Motion capture data processing and analysis

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# Introduction

Motion capturing is a modern, fast developing data acquiring method capable to record movement in 3D. The detailed data that is retrieved from such recording is very useful not only for movie and game industry, but also in other fields as military, medicine and for validation and control of computer vision and robotics. The benefits of this method attract scientist to utilize it for linguistic analysis. Sign language is the primary alternative to a spoken language. Unfortunately, there are people for whom this is the only alternative that gives them the ability to communicate and share thoughts directly. Sign language uses manual movements and body language to communicate thoughts with others. The basic component of a sign language includes hand gestures, movements, orientation of fingers and hands, hand shapes and facial expressions to communicate certain feelings. Every region in the world has a unique spoken language and similarly, every region has a unique sign language. Thus, sign language varies from culture to culture and from region to region. People with speech and/or hearing impairment find it difficult to communicate with other individuals via sign language due to the inability of most of the people to understand sign language.

The purpose of this paper is to show the methods of studying and understanding the properties of signs from motion point of view and developing a tool for processing sign language data base. It is focused on hand movement and gestures analysis. It is cultural and regional independent, because it uses kinematic and statistical methods for processing the data.

Such database is set of dictionary (lexical items separated by default stance //not sure if it should be here or later in the main part) files with motion capture data. The tool will perform raw segmentation (in the first step) and fine segmentation (using acquired parameters form data) of dictionary items to extract the meaningful information for each sign which will be used for further analysis. It will show the challenges to determine the exact beginning and ending of the sign. The significant problem with the nature of the data – the containing of noise and methods for isolating the noise. Each sign will be processed for extracting its properties. Such as: if the sign is one handed or two, which is the dominant hand, hand location and orientation, finger orientation.

Later with the help of computer learning methods such as SVM the extracted information will be used to cluster signs for further processing.

# Theory. Analysis. Aim.

## What is MoCap

## Vicon spec // 8 camera optical based mocap, high fps, ...

## representation of skeleton by length and angles // bones or markers

## solving // process of translating the raw mocap data into CG character to create skeleton animation

## data format (.c3d)

## methods for segmentation and it is challenges // challenges with manual and automatic segmentation

## problems with acceleration computation // fuzziness

## methods for filtering

## methods used for describing the properties of each sign

## SVM

# Program architecture

# Testing

# Conclusion

# Literature

1. HamNoSys Version 2.0. Hamburg Notation System for Sign Languages - Siegmund Prillwitz, Regina Leven, Heiko Zienert, Thomas Hanke, Jan Henning, Eva Richter, Joanne Martin