TR
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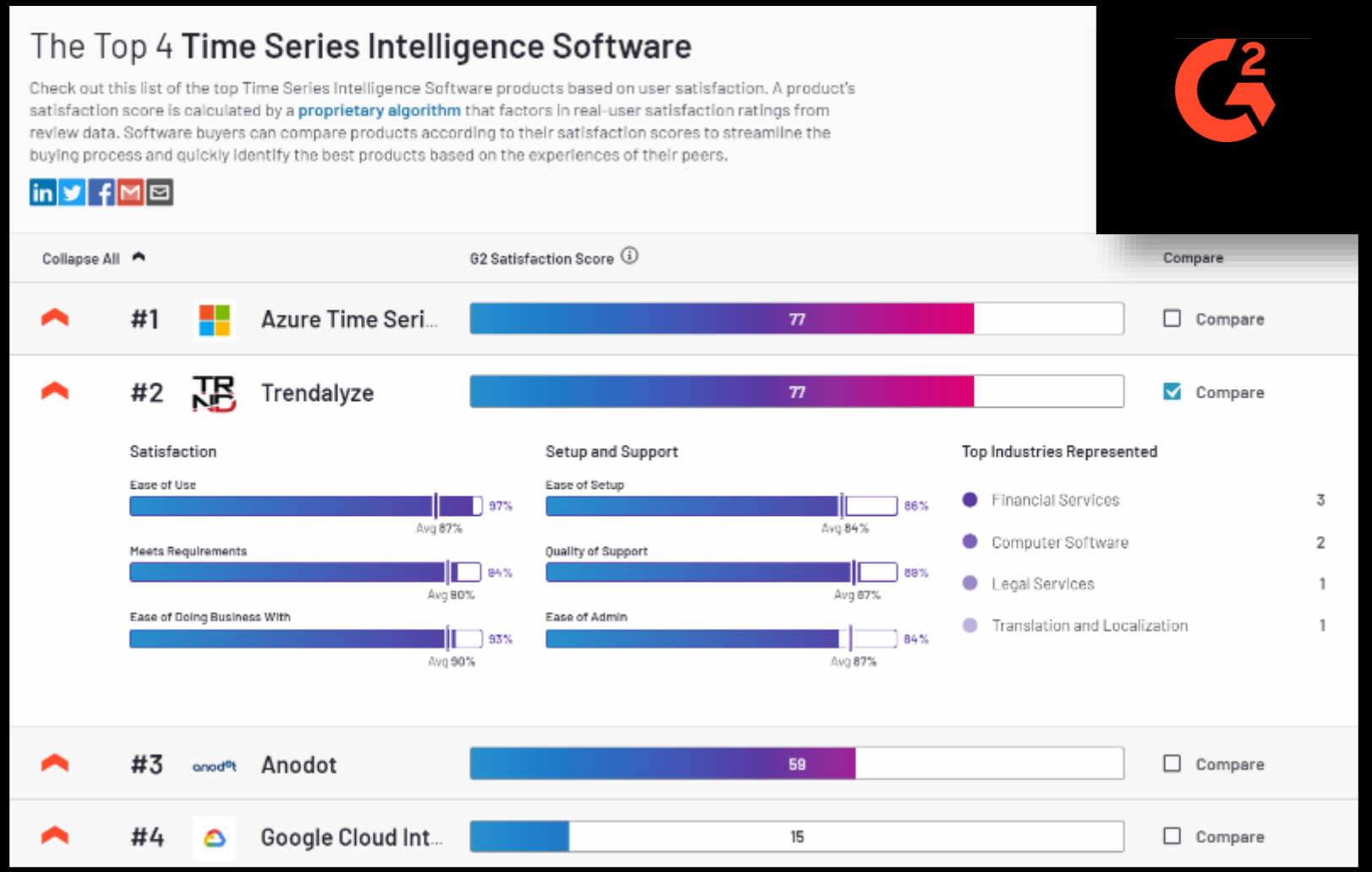
AI 3.0

