Single View Head Pose Estimation

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Abstract
- Head pose estimation from single view images.
- The 6DOF was estimated using Pose from Orthography and Scaling with Iterations (POSIT) where a statistical anthropometric 3D rigid model is used as an approximation of the human head, combined with Active Appearance Models (AAM) for facial features extraction and tracking.
- The results show that orientations and head location were, on average, found within 2º or 1cm error standard deviations respectively.

POSIT – Pose from Orthography and Scaling with Iterations
- POSIT is a fast and accurate iterative algorithm for finding the 6DOF of a 3D model given a set of 2D image projections and 3D points correspondences.

Active Appearance Models
- Shape Model
- Texture Model
- Combined Model
- Generalized Procrustes Analysis
- Piecewise Affine Warp
- Principal Components Analysis (PCA)
- Low Memory PCA
- Remove correlations between shape and texture model parameters
- $c$ is a vector of appearance controlling shape and texture

Anthropometric 3D Model
- Suitable rigid body model that describes the 3D face of several individuals.
- Physical model
- 3D laser scan
- Sparse model

3D Glasses Augmentation
- A 3D model of glasses is backprojected on image with the estimated 6DOF.

Pose Evaluation
- Comparison between the estimated pose (AAM+POSIT) with the one estimated from a planar checkerboard.

Examples of Head Pose Evaluation
- The application with AAM fitting plus POSIT pose estimation runs at 5 fps on 1024x768 images using a Intel 3.4GHz P4 under Linux OS. AAM is based on 58 landmarks sampling 48178 pixels with color information (m=144534).

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