

Peer Review File

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Review A:

Comment:

1. This article by Chang et al is well-written. The development of AI based algorithms for COVID-19 provided here gives good summary to the readers.

2. I agree with the authors point that “In the future, AI personnel and medical workers will further cooperate closely.” There are already live examples where hybrid models with blockchain secured data are developed for this purpose where patient information by the doctors are been fed into the health care systems. See for example following recent articles,

a. Giustina Secundoa, S.M.Riad Shams, Francesco N (2021). Digital technologies and collective intelligence for healthcare ecosystem: Optimizing Internet of Things adoption for pandemic management, Journal of Business Research Volume 131, July 2021, Pages 563-572

b. Rao, A.S.R.S., Vazquez, J.A., Better Hybrid Systems for Disease Detections and Early Predictions, Clinical Infectious Diseases, 2021;, ciab489, <https://doi.org/10.1093/cid/ciab489>

The authors might want to refer by describing in a sentence or two.

Reply: Thank you for these comments. As you advised, we have referred to and described the two articles in our paper.

Review B:

This paper titled “Application of Artificial Intelligence in Battling Against Covid-19” is a narrative review to present how artificial intelligence technologies have been applied to the field of medicine in the current COVID-19 pandemic. I respect the authors’ contributions to search and review many kinds of related articles, and hope my following suggestions will contribute to making your paper better.

Major comments.

Comment 1: All included papers must be presented in Table 1. For example, some reviewed papers in the section “4.3. Respiratory Pattern and Symptoms Diagnosis”,

“5. Applications of AI in the Covid-19 Progression”, and “7. Applications of AI in the COVID-19 Psychological Effects” are not presented in Table 1 (Ref # 46-47, 51-57, 77-80).

Reply 1: Thank you for these comments. As you advised, we have listed the related table for the content of the paper.

Comment 2: In Table 1, what column name “Algorithm” means? Is the model architecture? For example, LSTM in the third row is a model architecture, but Adam in the second row is an optimization algorithm. In addition, some algorithm names in the column “Algorithm” are ambiguous (even some words are not related to algorithm) such as “ECharts data visualization tool”, “ML/Linear Regression”, “segmentation algorithm/classification algorithm”.

Reply 2: Thank you for these comments. As you advised, we have revised the related tables and contents in the paper.

The algorithm can either be a sequence of simple if-then statements or a series of more complex mathematical equations. The complexity of an algorithm will depend on the complexity of each step it needs to execute and the sheer number of steps the algorithm needs to perform. Algorithms are the building blocks that make up artificial intelligence. Artificial intelligence is a set of algorithms but differs depending on whether the data they receive is structured or unstructured.

Comment 3: In the context of this paper, AI applications to medicine only have positive effects. Are there any papers that have negative results of AI applications comparing to conventional methods? To prove this, the search terms in the method section should be specified. It is related to “selection bias” issues. Providing the list of search terms as a supplementary file is recommended.

Reply 3: Thank you for these comments. As you advised, we have changed the search terms in the method section. And we have provided a list of search terms as a supplementary file.

Comment 4: This paper introduce which AI models are used in each task. However, several expressions to introduce which AI model was developed (or used) in each reviewed paper are inappropriate. For example, in section 3.3., the author described that “Marco et al. concluded that with the generalized linear models and binomial

regression models,” but binominal regression model is a member of the family of generalized linear model. Therefore, both model terms cannot be parallelly mentioned. Another example can be found in section 4.1. The author described that “Villarreal et al. detected typical profiles in PCR curves caused by contamination or artifacts. So, they designed a binary classification model to ease data verification.”, but the paper (Villarreal et al.) introduced several ML algorithms, namely, K-neighbor classifier, support vector machine for classification (SVC), decision tree classifier, and random forest classifier (RFC). Furthermore, other part of sentences introducing papers such as Arpaci et al(46), Liang W et al(53), Shashkumar et al(55), and Zhavoronkov et al(59), does not describe the AI model exactly. Please revise all the improper or ambiguous expressions about AI model.

Reply 4: Thank you for these comments. As you advised, we have revised the related tables and contents in the paper.

In section 3.3, Marco et al. fitted generalized linear models to their data using COVID-19 deaths and cases as the outcomes and nitrogen oxide, nitrogen dioxide, and ozone as the exposures of interest, adding the corresponding population density values as confounding variables. They modeled the number of cases and deaths using negative binomial regression analyses since the response variables are overdispersed count data.

In section 4.1, Villarreal et al. detected typical profiles in PCR curves caused by contamination or artifacts. So, they compared the accuracy and log loss parameters from different ML methods, such as K-neighbor classifier, SVM, decision tree classifier, quadratic discriminant analysis (QDA), linear discriminant analysis (LDA), and RF. LDA presented the highest accuracy value of 97.6 and a low log loss of 0.1. It was the best method to optimize PCR tests’ results.