Reduce Fuel and Maintenance Costs with Driving Micro Patterns

TRENDALYZE

Micro Patterns Intelligence™

About


The Top 4 Time Series Intelligence Software
Check out this list of the top Time Series Intelligence Software products based on user satisfaction. A product's satisfaction score is calculated by a proprietary algorithm that factors in real-user satisfaction ratings from review data. Software buyers can compare products according to their satisfaction scores to streamline the buying process and quickly identify the best products based on the experiences of their peers.
Collapse All
G2 Satisfaction Score
Compare
#1
Azure Time Seri...
77
Compare
#2
Trendalyze
77
Compare
Satisfaction
Ease of Use
97%
Avg 87%
Meets Requirements
84%
Avg 80%
Ease of Doing Business With
93%
Avg 90%
Setup and Support
Ease of Setup
86%
Avg 84%
Quality of Support
88%
Avg 87%
Ease of Admin
84%
Avg 87%
Top Industries Represented
Financial Services 3
Computer Software 2
Legal Services 1
Translation and Localization 1
#3
Anodot
59
Compare
#4
Google Cloud Int...
15
Compare

47% of the Fleet TCO Driven by Driver Behavior

35% difference in fuel consumption between a good driver and a poor driver

Huge savings in repair costs from reductions in hard acceleration and deceleration

Harsh braking and sudden acceleration leads to 75% increase in tire costs.

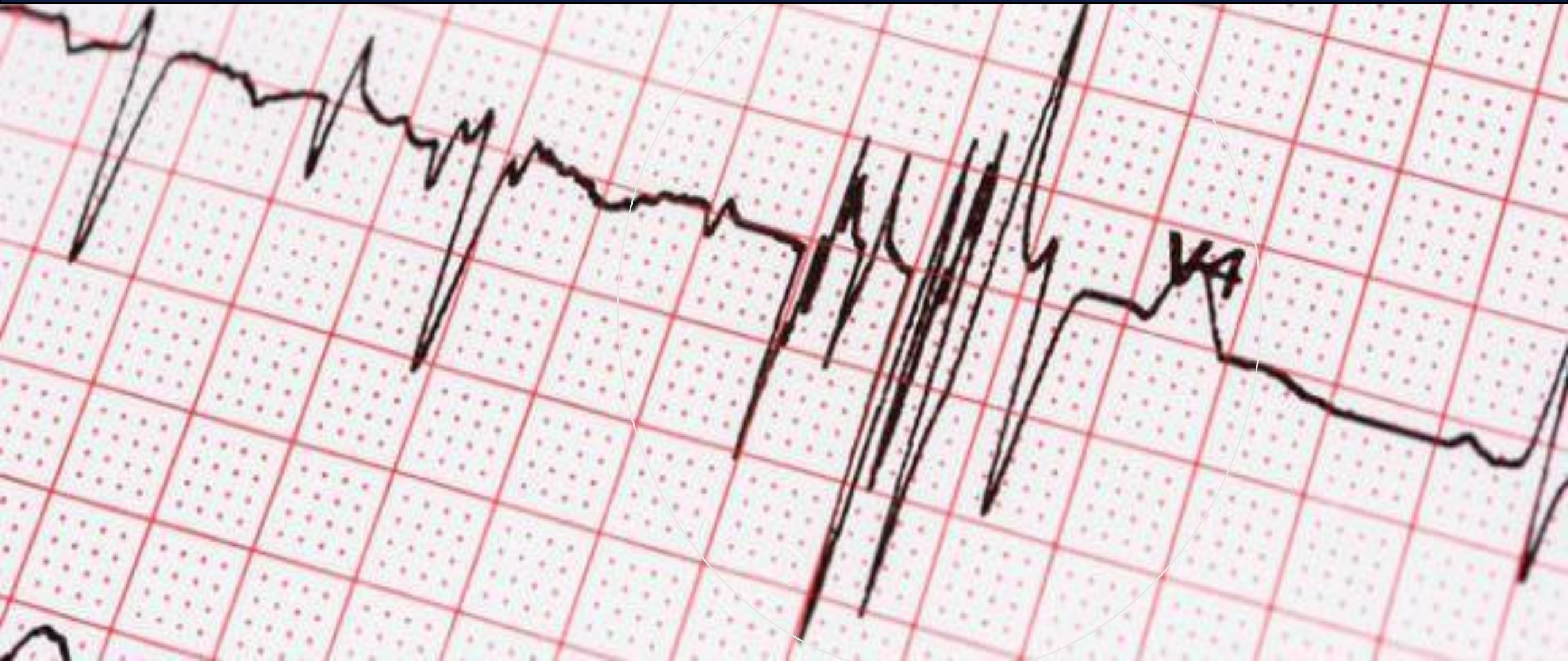
Flattening the accelerator leads to more crashes, more claims and larger claims.

