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College of Engineering and Technology  
Alexandria, 1029, Egypt.

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Dear Editors

We would like to thank the editor and the reviewers for their generous comments on the manuscript that have helped us in improving the quality of this manuscript. In addition, we have edited the manuscript to address their concerns.

We believe that the manuscript is now suitable for publication in PeerJ.

Yours sincerely;

Omneya Attallah and Dina A. Ragab

## *Editor comments (Sharif Aly)*

*Please address the reviewers comments, I am in agreement that the suggested changes will improve the manuscript clarity and get it closer to a final version.*

Thank you for encouraging us to update our paper and to submit the revised version. We find that all the comments are addressable and these comments have helped us to improve the quality of our work.

## Reviewer 1

### Basic reporting

*There are still some issues with English in the manuscript. I've pointed out a few instances, but there are a number of awkward phrases or grammatical errors.*

*Line 52: I recommend changing the wording to “the WHO encouraged efforts to reduce the spread of the infection, many countries...”*

*Line 55: “led to a tremendous increase in the need for hospital beds and necessary medical equipment”*

*Line 56:” Moreover, doctors and nurses are at high risk of infection.”*

*Line 63: “ the sensitivity of the RT-PCR test is inadequate resulting in more infections through test negative patients.”*

*Line 72: use “advantage” instead of “privilege”.*

*Line 80: “help radiologists in giving an accurate diagnosis based on medical images”*

*Line 168: “In the literature, these networks have not yet been used to detect and classify COVID-19”*

*Line 177: “AlexNet CNN was initially trained with ImageNet data...”*

*Line 197: “to lower the computation cost”*

**Response:** Thank you for the valuable corrections. We updated the manuscript by addressing all these comments. See lines 55-56, 58-60, 66-67, 76, 86, 186, 196, and 218.

*Line 155 , 174: convolution layer – you said in your rebuttal it was convolutional layer – please correct.*

*Line 402 “Discussion” instead of “Discussions”*

*Line 458 Your missing a digit, should be 33.765 s*

*Line 505 I wouldn't use “inadequate” – use “relatively small”. Inadequate implies that you really didn't have enough images to do the work*

**Response:** Corrected with thanks.

*Line 403 Delete the word “Nowadays” – it means “at the present time, in contrast with the past” Suggest changing the wording to “COVID-19 has led to the greatest worldwide health crisis in the recent past.”*

**Response:** Corrected with thanks.

*Line 438 – 450 This section is a repeat of your methods and has already been explained at length before. Please delete. Figure 5 is part of the results and should be described in the results section.*

**Response:** This section is deleted, and Figure 5 is described in the results section.

*Line 67: “precisely at the center of the pandemic area” – what do you mean with this phrase? The center of the pandemic is hard to pinpoint and is all around the world but also constantly shifting.*

**Response:** We removed this phrase “precisely at the center of the pandemic area.” See line 78.

*Line 73: “deducing a more favorable illustration” – I don’t understand this phrase*

**Response:** We replaced it to “DL methods have the ability to present optimum representations and significant information from the raw images without image enhancement, segmentation, and feature extraction processes, which correspondingly offers improved diagnosis process and lower complexity than classical ML approaches.” See lines 77-81.

*Line 96: “DL methods are more appropriate for detecting covid-19 from CT images” – do you mean more appropriate than a radiologist? Or should they be used to enhance the radiologist’s diagnostic capabilities?*

**Response:** We paraphrased this sentence to “DL methods could be used to enhance the radiologist’s diagnostic capabilities of COVID-19 from CT images.” See lines 104-105.

## *Experimental design*

*Your narrative of the design would be a lot easier to read if you presented it in the past tense as a description on how you developed and tested the system. The use of the present tense throughout your description implied to me that the entire process is part of MULTI-DEEP, when in reality, as I understand, it is scenario 3, which maximizes accuracy and computational speed. Please describe the development of the system in past tense instead of describing what you did in the present tense. E.g., line 221: “In the end-to-end DL classification stage, four CNNs of different architectures were constructed with the images available in the dataset. Each of the CNNs performed the classification and diagnosis procedure individually. In deep feature extraction, valuable features were extracted from each CNN separately...”*

**Response:** Thank you for the comment. We updated the manuscript and we rewrote the explanation of the system in past tense.

*I still found the term “stage” confusing in your narrative, as it implies that subsequent stages depend on previous stages. I would prefer a term like “component” or “approach” to enhance clarity.*

**Response:** We replaced the term “stage” to “approach” through the whole manuscript.

## *Validity of the findings*

*Line 507: I think you mean that you want to expand the model so that it can correctly diagnose other types of pneumonia while at the moment it can only distinguish COVID-19 from non COVID-19 cases. If so, please change the wording accordingly.*

**Response:** We paraphrased this phrase to “at the moment the proposed model can only distinguish COVID-19 from non COVID-19 cases. It is essential to distinguish COVID-19 cases from other

types of pneumonia as well. Future research will be done to expand the model so that it can correctly diagnose other types of pneumonia.” See line 551-555.

### *Conclusions*

*You should add that MULTI-DEEP should undergo further field testing before it can be employed by radiologists. Also, it will likely have to undergo regulatory approval by health authorities before its implementation into hospitals.*

**Response:** Thank you for the comment. We added this paragraph in the conclusion.

### *Comments for the author*

*Thank you for putting a lot of effort into the revision of the manuscript. I have a few more comments at this point.*

**Response:** Thank you so much.

## *Reviewer 2 (Emmanuel Ifeakor)*

### *Basic reporting*

*The English has improved, but there is still a need to still proof read the revised manuscript.*

Thank you very much for the comment. A native English speaker has revised and edited the revised version of this manuscript and we are now confident about the language.

### *Experimental design*

*This is satisfactory.*

**Response:** Thank you so much.

### *Validity of the findings*

*This is satisfactory.*

**Response:** Thank you so much.

### *Comments for the author*

*The authors have addressed most of my concerns. However, it is recommended that a further proof reading of the manuscript is undertaken.*

**Response:** Thank you so much. A native English speaker has revised and edited the revised version of this manuscript and we are now confident about the language.