INTRODUCTION

Want to learn Tai Chi, but running out of time? Want to find a great Tai Chi master, but have no idea how to find one?

This project may be an innovating one, offers users an exciting solution of these problems!!

FEATURES

We developed a Tai Chi learning application with Kinect, featuring ...

- Recording and replaying motions of Tai Chi master
- Learning Tai Chi by simply following on-screen master motions
- Real-time feedbacks of users’ motions
- Playback mode for users to improve their learning
**Touch-less** User Interface

- Control without touching any physical surfaces, including physical buttons
- Speech recognition system: Simply use voice to control!
- “Good bye” to going back and forth just for pressing buttons
- Say “Kinect!” first to wake the Kinect up, followed by command, e.g. “Start!”, “Stop!”, etc., to control

Clear-to-see Real-time Learning Algorithm

- Clear to identify what is wrong
- Map user’s skeleton onto master’s body
- If you went wrong, corresponding bones would go red immediately

Pre-record motions of master before the user use the application

Replay demonstration of master to the user

Allow the user to follow master’s motion and get immediate feedback from the real-time learning algorithm

Playback the user’s learning performance video together with master’s motion at the best matched pace to see how to do better

Master’s demonstration in front of the Kinect device

Record Motion

Replay

Start Learning

Playback Improved Motion

Recording Panel
- Record Motion
- Stop Record
- Replay
- Stop Replay

Learning Panel
- Start Learning
- Finish Learning
- Improve Learning

Settings:
- Speech Recognize
- Choose Mode: Training, Challenge
- Choose Difficulty: Easy, Medium, Hard

Replay FPS: 30
IMPLEMENTATION

the backbone of real-time feedback -
- Joint Angle Computation

- Basic concept:
  Same set of angles,
  Same posture
- Calculate the angles of each joint
  between planes using 3D-vectors
- Compare user's set of joint angles
  with master's set
- Determine right or wrong based on
  these angle differences

the intelligent teacher behind “Playback Improved Motion” -
- Dynamic Time Warping (DTW)

- Intend to dynamically match user's performance with master's motion
- From every moments
  of user's motion, we
  compute a best path
  to the end point

TESTING & RESULT

*Actual screenshot
when the user is learning:

*: Left frame:
  Master's demonstration.
Right frame:
  User's performance