OBDII Data Intelligence

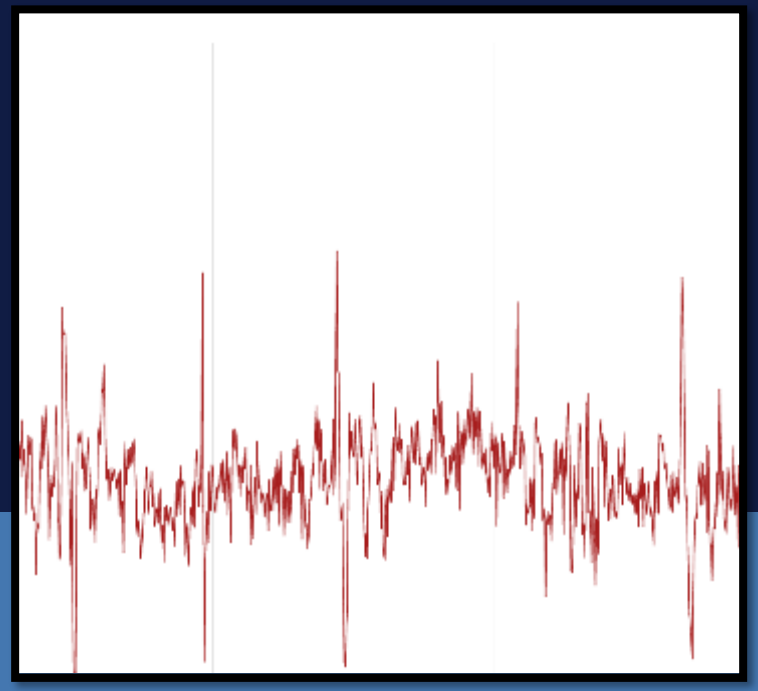
All problems have clear patterns in the OBDII granular time series data that can be identified, monitored and predicted

Value of Granular Time Series Data

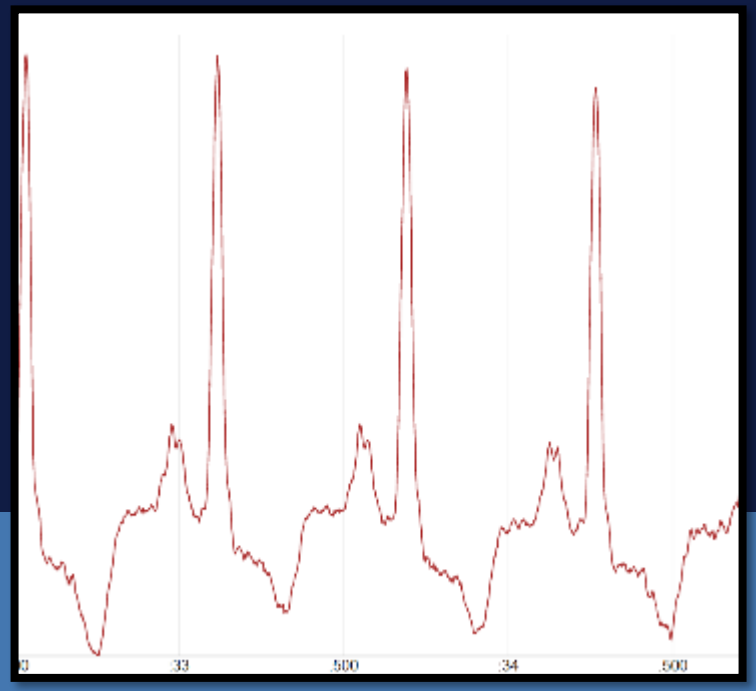
- Sensors and devices (CAN Loggers) collect the “heartbeats” of everything
- Knowing the good and the bad “heartbeats” is gold
- By monitoring the “heartbeats” you can save or make money



