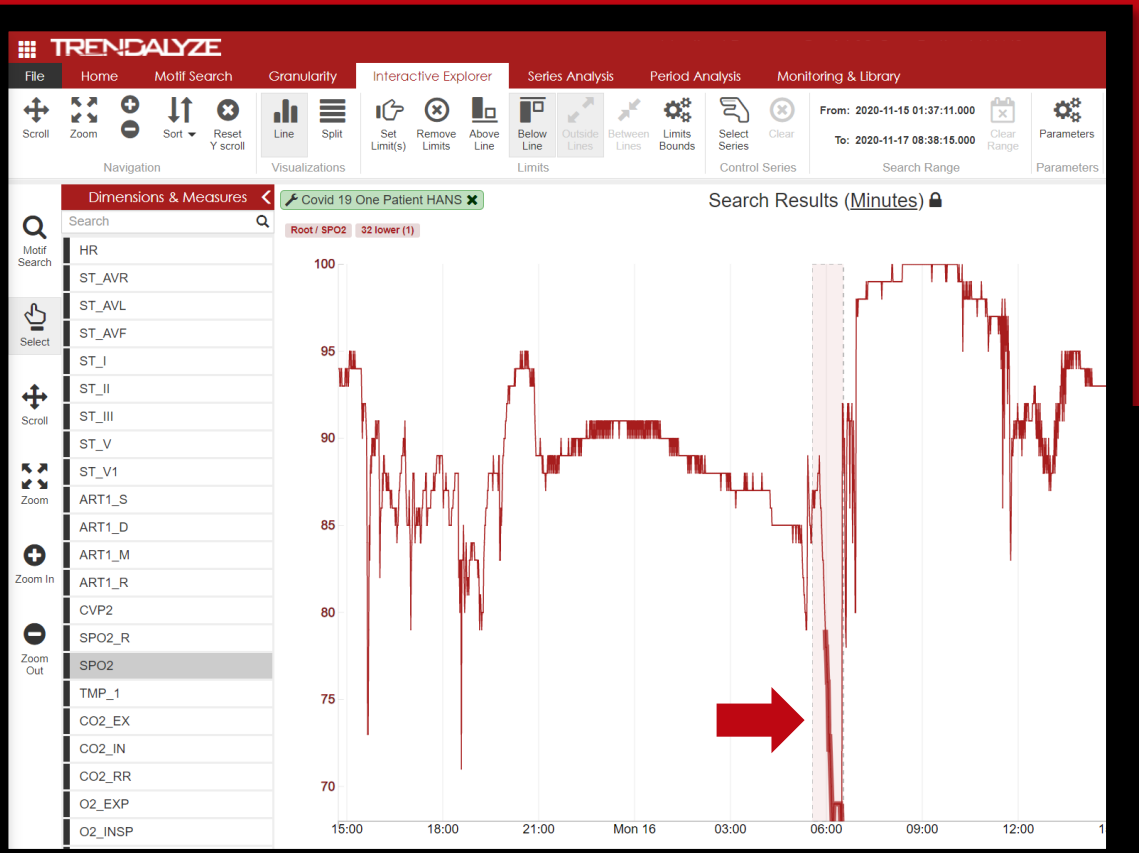
Google-like pattern search for Covid-19 medical research and patient monitoring

About Trendalyze

Trendalyze is a cloud-based AI platform for searching and monitoring for patterns in time series data generated by sensors, machines, and monitoring devices. Like Google search changed the Web, Trendalyze pattern search is changing how digital enterprises find and monetize opportunities from their data. Like words, pattern have meaning to experts: a heartbeat shape can signal a heart attack and an asset price chart pattern can signal a trading opportunity. Trendalyze automatically searches for known and unknown patterns and/or changes in patterns in patient-level data, and alerts medical professionals. The platform has been used for ECG patterns analysis, chronic pain management, and robotic surgery gesture detection.

TRENDALYZE



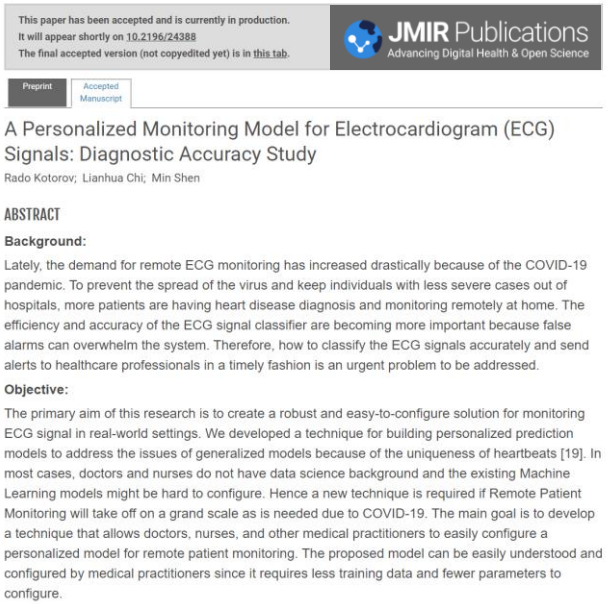
Relevance to Covid-19:

