Image-based Modeling on Human Upper Body

Chun Jia

Department of Computer Science

General Description

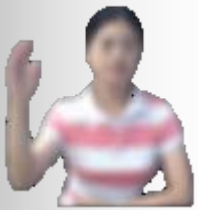
- Model a human upper body based on 2D imposters.
- A image database is created in the initialization stage by taking a short movie that includes the typical upper body movements.
- Each frame captured from the live camera is compared with the images in the database to find the best fit.

- Error metric is measured by the transformation between the current frame and the best matched frame from the database.
- The new imposter will be updated using the matched image in the database adapted with the error metric.

Two Approaches

- Tracking body components based on body segmentation using computer vision techniques.
- Find best match from the database mainly based on more robust image based technique.

Image-based Approach



Down sampled input image

Silhouette of the input image

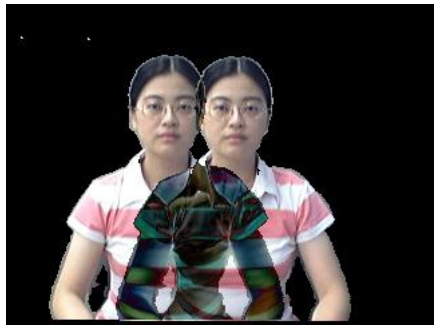
Matched database image

- Images in the database are down sampled and blurred when loaded. Silhouette for each image is computed.
- Each captured frame is down sampled and blurred. Silhouette is also computed.
- A brute-force searching runs to find the best match of the current frame, based on the silhouette shape, silhouette area and color. A frame is claimed to be the best match if it has the lowest weighted average of the above three components.

- RUN PROGRAM

Problem





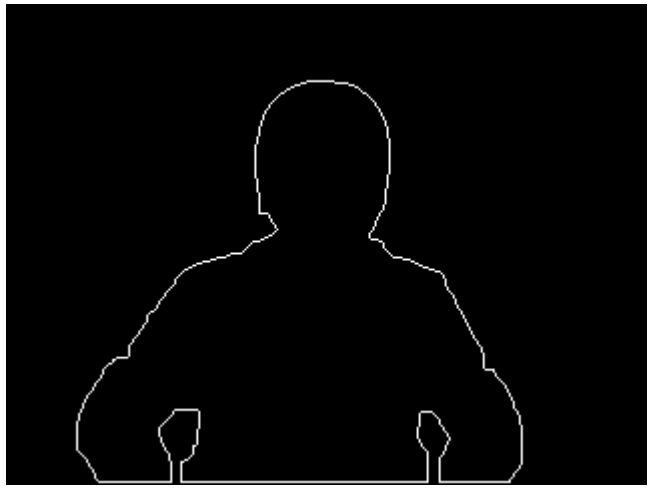
- Two images will have large color and silhouette difference with similar posture

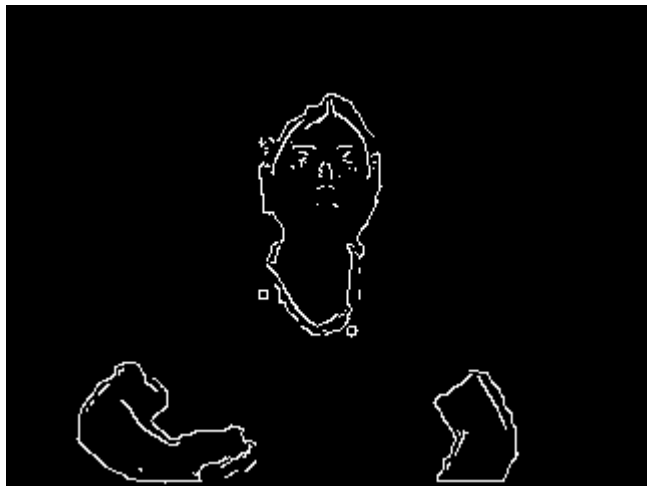


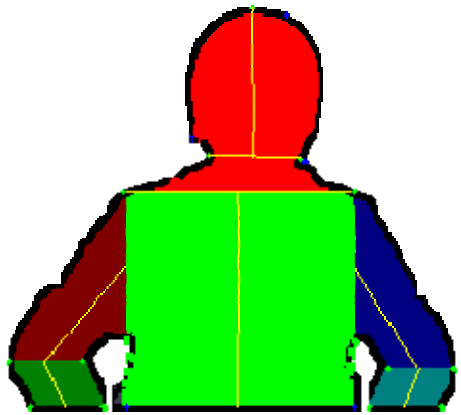
- Two images will have different posture with small color and silhouette difference.

Computer Vision Based Approach

- Body segmentation on initial friendly posture
- Extract silhouette and contour to detect the joint points and joint segments from the initial image.
- Update the joint points and segments using the knowledge from the previous pose. Edge detection on inner body is needed detect the arm joints.







Problem

- Feature detection is hard and error prone.
- Extra assumption about the initial posture.
- Body parts might not merge well at the joint point.
- Transformation for the body parts is harder to do.

Future work

- Wise matching algorithm
- 2D transformation
- Efficiency