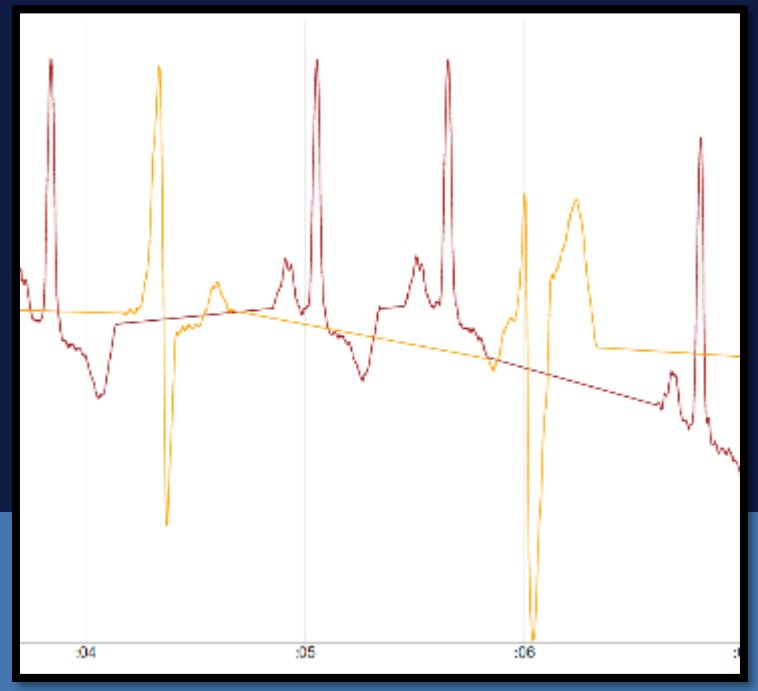
The Value of Identifying Meaningful Shapes



