Real-time Identification and Localization of Body Parts from Depth Images

Motivation: AWARE@ICU

(+)= location :: skeleton = joints positions :: green = correct :: red = wrong
Methods

- Novel interest point detector
- Multi-class boosting classification

1) Construct a set of connected surfaces meshes from the point cloud
2) Identify interest points on each of these meshes
3) Extract local descriptors for the interest points
4) Classify the descriptors to body part classes
5) Sort patches by classifier confidence
Accumulative Geodesic EXtrema (AGEX)

**Algorithm:**
1. Find mesh centroid (Vc)
2. Find shortest path for each point to Vc
3. Choose longest path, label as Vs
4. Set the edge of Vs -> Vc as zero

**Invariance:**
- Mesh deformations, translations, rotations, noise
Example
Feature window

Pose: Trace shortest path

Classification:
  - Haar classifier
  - Multi-class boosting
Examples
Results

![Graphs and Confusion Matrix showing precision-recall curves for different classes and the AGEX and SW datasets.](image)
Additional Material

Paper slides:
http://stanford.edu/~plagem/publ/icra10/ICRA10_slides.pdf

Video:
http://stanford.edu/~plagem/publ/icra10/