

Review of: "Exploring the effect of image enhancement techniques on COVID-19 detection using chest X-ray images"

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Rahman et al. investigated the automatic classification of chest X-ray (CXR) images into COVID-19 pneumonia, non-COVID-19 pneumonia, and normal CXRs using Convolutional Neural Network (CNN) models [1]. The major contributions of this study were as follows: (i) the study evaluated the effect of lung segmentation and image enhancement techniques on the classification and (ii) the authors constructed a large dataset of COVID-19 pneumonia, non-COVID-19 pneumonia, and normal CXR images. The authors' results show that Gamma correction was useful for improving the performance of CNNs. Because I am interested in image preprocessing for CNNs, I find this paper to be useful.

Major points

1

The authors show that their modified U-net could perform reliable lung segmentation for their dataset. However, their dataset includes many normal CXR images (nearly 50% of CXRs in the test set are normal). Therefore, their modified U-net may not perform well in CXR images of COVID-19 pneumonia and non-COVID-19 pneumonia. As shown in one paper [2], the performance of their modified U-net should be evaluated for CXR images with severe abnormal findings.

2

The classification's performance was slightly better on plain CXR images than on segmented lung CXR images; this might have been caused by the performance degradation of the authors' modified U-net for CXR images with severe abnormal findings.

3

It seems that the authors intend to disclose the dataset they used in this study. I hope that their dataset will be disclosed immediately, to promote the automatic classification of CXR images.

4

According to their paper, their definitions of true positive (TP), true negative (TN), false positive (FP), and false negative (FN) are as follows:

- TP: the number of COVID-19 CXR images that were identified as COVID-19 CXRs
- TN: the number of normal and non-COVID lung opacity CXRs that were identified as normal and non-COVID CXRs
- FP: the number of normal and non-COVID CXRs that were incorrectly identified as COVID-19 CXRs
- FN: the number of COVID-19 CXRs that were incorrectly identified as normal and non-COVID CXRs

In my opinion, these definitions may be inadequate. For example, if a normal CXR image was identified as non-COVID, how did the authors handle this result? Such a result may have been treated as a TN in this study. However, this result would be regarded as a misdiagnosis from a clinical viewpoint. The results of the performance metrics of this study should therefore be handled carefully.

Minor points

5

EfficientNet and Vision Transformer are both state-of-the-art and are available as CNNs with pretrained models [3,4]. I am interested in how these models would perform on the authors' dataset.

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