1 Meaningless

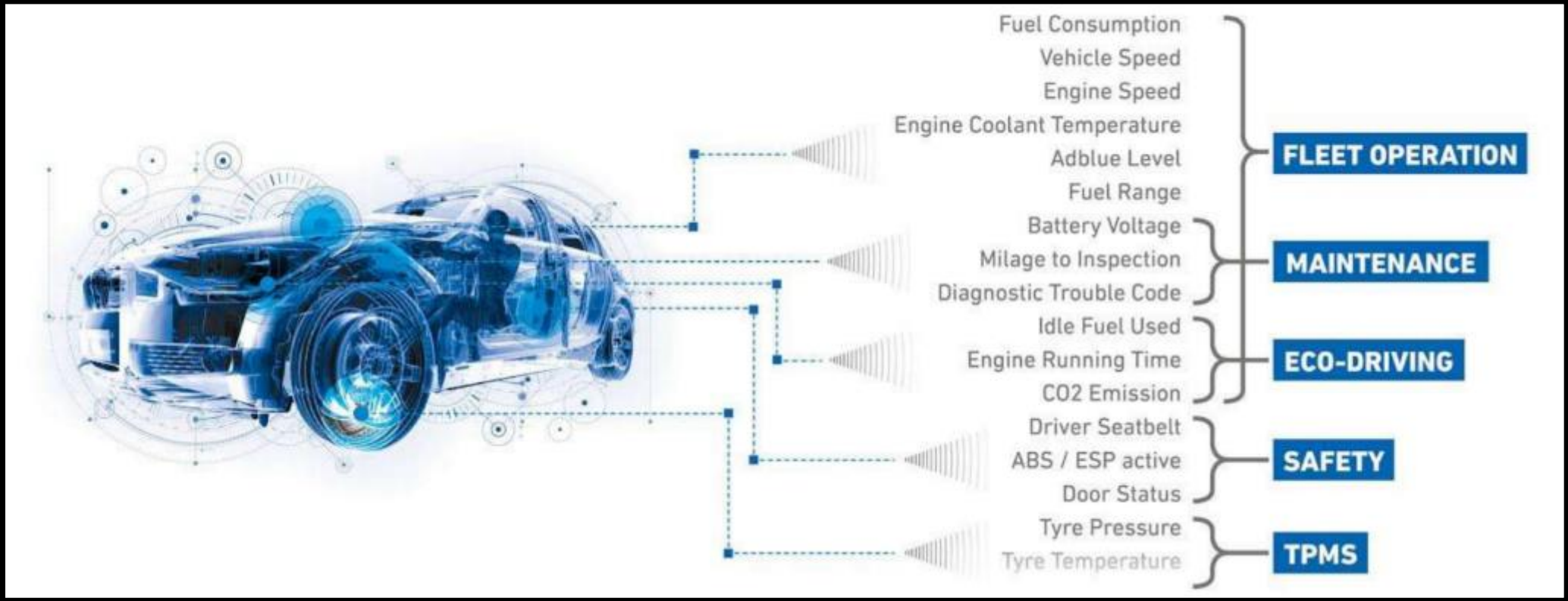


2 Recognizable

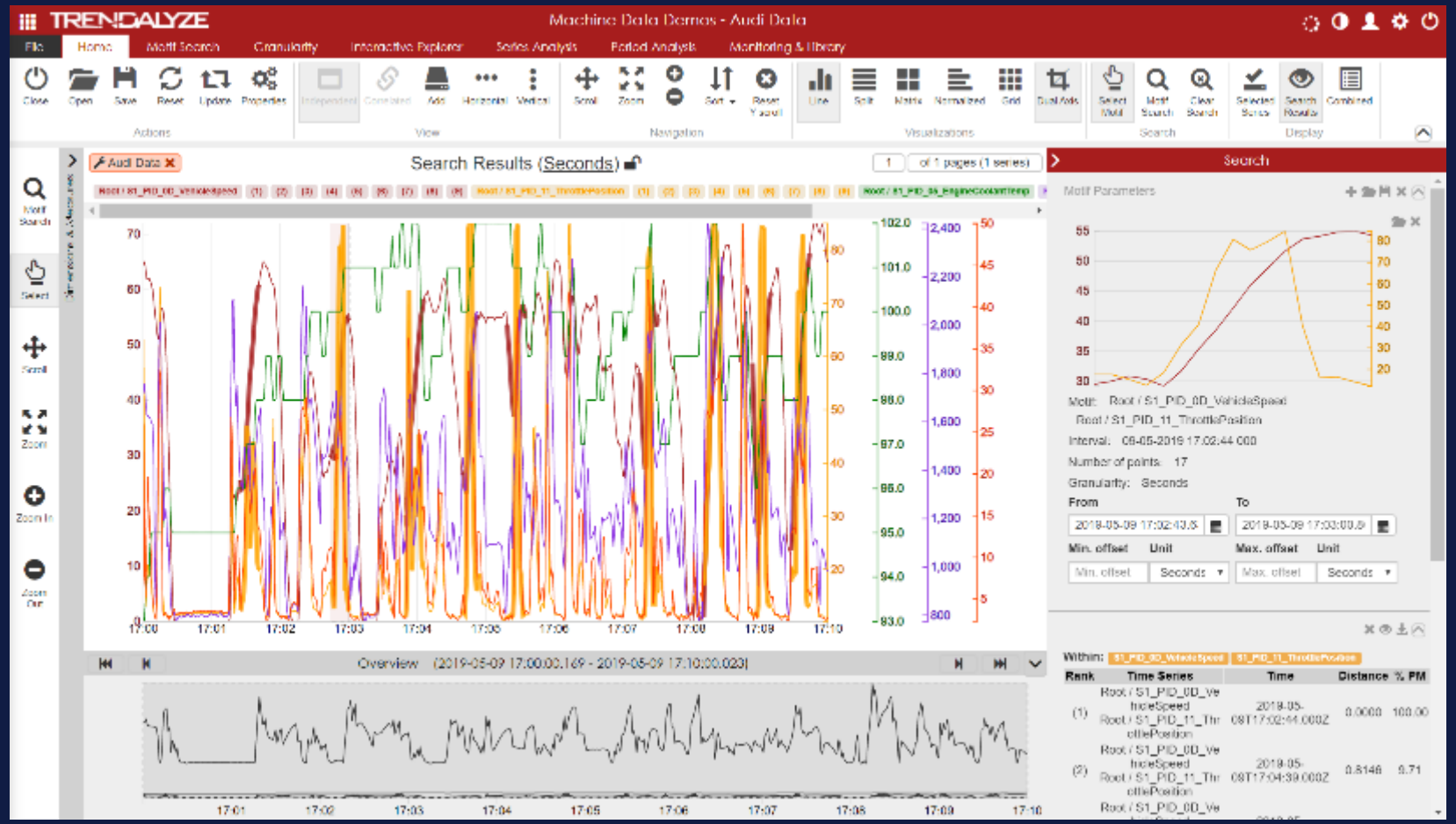


3 Monetizable

Range of Opportunities to Monetize OBDII Data



