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信息科学

微小型结构件显微图像边缘的自动识别

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摘要： 在前一阶段的研究工作中，针对微小型结构件的显微图像边缘提取，作者提出了一种基于工艺匹配的显微图像边缘提取算法（Micro Processing Technology Matching based Micro Image Edge Detection, MPTM-MIED）。使用MPTM-MIED提取图像边缘之前，需要手工从零件显微图像中选取边缘过渡区域，这一操作将极大影响微小型零件的检测速度，从而使MPTM-MIED不能应用在实时自动检测中。针对MPTM-MIED的这一不足，本文利用BP神经网络技术重新设计并实现了MPTM-MIED，提出了一种新的自动提取显微图像边缘的方法（An Automated Micro Image Edge Detection Method，AMIED）。为了验证该方法的有效性，本文还利用AMIED对4种工艺微小型结构件显微图像的边缘进行了提取，并对线切割工艺零件的尺寸进行了测量。边缘提取的分析结果表明：AMIED提取出的显微图像边缘与MPTM-MIED提取出的基本一致；与常用的边缘检测算法相比，AMIED提取出的显微图像的边缘线形连接程度较好。测量尺寸的分析结果表明：MPTM-MIED和AMIED测量的尺寸基本相同，与Canny测量的相比，更接近万能工具显微镜测得的尺寸。

关键词： 微小型结构件 显微图像 自动边缘识别 BP神经网络（BPNN）

Automatic detection of micro image edges for micro accessories

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Abstract: In the previous research, a Micro Processing Technology Matching based Micro Image Edge Detection method (MPTM-MIED) was developed for detecting micro image edges of micro accessories. Before employing MPTM-MIED an edge transition zone has to be picked up manually from the micro image of micro accessories. This exerts a considerable influence on inspection speed and thus prevents MPTM-MIED from measuring sizes of micro accessories online and automatically. To overcome this shortcoming BP Neural Networks has been employed to design and implement a novel Automated Micro Image Edge Detection method (AMIED). From analysis results for micro accessories' edge detections the following two conclusions are arrived at: the detected edges by AMIED and MPTM-MIED are almost the same; compared with some common used detection algorithms AMIED has the smallest edge-connectivity. From analysis results for measured sizes the following conclusions are drawn: the measured sizes by AMIED are almost equal to these measured ones by MPTM-MIED; compared with Canny the measured sizes by AMIED are closer to these measured ones by MPTM-MIED.

Keywords: Micro Accessories Micro Image Automated Edge Detection BP Neural Networks (BPNN)

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