3D Gesture Recognition

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Since last time...

- Moved from the N900 to iPhone and made a lot of progress
  - 2D gesture recognition and messaging
  - 3D started, but not finished
2D gesture recognition

- Currently have 3 Gestures fully defined

  - Based on paper "$1 gesture recognition"

  - Very simple to implement

  - Good results, but small set and triangle only works one way!
1. Resample the points
2. Rotate based on the indicative angle
3. Scale and Translate
4. Find the optimal angle for the best score
1. Resample the points

- Normalise the differences between gestures by resampling so both gestures have the same number of points.
2. Rotate based on indicative angle

- Take starting point and centroid of gesture.
- Defines ‘angle’ of gesture.
- Normalise this so gestures are now rotationally invariant.
3. Scale and Translate

- Centred and scaled to reference square of unit size.
- This is a non-uniform scaling...
- Puts gestures in the same context
4. Find the Optimal Angle

- Scoring stage
- Candidate gesture is compared with stored templates
- Minimise the ‘path distance’ between the gestures
$3 \text{ recogniser}

- Extend the 2D case to 3D
  - Accelerometer data much noiser than Touchscreen
- Exactly the same steps as before but now add in a heuristic (scoring scheme)
5. Scoring Heuristic

- Now produce a table of scores for each gesture template
  - $\epsilon$ is defined as the threshold score.
  - Iff the highest-scoring candidate in the score table has a score $> 1.1\epsilon$, return this candidate’s gesture ID.
  - Iff, within the top three candidates in the score table, two candidates exist of the same gesture class and have a score $> 0.95\epsilon$, respectively, return the gesture ID of these two candidates.
  - Else, return “Gesture not recognized!”.
Next steps..

• $3 recogniser currently limited to highly defined gestures. i.e. ‘press the button’

• Aim to find a way to segment the gestures so that the $3 recogniser can be continuous

• Compare results with HMM implementation (Wii or Android based phone)