Pulling the Golden Nuggets from The Haystack



Standardize Operating Patterns

Benchmark Adherence

Monitor to Monetize

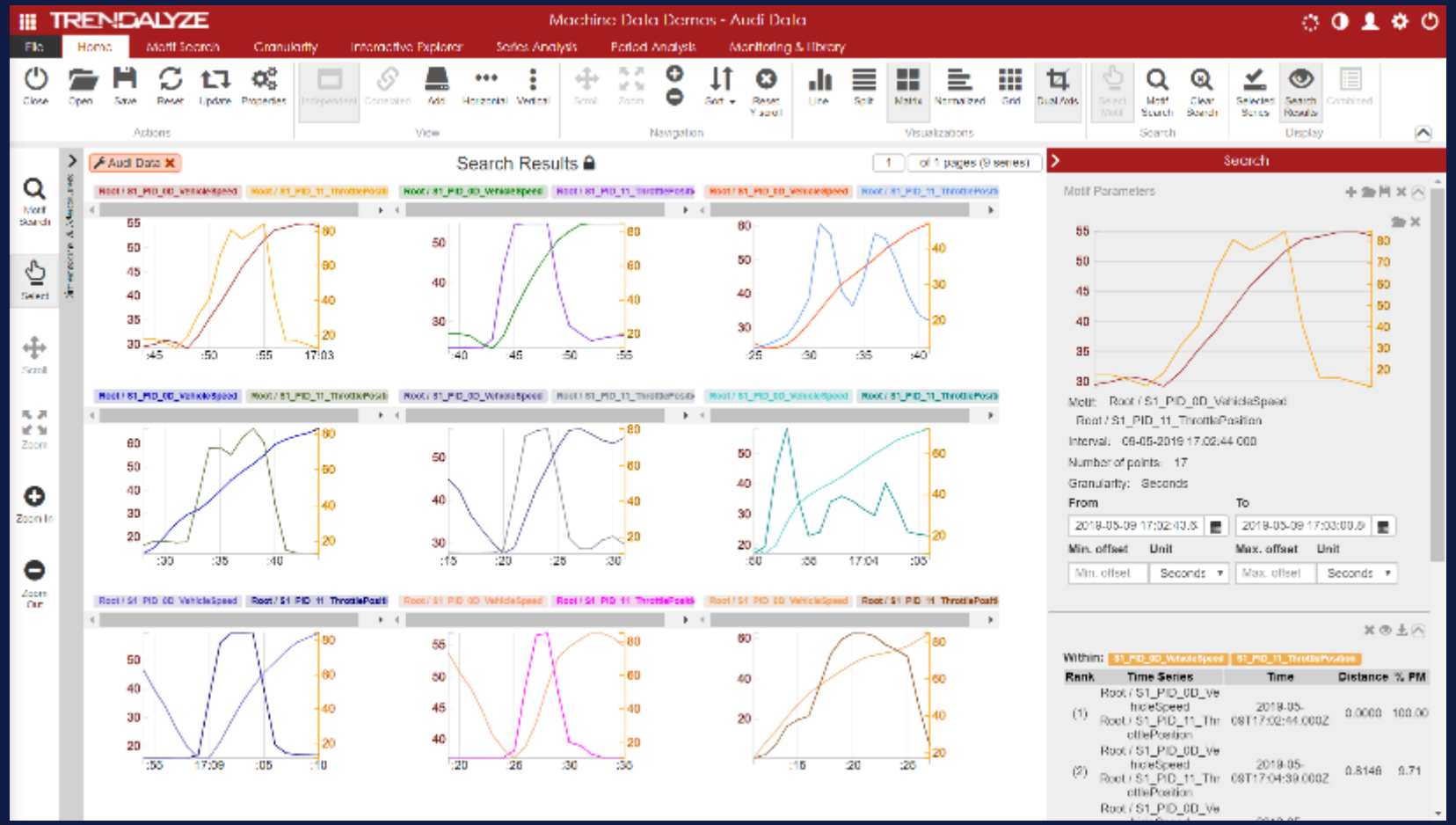
Drivers' Footprints & Engine Health:

