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三次透视投影变换图像拼接

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Three projective transformations for image stitching

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摘要 为了减少带有路面信息的建筑物图像的拼接中产生的图像失真并提高拼接速度,基于局部变形方法并结合建筑物和路面纹理信息的不同提出了三次投影变换图像拼接方法。该方法根据图像内容将图像分割成不同子图像,然后拼接图像内容相同的子图像,最后实施总体拼接。为了改善当前全局投影变换带来的图像形状失真或扭曲问题,整个拼接过程采用三次局部的透视投影图像变换方法。由于是在传统的透视投影变换的基础上基于图像内容分割后再拼接,故拼接结果比传统方法更精确、更真实。实验结果表明:采用提出的图像拼接方法克服了路面部分纹理信息过少导致图像失真的缺陷,拼接速度比相关拼接方法提高了20%~40%。该方法能快速得到清晰无缝的拼接图像,基本满足拼接速度快、真实度高的要求。

关键词 : 图像分割, 图像拼接, Hough变换, 透视投影变换

Abstract : A three projective transformation image stitching algorithm was proposed based on local warping method combined with different textures of buildings and ground planes to overcome the image distortion and improve the stitching speed for the stitched building image with ground plane information. With the method, the image was first segmented into different small images with different contents, and then the ones with the same content were stitched together before finishing the whole stitching process. In order to reduce the local distortion and warping caused by globally projective transformation methods, the locally projective transformation method was adopted three times during the whole process. As the method stitches the image based on image content segmentation, it has a very precise and reliable stitching result than traditional ones. Experimental results show that the proposed method obtains seamless stitching image and overcomes the defects caused by image distortion due to less texture information of the ground plane, as well as improves the speed by 20%—40% as compared with that of traditional method. The rapid speed and high fidelity of proposed method satisfies the requirements of image stitching.

Key words : image segmentation image stitching Hough transformation projective transformation

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