Hand Sign Recognition Based on Palm Gesture and Movement
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Gesture-Movement Recognition System Design
Skin Detection
- Training
  - Gesture ID and Training
  - Principal Component Analysis and Feature Extraction
  - Training Eigenspace
- Testing
  - Skin Detection and Tracking
  - Gesture Classifier Using Training Eigenspace
  - Gesture Movement Pair

Algorithms and Implementation
Skin Detection
- RGB to YCXR
  - Fitting skin pixels with tilted ellipse
- Extraction of PCA features to determine the (M = 10) most eigenvectors
  - Eigenimages (El)

Testing
- Capture images
  - Skin Detection and Face Subtraction
  - Hand Gesture Detection
  - Project Hand Gestures onto (M=10) eigenvectors. Form weights.
  - Gesture recognition from Euclidean distance between sets of weights

Application of Gesture Recognition
- Sign Language
- Socially Assistive Robotics
- Affective Computing
- Virtual Reality
- Remote Control

So Why Movement Tracking?
- Number of gestures that can be reliably detected (especially with non-uniform lighting conditions) is limited.
- If hand movement can be tracked simultaneously with the gesture, more granular recognition and tracking can be achieved.

Results
- Real-time application for robust gesture and movement detection.
- Can be trained to track any type of gesture and movement with an increased number of combinations
- Currently recognizes 32² possibilities for gesture-movement-pairs (for both hands).
- Possible extensions include incorporation of complex non-linear movements of hands
- Classification of a succession of movements (such as a squiggle)