Scale- and orientation-invariant generalized Hough transform—a new approach

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Received 1 May 1990; revised 31 August 1991.

Available online 19 May 2003.

Abstract

The conventional generalized Hough transform (GHT) is useful for detecting or locating translated 2-dimensional (2D) object shapes. However, a weakness of the conventional GHT is that a brute force approach is usually required to handle shape scaling and rotation, resulting in the use of a 4D Hough counting space (HCS). A new version of the GHT, called scale- and orientation-invariant GHT (SOIGHT), is proposed to remove this weakness. The improvement is based on the use of half lines and circles to replace the displacement vectors used in the conventional GHT for cell value incrementation. The required dimensionality of the HCS for the SOIGHT is reduced to 2D so that the storage and computation requirements for cell value incrementation and maximum detection in the HCS can be reduced effectively. Some experimental results are included to demonstrate the applicability of the proposed SOIGHT.
Keywords: Generalized Hough transform; Hough counting space; Cell value incrementation; Point spread function; Scale and rotation invariant; Shapes detection and location