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## Toward Unconstrained Ear Recognition From Two-Dimensional Images

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### ABSTRACT

Ear recognition, as a biometric, has several advantages. In particular, ears can be measured remotely and are also relatively static in size and structure for each individual. Unfortunately, at present, good recognition rates require controlled conditions. For commercial use, these systems need to be much more robust. In particular, ears have to be recognized from different angles (poses), under different lighting conditions, and with different cameras. It must also be possible to distinguish ears from background clutter and identify them when partly occluded by hair, hats, or other objects. The purpose of this paper is to suggest how progress toward such robustness might be achieved through a technique that improves ear registration. The approach focuses on 2-D images, treating the ear as a planar surface that is registered to a gallery using a homography transform calculated from scale-invariant feature-transform feature matches. The feature matches reduce the gallery size and enable a precise ranking using a simple 2-D distance algorithm. Analysis on a range of data sets demonstrates the technique to be robust to background clutter, viewing angles up to  $\pm 13^\circ$ , and up to 18% occlusion. In addition, recognition remains accurate with masked ear images as small as  $20 \times 35$  pixels.

### INDEX TERMS

Index Terms are available to subscribers and IEEE members.

Additional Details	References (42)	Citing Documents (5)
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