A Comparative Study of Automated PCB Defect Detection Algorithms and to Propose an Optimal Approach

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Abstract

Automated visual printed circuit board (PCB) inspection is an approach used to counter difficulties occurred in manual inspection that can eliminate subjective aspects and then provide fast, quantitative, and dimensional assessments. Various concentrated work on detection of defects of printed circuit boards (PCBs) have been done, but it is also crucial to classify these defects in order to analyze and identify the root causes of the defects. However, besides the need to detect the defects, it is also essential to classify these defects so that the source of these defects can be identified. Based on studies done till now, some PCB defects can only exist in certain groups. Thus, it is obvious that the image processing algorithm could be improved by applying a segmentation exercise. This paper makes a comparative study of all such algorithms developed till date, to analyze their shortcomings and thereby provide an optimal approach to detect maximum of the defects with higher accuracy as well as with speed. This approach uses morphological image segmentation algorithm and simple image processing theories. The given algorithm can overcome most of the defects of previous algorithms and detect more than 80% of defects in a given PCB which ranges from missing components, broken tracks, misplaced components etc.
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References


**Index Terms**

- Computer Science
- Algorithms

**Keywords**

- PCB Testing
- Digital Image Processing
- Morphological Operators
- Pattern Classification
- Wavelet Transform