Changes in vital patterns reveal important information about the progression of medical conditions that can aid both treatment algorithms and drug discovery. The challenge with pattern discovery (even in DNA) has been that it could only be done by statisticians. Trendalyze puts the human in the loop and empowers medical professionals to do systematic pattern discovery and build libraries of patterns for monitoring and prediction.

Example: The screen shot shows a 32-minute SPO2 pattern that triggers an alert for the need of a ventilator. Single sporadic drops in SPO2 are noted but do not produce alerts. This particular pattern was implemented in a Germen monitoring device, but there are many more unknown individual and correlated patterns that can enhance the care while simultaneously reducing the cost of care.

The two opportunities are in scaling medical research and in reducing the burden of monitoring

R&D and Grants



This paper has been accepted and is currently in production.
It will appear shortly on 10.2196/24388
The final accepted version (not copyedited yet) is in this tab.

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A Personalized Monitoring Model for Electrocardiogram (ECG) Signals: Diagnostic Accuracy Study

Rado Kotorov; Lianhua Chi; Min Shen

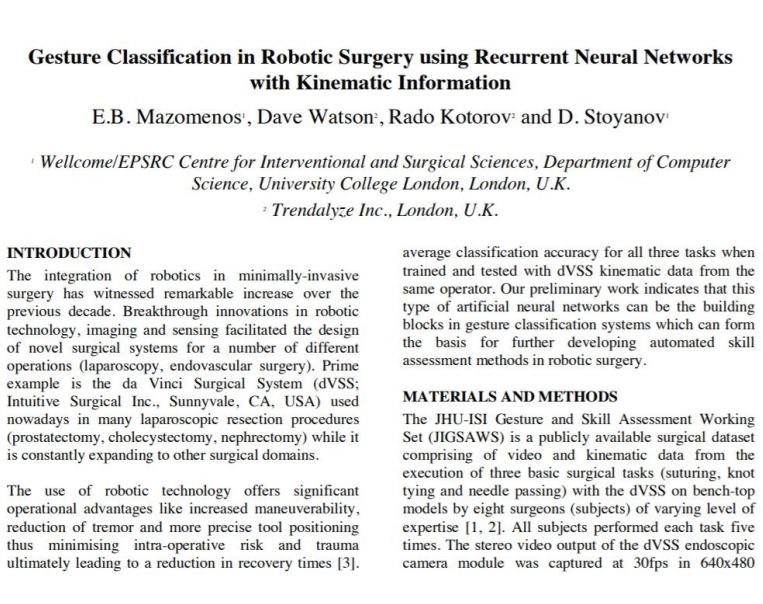
ABSTRACT

Background:

Lately, the demand for remote ECG monitoring has increased drastically because of the COVID-19 pandemic. To prevent the spread of the virus and keep individuals with less severe cases out of hospitals, more patients are having heart disease diagnosis and monitoring remotely at home. The efficiency and accuracy of the ECG signal classifier are becoming more important because false alarms can overwhelm the system. Therefore, how to classify the ECG signals accurately and send alerts to healthcare professionals in a timely fashion is an urgent problem to be addressed.

Objective:

The primary aim of this research is to create a robust and easy-to-configure solution for monitoring ECG signal in real-world settings. We developed a technique for building personalized prediction models to address the issues of generalized models because of the uniqueness of heartbeats [19]. In most cases, doctors and nurses do not have data science background and the existing Machine Learning models might be hard to configure. Hence a new technique is required if Remote Patient Monitoring will take off on a grand scale as is needed due to COVID-19. The main goal is to develop a technique that allows doctors, nurses, and other medical practitioners to easily configure a personalized model for remote patient monitoring. The proposed model can be easily understood and configured by medical practitioners since it requires less training data and fewer parameters to configure.



Gesture Classification in Robotic Surgery using Recurrent Neural Networks with Kinematic Information

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INTRODUCTION

The integration of robotics in minimally-invasive surgery has witnessed remarkable increase over the previous decade. Breakthrough innovations in robotic technology, imaging and sensing facilitated the design of novel surgical systems for a number of different operations (laparoscopy, endovascular surgery). Prime example is the da Vinci Surgical System (dVSS; Intuitive Surgical Inc., Sunnyvale, CA, USA) used nowadays in many laparoscopic resection procedures (prostatectomy, cholecystectomy, nephrectomy) while it is constantly expanding to other surgical domains.

