ErgoTracker

don't thank us, thank your posture

MaxUbi
Team 5

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Agenda

I. Problem
II. Solution
III. Envisioned Use
IV. Related Work
V. Team Structure
VI. Design & Implementation
VII. Methodology & Results
VIII. Conclusion
Problem

- On average, adults spend at least 4 hours at a desk daily, which can lead to:
  - Chronic back pain.
  - Cervical Vertebrae diseases

- Existing Computer Vision techniques and pressure detection solutions are not accurate.

We do not want to have sore backs anymore!
Solution

- There is no end-to-end solution in the market.
- Intelligence in the cloud gives real time statistical reports to help and notify users.
- Building a database of useful data points for the prediction of Kyphotic Spine.
Envisioned Use

...and more!
Related Work

**Academic Research:**

+ Pose Estimation with a Kinect for Ergonomic Studies: Evaluation of the Accuracy Using a Virtual Mannequin *(Plantard, Auvinet, Pierres, Muloton)*

+ Real-Time Posture Reconstruction for Microsoft Kinect *(Shum, Ho, Jiang, Takagi)*

**Commercial Products:**

+ Pressure detection on chair
+ Posture surveillance system
Team Structure

Front End

End To End

Back End
Agile Development

Front End
1. Kevin Tran - CSE118(kevtran15)
2. Hien Hoang - CSE118(royal50911)

Back End
1. Xinyu Zhang - CSE 218(BenBBear)
2. Michael Chang - CSE218(mchangjs)
3. Ajay Mohan - CSE218(AjayMarley)
Design and Implementation

Three Deliverables:

- **Native Client:**
  - Windows App
- **Web Server:**
  - Web Browser
- **Prediction Server:**
  - Machine Learning
Joint Information:
- head: 0.0755; 0.3071; 0.5893
- shoulder center: 0.0508; 0.1962; 0.9181
- shoulder left: 0.2647; 0.1318; 0.0784
- shoulder right: 0.0874; 0.1299; 0.9170
- spine: -0.0884; 0.1066; 0.9827
- hip center: -0.0917; 0.0360; 0.5765
- hip left: -0.1524; 0.0416; 1.0358
- hip right: -0.0662; 0.0369; 0.9691

Posture Score 85
*Updates once every 30 seconds.*
Web Interface
Daemon State Transitions

Start

Web view

Success login

Fail login

Log off

Get server path

Capture Kinect data (Multiple mode)
Methodology: Determining Healthy Posture

- Posture data captured by Kinect through the Client Application.

- Data sent to remote server to be analyzed based on both average cases and personal cases.

- Generates a health score that represents a quantitative value for your posture.
Results

Algorithm

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Accuracy: 92.64%
Recall: 0.7503
Precision: 0.9057
F1-score: 0.8571

tested on 45900 examples.

Reports for each class:
- Precision
  - class 0: 0.9998
  - class 1: 0.7503
- F1-score
  - class 0: 0.9057
  - class 1: 0.9933
- nb ex
  - class 0: 32400
  - class 1: 13500

Health Report

Previous Suggestions:
- November 8, 2015:
  - Put a pillow behind your back.
  - Sit 5 feet away from your computer screen.
Future Work

- Integrate the backend with alternate front end video capturing devices.
  - Utilizing the real sense camera from Intel

- More features
  - add eye detection features

- Vision → IFGTT: If gesture, then that.
Things Learned

- **Risks**
  - Interrupting users during work
  - Privacy

- **Challenges:**
  - Integration
  - Vision
  - Sticking to the original Idea

- **How would we do things differently next time?**
Conclusion

Overall, our team believes our ErgoTracker can potentially help many users with improving their posture. Monitoring our own health has never been this important.

It's only prudent to act before we feel the pain!
Thank you!

Any questions?

The Programmers Life

WORK  HOME  PLAY  SLEEP