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Name: Roman Melnyk
Institution: Lviv Polytechnic National University, Software Department
City: Lviv
Country: Ukraine
Phone: +380 97 381 25 32
Academic Email: ramelnyk@polynet,lviv,ua

I declare, I confirm, I certify and I sign that I received substantial, important, line by line peer review with several and substantial comments, important remarks and hints from, at least, 3 Reviewers and the Assistant Editor for my paper:

Image Processing and Machine Learning for the Detection of Defects in PCB Images

ID: Coupon ELCT24 - 1482

with Coauthor: .**Pavlo Viazovskyy**

I would like to thank all the reviewers for their thoughtful comments and efforts towards improving our manuscript. We revised the manuscript with special attention to the comments that we received from **.....Three (3).....** (<-write the correct number) reviewers that were experts, specialists in the area of my paper. I declare, confirm, certify and sign that WSEAS has checked my paper for possible plagiarism by Turnitin and my paper was found without plagiarism or self-plagiarism by Turnitin. I also declare, confirm, certify and sign that also that no Associate-Editor, no Editor-in-Chief, no member of the WSEAS Secretariat forced me in this Journal to add references (citations) to any previous publications of the journal.

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Date: 10-1-2025

Reply to the Reviewers

Reviewer 1

It is a good paper, but I have several remarks

1. Does the paper present a novel approach or significant advancement in the detection of PCB defects?

The article presents a new approach by combining pre-processing of images with software tools to obtain characteristics, and using artificial intelligence tools based on them to classify types of defects in printed circuit boards. Such an approach can find a place in the mass production of printed circuit boards without operator intervention. Without familiarity with modern printed circuit board manufacturing technology, it is difficult to talk about significant progress.

2. Are the findings a meaningful addition to the existing literature, or are they merely an incremental improvement?

In our opinion, the article represents a gradual improvement over our previous work, and in the field of similar research, it is a significant addition to the existing literature.

3. Are the proposed methods for defect detection using image processing and machine learning robust and replicable?

Yes, the proposed defect detection methods using image processing and machine learning are robust and repeatable. It is best done by professionals in the field of software, artificial intelligence, and familiarity with the basics of printed circuit board design.

4. Is there enough technical depth in the algorithms and tools used, or are they overly simplistic or derivative?

Yes, there is enough technical depth in the algorithms and tools used, and they are not simplified or derivative. A non-specialist must spend a lot of time to understand the content of the algorithms and programs. Before this version of the article, many other attempts were made with more steps. The presented version reduces the amount of software required.

5. Were experiments conducted on a sufficiently diverse dataset of PCB images, or was the dataset inadequate?

The approach described in the article demonstrates the idea, not the operation of an industrial tool. The developers are 2 teachers of the department, who combine teaching and research work. The main steps are designed, programmed and tested. The set of images is fragments from the Internet of appropriate quality and which do not require significant effort to prepare them. Since on the Internet most images have inscriptions, additional components, are poorly photographed. Therefore, the choice for experiments is not very large.

6. Tell them to IMprove the English language and the format.

Tell them to add some references from the WSEAS Journals of the last 2 years

Can they give directions for future research,

Tell them to correct some grammatical errrors.

The English language of the article has been checked and some noted grammatical and syntactic inaccuracies have been corrected by the Grammarly (Premium) program. Figures and subscriptions were checked and corrected if needed.

5 references to articles in WSEAS journals over the last 2 years have been provided.

Directions for future research are given in the conclusion.

Reviewer 2

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1. The methods described (e.g., image subtraction, flood-filling, histogram analysis) may not offer significant novelty over existing works.

The ideas are undoubtedly not new. But they are modified for the needs of application in printed circuit boards. Traditional subtraction for defect detection: these are binary images, two subtraction operations. And separate obtaining of only positive or negative defects, isolated. We have one subtraction, defects are marked with different colors, black components remain in the image. Filling: traditional requires a smooth surface, with fluctuations in the intensity of the area does not fill. In our case, an uneven surface is filled with an intensity tolerance and becomes smooth with a new color.

2. Heavy reliance on standard machine learning tools (e.g., Brain.js, TensorFlow) without introducing unique algorithms or architectures.

The remark is correct. But the purpose of the work is to show how the combination of software and artificial intelligence allows solving the problem of finding defective products in production and indicating the cause of the defect. The development of unique algorithms or architectures is a separate, large-scale work that is beyond the power of two teachers (not from the field of NN3). For example, in

articles by Chinese authors with 6-8 co-authors, new neural networks are presented. At least, theoretically.

3. Pay high attention to the references. Every reference inside the text must be reported in the list of the references, and every reference in the list of the references must be connected inside the main text properly.

The general policy of the WSEAS Journals in the references is the authors of the paper

to dedicate maximum 10% of their citations to their previous publications with a maximum number 5.

References include one link to a previous publication and 5 links to WSEAS journal articles.

Every reference inside the text is reported in the list of the references, and every reference in the list of the references is connected inside the main text.

4. Also the references must have diversity to authors, journals and countries.

The article has 26 references. Of these, 6 are earlier than 2020, and the rest are from 2020 to 2024. Among the authors are representatives of various countries, including China, India, Sri Lanka, Malaysia, Georgia, Ukraine, Great Britain, the United States, Turkey, etc.

Various journals, conferences and Internet resources are presented.

Reviewer 3

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1. Some sections are difficult to follow due to technical jargon and dense descriptions.

The authors, together with the PREMIUM program, tried to correct sentences with not quite correct word order (accepted in English).

2. Figures are referenced but not always effectively explaine

The numbering of figures and captions has been checked and corrected as necessary. More complex figures have been explained. If illustrative figures are explained in detail, the article length increases.

3. Authors state no funding or conflict of interest but lack detailed explanation of dataset origins and usage rights.

In the article we are talking about small PCB fragments since many schemes have such parts. Complete or practical schemes, moreover, cannot be entered, since they may be protected by copyright. We have no contact with the manufacturers of printed circuit boards or the authors of the images presented on the Internet.

5. The authors must expand the list of references to include more recent literature,

especially post-2020 studies, to strengthen the relevance and currency of your work

The article has 26 references. Of these, 6 are earlier than 2020, and the rest are from 2020 to 2024. Among the authors are representatives of various countries, including China, India, Sri Lanka, Malaysia, Georgia, Ukraine, Great Britain, the United States, Turkey, etc.

Various journals, conferences and Internet resources are presented.

6. The authors are obliged to check if the in-text citations exist in the reference list

also Check if all the articles in the reference list exist in the in-text citations.

Every reference inside the text is reported in the list of the references, and every reference in the list of the references is connected inside the main text.

7. Can the authors of the article increase the examples and can they give some practical results?

Some more examples with small fragments could be given, but this would significantly increase the volume of the article without adding new facts. It is difficult to add large fragments since they are greatly reduced when entered into the article. We are talking about fragments since many schemes have such parts. Complete or practical schemes, moreover, cannot be entered, since they may be protected by copyright. We have no contact with the manufacturers of printed circuit boards or the authors of the images presented on the Internet.

8. The conclusion can be written again in a more extended form

Two paragraphs are added.

Thank you for your work and we apologize for having missed these inaccuracies.

Authors.