Object detection and recognition using Evidences-based Image Analysis.

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ABSTRACT

The generic technique called the "*Evidences-based Image Analysis*" is proposed for a model-based object detection. Real images to be analysed are considered as the sources of evidences generated by the procedures of low-level image processing. These evidences support or refute hypothesises connected with different objects and their features. The Bayesian theorem is of use for hypothesis testing by evidences. The unknown (as a rule) parameters of probabilistic model are used as the internal parameters of algorithm tuning. This approach provides the most uniform and efficient way for the fusion of any available image information: intensity and contour, 2D and 3D, multispectral, multisensor and so on.

Our technique takes into account three principal points: object/background model, registration model and corruption model. This paper concentrates mainly on the registration parameters' estimation, especially on the problem of geometrically invariant object detection. It is shown that the Hough-like accumulation methods really implement the maximum a posteriori estimation of the parameters of registration model under the assumption of statistical independence of evidences. The reduction and separation of models are proved to be the legal ways for fastening of the invariant object detection. The usage of complex hierarchical models of objects is considered as another way for fast invariant detection and recognition.

KEY WORDS: model-based object detection, evidences' analysis, maximum a posteriori estimation.

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