工程与应用

工业CT图像的亚像素级面积测量

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摘要　 为了提高工业CT图像测量的精度，研究了一种基于Facet模型的亚像素级面积测量方法，并将其应用于实际的工业CT图像测量中。首先采用基于Facet模型的边缘检测算法提取亚像素边缘，然后通过最小距离搜索法分离出待测目标的边缘点并排序，最后利用离散化的格林公式计算面积。其中，基于Facet模型的边缘检测算法精度高、抗噪声能力强，能为后续基于边缘的测量提供高精度的数据；最小距离搜索法在浮点型边缘点上实现了待测目标边缘与整幅图像边缘的分离，并生成排序链码，克服了边缘点是浮点型且不连续的困难，给面积的计算提供了有效的数据。测量方法是在亚像素边缘上进行的，突破了图像分辨率对测量精度的限制，使在低分辨率的图像上实现高精度的测量成为可能。分别针对仿真图像和实际的工业CT图像进行了实验，实验结果表明该方法的测量精度高于普遍采用的像素累加法。

关键词　 图像处理　工业CT　Facet模型　亚像素　面积测量
分类号

Sub-pixel area measurement method of ICT image

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Abstract

In order to improve the accuracy of ICT（Industry Computerized Tomography） image measurement，a sub-pixel area measurement method based on Facet model is studied，and applied in actual ICT images.Firstly，an edge detection method based on Facet model is used to extract the sub-pixel edges.Secondly，the method of minimizing distance search is studied to separate and sort the edge of the measured object.At last，Green formula is adopted to compute the area.The edge detection method based on Facet model can achieve higher accuracy，reduce noise，and offer accurate data for further area measurement.The method of minimizing distance search method can separate the edge points of the measured object from the discontinuous edges of whole image，obtain sorted edge point chain，and offer available data for area computing.The measure method in this paper is based on sub-pixel edge；break through the restriction of measure precision by image resolution.Experiments have been done on emulation images and actual CT images，and the results prove that the accuracy of this paper's method is higher than the method of counting pixel.

Key words image processing Industry Computerized Tomography（ICT） Facet model sub-pixel area measurement

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