Exercises in Physical Examination Using Skeletal Information Support System

Research Progress Report B4 Summer

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Outline

- Research Overview
- Related Research
- Consider the features
- System Creation
- Experiments
- Data analysis
- Future Plans

Research Overview

- Research on Support System for Physical Examination Exercises
- Increasing opportunities for students to practice and improving the quality of exercise instruction for teachers
- A system that automatically judges whether a movement is good or bad based on videotaped images
- A system that can provide feedback immediately after performing an exercise.
- To analyze the factors that determine whether a technique is good or bad
- We want to measure whether the use of the system improves motivation.

Related Research

- Shunta Hieda, Proposal and validation of a nursing support practice method using skeletal information, Kochi University of Technology Thesis and Graduation Thesis, 2023-02-28. (https://www.kochi-tech.ac.jp/library/internal/ron/pdf/2022/03/13/1230361.pdf)
- Noguchi, Shuntaro, Extraction of similar human actions using unsupervised learning and classification of daily activities by their recognition frequency changes, Annual Report of the Graduate School of Science and Engineering, Chuo University, ed. 2019-08-01. (https://chuo-u.repo.nii.ac.jp/records/14412)

Consider the features

- Distance between doctor's hands and knees (to determine the start and end of movement)
- Distance between doctor and patient
- Distance between doctor's hand and patient's face
- Distance between doctor's hand and patient's shoulder
- Angle of patient's elbow
- Angle of patient's wrist

System Creation

- Functions: Recording, Pose Estimation, Output of Resulting Video and Coordinate Data
- Application: Python
- Posture estimation: Mediapipe

Experiments

- Subjects: 3 medical students from Kanazawa Medical University
- Video recording of 5 procedures
- Video was taken for each procedure and applied to posture estimation.
- After the procedure, the students were asked to review the videos and give their opinions.

Data analysis

- Data was subjected to a feature calculation algorithm.
- Motion detection was not very successful.
- The number of movements increased too much because the movement was started as soon as the hand was released.

Future plans (timeline)

- October: Read literature and proceed with feature analysis
- November: Feature analysis, system improvement
- December: Experiments and data analysis
- January: Writing papers
- February: Writing papers

Future plans

- Experiment again on 12/8
  - Increase the number of data
  - Change camera placement and search for effective camera positions
  - Get feedback on features

Future plans

- Examine the features
  - Adapt the features already under consideration: write a Python program
  - Examine new features: review videos and physical examination materials
  - Consider whether machine learning can make a difference: Kaggle