A Monte Carlo strategy to integrate detection and model-based face analysis

We present a novel probabilistic approach for tting a statistical model to an image. A 3D Morphable Model (3DMM) of faces is interpreted as a generative (Top-Down) Bayesian model. Random Forests are used as noisy detectors (Bottom-Up) for the face and facial landmark positions. The Top-Down and Bottom-Up parts are then combined using a Data-Driven Markov Chain Monte Carlo Method (DDMCMC). As core of the integration, we use the Metropolis-Hastings algorithm which has two main advantages. First, the algorithm can handle unreliable detections and therefore does not need the detectors to take an early and possible wrong hard decision before tting. Second, it is open for integration of various cues to guide the tting process. Based on the proposed approach, we implemented a completely automatic, pose and illumination invariant face recognition application. We are able to train and test the building blocks of our application on di erent databases. The system is evaluated on the Multi-PIE database and reaches state of the art performance.