OBDII data is like ECG, contains good and bad "heartbeats".

Put the expert in the loop to detect and catalogue heartbeats.

Google-like pattern search monitors in real time millions of events.

Pattern Search Can Find Operational Issues Precisely when they Occur



Single Pattern Search | Correlated Patterns Search | Artificial Logical Networks

How It Works?

1

Machine profile data to identify distinct pattern categories

2

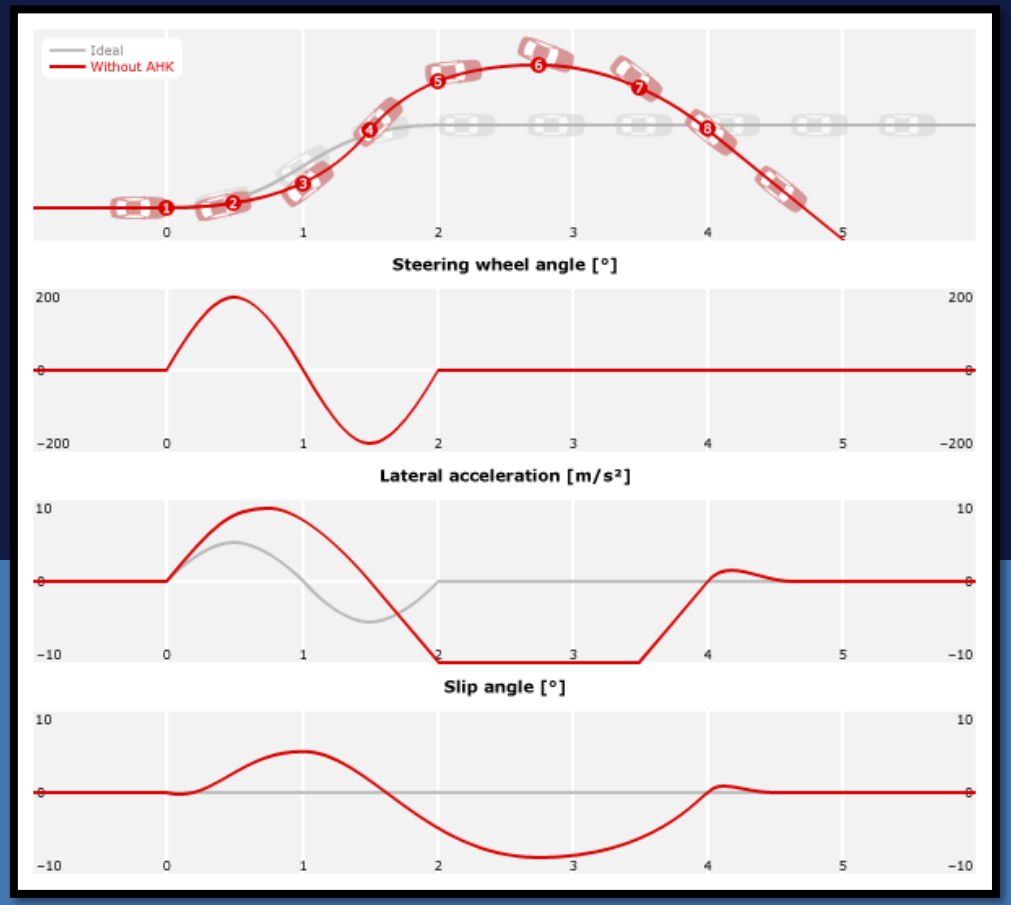
Review categories with experts to catalogue meaningful patterns

