

光电信息获取与处理

基于傅里叶-极坐标变换的相关结果后处理技术

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摘要:

在光学相关识别中,对相关输出结果进行后处理是保证图像识别准确性的关键之一。研究者通常采用神经网络技术对相关输出结果进行处理,并取得了较好的效果,但它需要预先准备大量的相关峰和噪声峰训练样本。根据极坐标变换能将笛卡尔坐标系下的旋转转变成平移的性质以及傅里叶变换的平移不变性,提出一种基于傅里叶-极坐标变换的相关结果后处理方法。验证结果表明:目标的旋转图像与目标自身的傅里叶-极坐标变换的相似度较大,而干扰图像与目标的傅里叶-极坐标变换的相似度较小。本文的方法在后处理阶段可对目标和干扰进行有效的分类识别,而且还能避免对相关峰和噪声峰训练样本的收集,从而使得光学相关识别系统的应用更加便利。

关键词: 信息光学 光学相关识别 傅里叶变换 极坐标变换 旋转不变性

Post processing technique for correlation results based on Fourier-polar transformation

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Abstract:

In optical correlation recognition, the post-processing of correlation output results is one of the key steps to ensure the correctness of image recognizing. Neural network technique is usually used to post-process correlation output results and good result is obtained, however, this method needs to prepare a lot of training samples of correlation peaks and noise peaks in advance. Based on the polar coordinates transformation's capability of transforming the rotation in Cartesian coordinate into translation and the translation invariant property of Fourier transformation, a post-processing method of correlation results based on Fourier-polar transformation is proposed. The verification results indicate that the similarity between the Fourier-polar transformations of target and its rotated images is greater compared to the similarity between the Fourier-polar transformations of target and disturbances. So the proposed method can effectively distinguish between targets and disturbances at the post processing stage, and it can avoid collecting training samples, which makes optical correlation recognition system convenient to be applied.

Keywords: information optics optical correlation recognition Fourier transformation polar transformation rotation invariance

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