Machine Learning Based Diagnostic for Identifying Sepsis

Tech ID: 32705 / UC Case 2020-012-0

ABSTRACT

Researchers at the University of California, Davis, have developed a novel approach of identifying sepsis by employing custom machine learning models within a combination of known laboratory data.

FULL DESCRIPTION

Current methods for detecting sepsis in patients rely on physician gestalt (which may be flawed), non-specific systemic inflammatory response syndrome (SIRS) criteria, and biomarkers. For example, the SIRS criteria may be met if a patient exhibits fever, has a rapid respiratory rate, has a high heart rate, and/or has abnormally high or low white blood cell counts. As a result, a healthy person can manifest SIRS just by exercising.

Sepsis is defined as SIRS with a suspected or identified source of infection. Unfortunately, infection is difficult to detect in a timely fashion using existing microbiological techniques, often taking 24-48 hours to provide definitive results. As a result, sepsis recognition may be delayed, contributing to its increased mortality – reported to be as high as 50% in some instances.

Due to these limitations, sepsis recognition is delayed and contributing to increased mortality which has been reported to be as high as 50%. Using customized AI/ML techniques, UC Davis researchers have developed a robust system for differentiating between sepsis and non-sepsis conditions using a combination of known laboratory and vital signs data such as heart rate, body temperature, blood pressure and additional parameters such as the Glasgow Coma Score (GCS) and Multiple Organ Dysfunction Score (MODS).

APPLICATIONS

- Prediction of sepsis rapidly without waiting for pathogen identification.

FEATURES/BENEFITS

- Able to adequately predict sepsis with less variables compared to those recommended in consensus guidelines
- Method empirically generates thousands of models within a multitude of algorithms which enables to find the best performing model
- Constructed through a series of variations in its hyperparameter settings which include variable activation functions, variable hidden layer depths, and variable alpha values.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20220292876	09/15/2022	2020-012

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OTHER INFORMATION

KEYWORDS

sepsis, machine learning models, algorithms, deep neural network, blood

CATEGORIZED AS

- Medical Diagnostics

RELATED CASES

2020-012-0

RELATED MATERIALS

- Tran, N.K., Albahra, S., Pham, T.N. et al. Novel application of an automated-machine learning development tool for predicting burn sepsis: proof of concept. Sci Rep 10, 12354 (2020). - 02/07/2022

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Hemodynamically Responsive Retrograde Endovascular Balloon Occlusion Of The Aorta (REBOA) Simulator
- Method for Estimating Blood Plasma Water Content Using Portable NMR Relaxometry
- Neural Network Machine Learning Applied to Diagnose Acute Kidney Injury

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