The use of robotic technology offers significant operational advantages like increased maneuverability, reduction of tremor and more precise tool positioning thus minimising intra-operative risk and trauma ultimately leading to a reduction in recovery times [3].

MATERIALS AND METHODS

The JHU-ISI Gesture and Skill Assessment Working Set (JIGSAWS) is a publicly available surgical dataset comprising of video and kinematic data from the execution of three basic surgical tasks (suturing, knot tying and needle passing) with the dVSS on bench-top models by eight surgeons (subjects) of varying level of expertise [1, 2]. All subjects performed each task five times. The stereo video output of the dVSS endoscopic camera module was captured at 30fps in 640x480

average classification accuracy for all three tasks when trained and tested with dVSS kinematic data from the same operator. Our preliminary work indicates that this type of artificial neural networks can be the building blocks in gesture classification systems which can form the basis for further developing automated skill assessment methods in robotic surgery.

Collaborate to Innovate

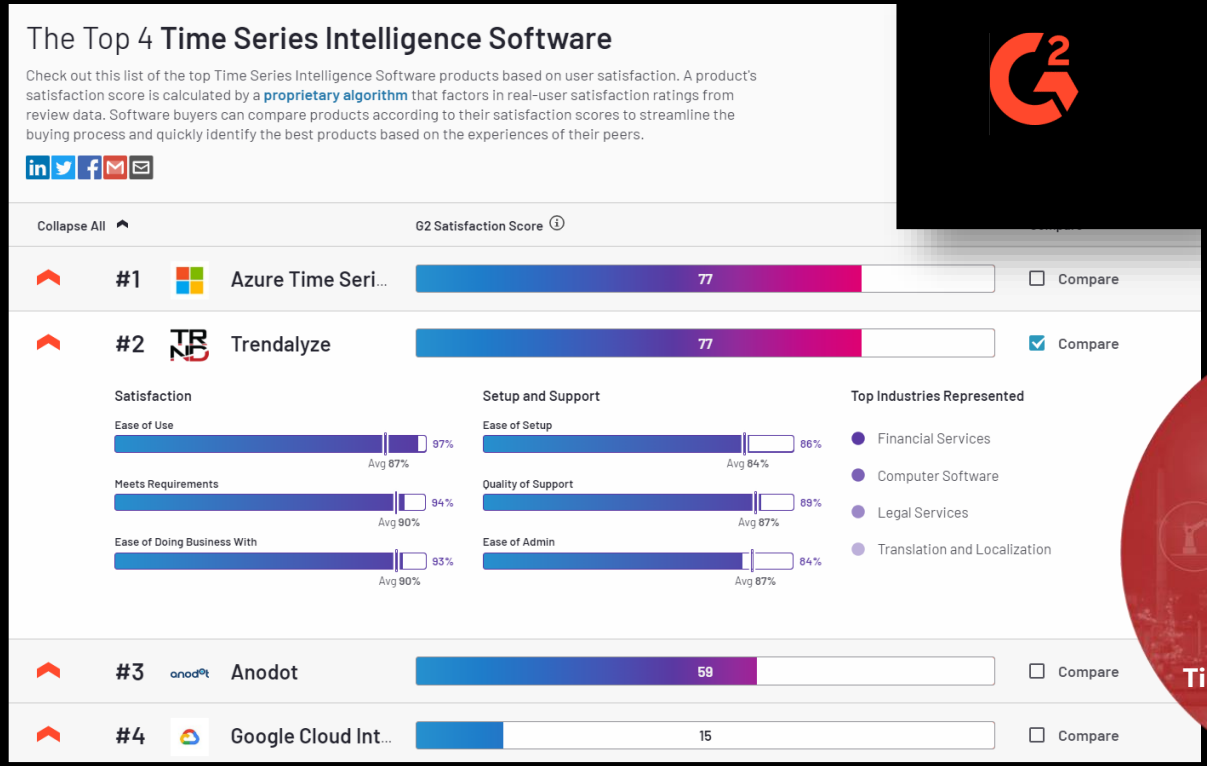
European Union
European Regional Development Fund

Joint R&D grant with University College London for robotic surgery gesture detection and optimization

FI-WARE

Chronic pain pattern detection and management

Trendalyze is a leader in the market



The rapid growth of time series data compared to any other business data has created a $45B untapped market opportunity (compared to the $16 B existing Business Intelligence software market).

$45 Billion
Time Series Intelligence

$16 Billion
Business Intelligence