20140221/Realistic-target-and-arrow-vector-material-62668.jpg(5/2/2017)