

Face Detection and Synthesis Using Markov Random Field Models

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Abstract

The spatial distribution of gray level intensities in an image can be naturally modeled using Markov Random Fields (MRFs). We develop and investigate the performance of face detection algorithms derived from MRF considerations. For enhanced detection, the MRF models are defined for every permutation of site indices (pixels) in the image. We find the optimal permutation that provides maximum discriminatory power to identify faces from nonfaces using certain types of metrics. These metrics avoid parameter estimation when finding the optimal permutation from the training data base. A maximum pseudolikelihood criteria is proposed for subsequent estimation of the MRF parameters. We investigate the performance of the estimated MRF models for face detection and synthesis. Some detection and synthesis results based on the first and second order neighborhood systems will be shown.