In section 4.3, Arpaci et al. analyzed 114 cases from the Taizhou hospital of Zhejiang Province in China. They developed six predictive models for COVID-19 diagnosis using six different classifiers based on 14 clinical features, including Bayes classifier (BayesNet), logistic-regression (Logistic), lazy-classifier (IBk), meta-classifier (Classification via Regression (CR), rule-learner (PART), and decision-tree (J48). As

a result, the Classification via Regression (CR) was the most accurate classifier for predicting the positive or negative COVID-19 cases with an accuracy of 84.21%.

In section 5, the context of Liang W et al. and Shashkumar et al. were deleted. In section 6.1, the context of Zhavoronkov et al. was deleted.

Comment 5: When describing the result of AI model evaluation, results such as sensitivity, specificity, accuracy and AUC, should be presented with the number. However, some results are just expressed by ambiguous words such as “good”, “better”, and “accurately predicted” (especially section 3). All results of each papers should be described more accurately and objectively.

Reply 5: Thank you for these comments. As you advised, we have revised the related tables and contents in the paper.

Comment 6: In section 8, the author described the critical topic of data security. However, the contents are general issues of AI although this paper focused on AI application to “medicine”. Please review the papers of which topic are associated with data security in medical field.

Reply 6: Thank you for these comments. As you advised, we have revised the related contents and added papers associated with medical data security in the paper.

Comment 7: The contents of section 9 is more close to “discussion”, not “conclusion”. Authors should describe what problems still exists in the AI application to medical field with proper references.

Reply 7: Thank you for these comments. As you advised, we have revised the related contents of the paper.

Minor comments.

Comment 8: Table 1 can be divided into sub-tables according to six areas.

Reply 8: Thank you for these comments. As you advised, we have revised the related tables in the paper.

Comment 9: The type of this paper might be presented in the title name.

Reply 9: Thank you for these comments. As you advised, we have revised the paper title.

Comment 10: In section 3.1., cross validation method is described in 2nd paragraph (It is also used cross-validation to overcome~), but that method is commonly used in other several articles. Please explain why author explain this method here with the paper (Chimmula et al.)

Reply 10: Thank you for these comments. As you advised, we have revised the related contents of the paper.

Comment 11: In 2nd paragraph of section 3.1., the author stated that “In addition to RNN, convolutional neural networks (CNN) can also predict the spread of infectious diseases. By converting one dimensional data into a two-dimensional matrix and inputting it into a CNN, the cumulative number of confirmed cases in a region can be accurately predicted”. Please suggest the reference of this description.

Reply 11: Thank you for these comments. As you advised, we have revised the related contents of the paper.

Comment 12: In section 3.2, the author stated that “The minimum utilization or coverage rate of the centralized model in epidemic control was remarkably lower than that of the decentralized model.”. This sentence exists in the paper (Mao et al (21)) with the other paper referenced. Namely, this sentence may not main description of the paper(Mao et al (21)) Please check and revise it if agree.

Reply 12: Thank you for these comments. As you advised, we have revised the related contents of the paper.

In section 3.2, Mao et al. divided the data storage and processing models of digital contact tracing into centralized and decentralized models. South Korea and China have adopted the centralized model for digital contact tracing. In the centralized

model, anonymized data were uploaded from people's contact information to centralized servers; then, health authorities can check, notify, and manage previous contacts. The decentralized model was adopted by countries and regions such as Europe, North America, and Singapore. In comparison, the decentralized model locally stores these keycodes and allows users to notify the system if they have tested positive (or not), so the mobile app will upload the last 14 days of locally stored keys to the server; and voluntarily check their risk exposure, that is, whether they have been in contact with someone who may have been infected, by downloading the uploaded keys from the server and matching locally against the stored keys to evaluate their risk of exposure. Mao et al. decided digital contact tracing in a centralized model may become the mainstream measure for primary epidemic emergency management worldwide.

Comment 13: In section 6.4, the author stated that “Ong et al. (73) used the newly developed machine learning-based Vaxign-ML reverse vaccinology tools to predict COVID-19 vaccine candidates.” However Vaxian-ML and Vaxian-VR(reverse vaccinology) are different. Please clarify that sentence.

Reply 13: Thank you for these comments. As you advised, we have revised the related contents of the paper.

Review C:

Comment: This submission is “Application of Artificial Intelligence in Battling Against Covid-19”. However, there are very similar manuscripts already published on this theme.

“Applications of artificial intelligence in battling against covid-19: A literature review” published on Chaos Solitons Fractals.

<https://pubmed.ncbi.nlm.nih.gov/33041533/>

And the keywords of this submission is also similar to that paper.

Keywords of this submission are COVID-19; artificial intelligence; coronavirus; deep learning; machine learning.

Keywords of the published paper are Artificial intelligence; Artificial neural networks; Convolutional neural networks; Coronavirus; Covid-19; Deep learning

I know it is not easy to write review articles and the methods of this submission are much clear than that published paper.

But the novelty and value of this submission have decreased a lot. For example, both of them discuss epidemiology, diagnosis, treatment, drug designing, drug repurposing, and so on.

Reply: Thank you for these comments. As you advised, many articles are covering AI applications in COVID-19, but each article has its corresponding value. Because the authors have different professional backgrounds and academic directions of interest, their articles have different focuses, analysis angles, and conclusions. We selected articles covering a wide range, sophisticated and novel, and strived to give readers a different experience.