

LETTER TO THE EDITOR

Open Access



The appropriate division of data in training of computers to predict physicians' decision on blood transfusions: a reply to Dr. Sander de Bruyne

Yuanyuan Yao¹, Jenny Cifuentes², Bin Zheng³ and Min Yan^{1*}

Dr. Francesco Marincola
Editor-in-Chief

Journal of Translational Medicine

We have read the letter to the editor, written by Dr. Sander de Bruyne about our paper entitled "Computer algorithm can match physicians' decisions about blood transfusions" [1]. In this study, as mentioned in the letter [2], we used a multilayer perceptron neural network to predict the appropriateness of intra-operative blood transfusion cases. In this preliminary report, the deep learning algorithm yielded a promising accuracy of 96.8% in a dataset of 4946 patients. Expert anesthesiologists classified 3604 cases as appropriate and 1342 as inappropriate in this dataset. This was completed based on the World Health Organization's (WHO) guidelines.

In his letter, Dr. Bruyne mentioned a well-known adequate practice to prevent the computer algorithm from overfitting and to accurately evaluate machine learning strategies, which is the separation of the sets of training and validation/test. The danger of not dividing the dataset in the training process is that the model may learn an overly specific function that performs well on the training data, but is less effective in generalizing to data outside training. In lieu of this concern, Dr. Bruyne suggested that not splitting data was a problem in this study.

Reading through Python scripts, it seemed to Dr. Bruyne that the model was trained and validated on the same data entries. However, importantly, this was not true. As it can be seen in the supplementary material, the files associated with the training and testing have different names. The data were divided and processed before the neural network implementation and consequently saved in different files. In the study published in the Journal of Translational Medicine, no further description about data division was included. This is because the work was focused on providing an exploratory analysis on clinical data, designed for a wider healthcare audience; it also focused on implementing a general, machine learning based classifier to demonstrate how this algorithm could help physicians to make decisions.

We have provided an in-depth analysis on the machine learning strategies, and their implementation details in another paper [3]. In our second paper, the training and validation datasets were split in 70% and 30% of the total data, similar to our first paper [1, 3]. The second paper was focused on a computer science audience; an analysis of the optimal hyper-parameters for different classifiers (Random Forest, Support Vector Machine, MultiLayer Perceptron Neural Network and Decision Tree Classifier) was included [3]. In addition, the training and cross-validation scores were provided and analyzed in the hyper-parameter setting procedure to avoid any overfitting or bias in the evaluation results [3]. We encourage readers to view this latest study if details regarding the deep learning implementation are required.

*Correspondence: zryanmin@zju.edu.cn

¹ Department of Anesthesiology, The Second Affiliated Hospital, School of Medicine, Zhejiang University, Hangzhou 310009, China
Full list of author information is available at the end of the article



© The Author(s) 2021. This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

Acknowledgements

Not applicable.

Authors' contributions

All authors have seen the manuscript and approved to submit to your journal. MY, YY and BZ designed the study, wrote the first article and this letter; JC helped develop a custom-designed computer algorithm. All authors read and approved the final manuscript.

Funding

No funding was received.

Availability of data and materials

Not applicable.

Declarations**Ethics approval and consent to participate**

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Author details

¹Department of Anesthesiology, The Second Affiliated Hospital, School of Medicine, Zhejiang University, Hangzhou 310009, China. ²Program of Electrical Engineering, Universidad De La Salle, Bogotá, Colombia. ³Department of Surgery, University of Alberta, Edmonton, Canada.

Received: 26 May 2021 Accepted: 5 June 2021

Published online: 27 June 2021

References

1. Yao Y, Cifuentes J, Zheng B, Yan M. Computer algorithm can match physicians' decisions about blood transfusions. *J Transl Med*. 2019;17:340.
2. De Bruyne S. *Comment* on "Computer algorithm can match physicians' decisions about blood transfusions". *J Transl Med*. 2021;19:175.
3. Cifuentes J, Yao Y, Yan M, Zheng B. Blood transfusion prediction using restricted Boltzmann machines. *Comput Methods Biomech Biomed Eng*. 2020;23:510–7.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

