Project title: Real time automatic face tracking using adaptive random forests

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Tracking is treated as a pixel-based binary classification problem in this thesis. An ensemble strong classifier obtained as a weighted combination of several random forests (weak classifiers), is trained on pixel feature vectors. The strong classifier is then used to classify the pixels belonging to the face or the background in the next frame. The classification margins are used to create a confidence map, whose peak indicates the new location of the face. The peak is located by Camshift which adjusts the size of the tracked face. The random forests in the ensemble are updated using AdaBoost by training new random forests to replace certain older ones to adapt to the changes between two frames. Tracking accuracy is monitored by a variable called the classification score. If the score detects a tracking anomaly, the system will stop tracking and restart by re-initializing using a Viola-Jones face detector. The tracker is tested on several sequences and proved to provide robust performance in different scenarios and illumination. The tracker can deal with complex changes of the face, a short period of occlusion, and the loss of tracking.