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Lecture Notes in Electrical Engineering • Volume 835, Pages 633 - 645 • 2022 • 8th International Conference on Computational Science and Technology, ICCST 2021 • Virtual, Online • 28 August 2021 through 29 August 2021 • Code 275849

Document type

Conference Paper

Source type

Book Series

ISSN

18761100

ISBN

978-981168514-9

DOI

10.1007/978-981-16-8515-6_48

Publisher

Springer Science and Business Media Deutschland GmbH

Original language

English

Volume Editors

Alfred R., Lim Y.

[View less](#)

Interpretation of Machine Learning Model Using Medical Record Visual Analytics

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Abstract

The state of the art of medical application that being implemented are mostly based on common machine learning model. Nevertheless, one of the drawbacks of the practice of medical diagnosis is the lack of explanation on the proposed solution, which is also known as a black box, without knowing

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the internal decision process between the input and output. It will lead to untrustworthiness and difficult to understand by the medical expert. They are questioning how the complexity of machine learning methods decide on the output without clear and understandable explanations. Moreover, in machine learning field the characteristic of a black box model may lead to biased data analysis and incorrect output decisions. There is work that uses visual analytics techniques to interpret the machine learning output to ease the understanding of medical experts. However, the functionality of existed and combined visual analytics techniques is not sufficient to visualized and interpreted the output of machine learning operation. Other visual analytic techniques faced the same problem, unreliability to produce strong reason on the output when working with complex machine learning models. This paper analyzed several visual analytics approaches instantiated in machine learning algorithm for medical record analytics. The motivation of this paper is to allow medical experts to understand the interpretation of a black box machine learning model in predicting medical outcome. This paper studied on the effectiveness of visual analytics techniques to identify the appropriate technique to be instantiated to the machine learning algorithm to further elaborate the results obtained by demonstrating transparency, interpretability and explainability of the machine learning algorithm. The visual analytics that are been studied are Local Interpretable Model-agnostic Explanations (LIME) and Shapley Additive exPlanations (SHAP). Based on the comparison of LIME and SHAP methods, this paper found that SHAP has consistent interpretability as compared to LIME. © 2022, The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

Author keywords

Interpretability; Machine learning ; Visual analytics

Indexed keywords



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