Toward Unconstrained Ear Recognition From Two-Dimensional Images

This paper appears in:
Systems, Man and Cybernetics, Part A: Systems and Humans, IEEE Transactions on
Date of Publication: May 2010
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Volume: 40 , Issue: 3
Page(s): 486 - 494
Product Type: Journals & Magazines

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 ??13??, and up to 18% occlusion. In addition, recognition remains accurate with masked ear images as small as 20 ?? 35 pixels.

INDEX TERMS

Index Terms are available to subscribers and IEEE members.

ISSN : 1083-4427
INSPEC Accession Number: 11228783
Digital Object Identifier : 10.1109/TSMCA.2010.2041652
Date of Publication : 25 March 2010
Date of Current Version : 12 April 2010
Issue Date : May 2010
Sponsored by : IEEE Systems, Man, and Cybernetics Society