3

Monitor and report occurrences to save costs and improve safety

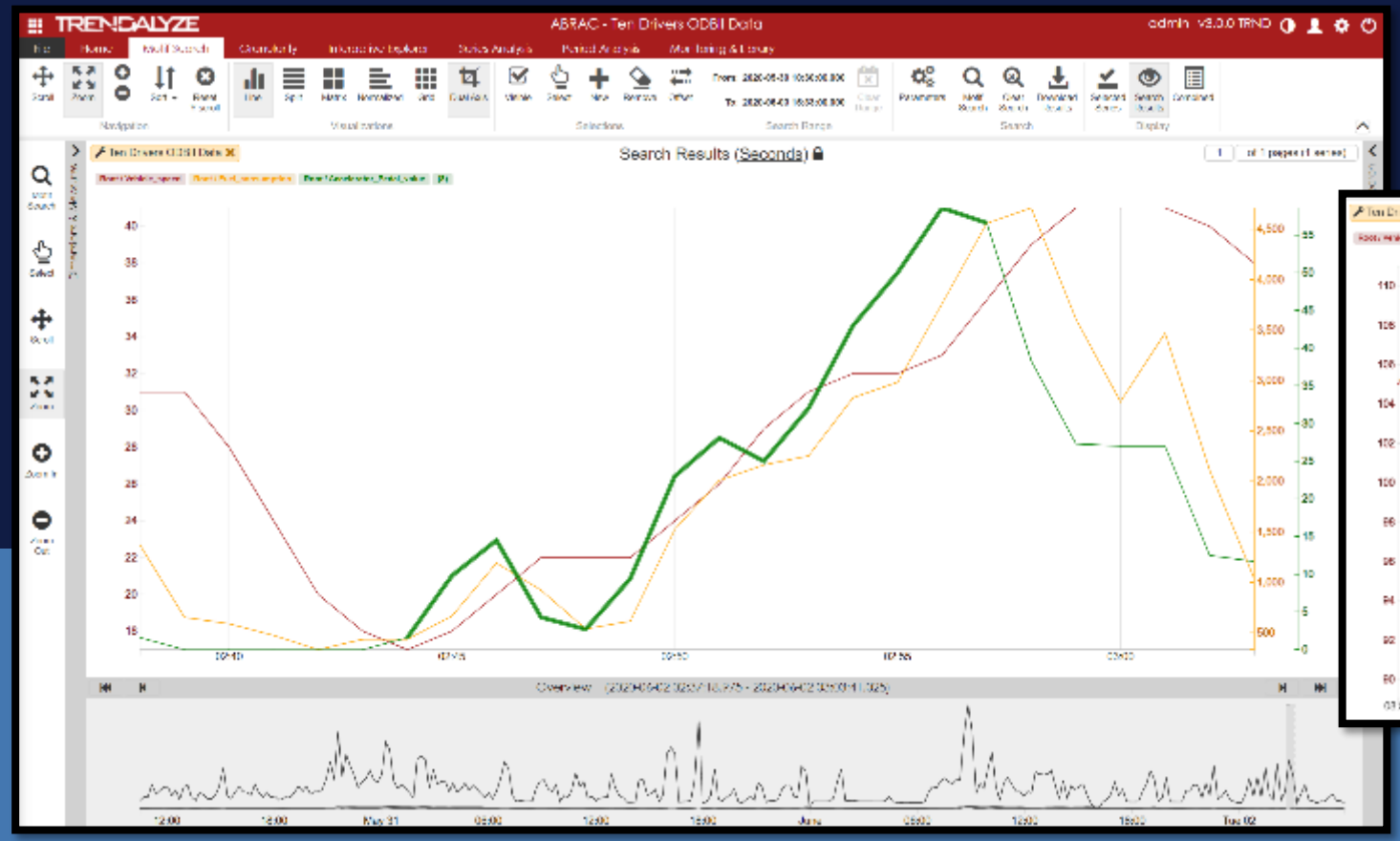
Shape Examples in OBDII Data

(Steering Wheel Angle & Speed Can Signal Sudden Maneuvering)

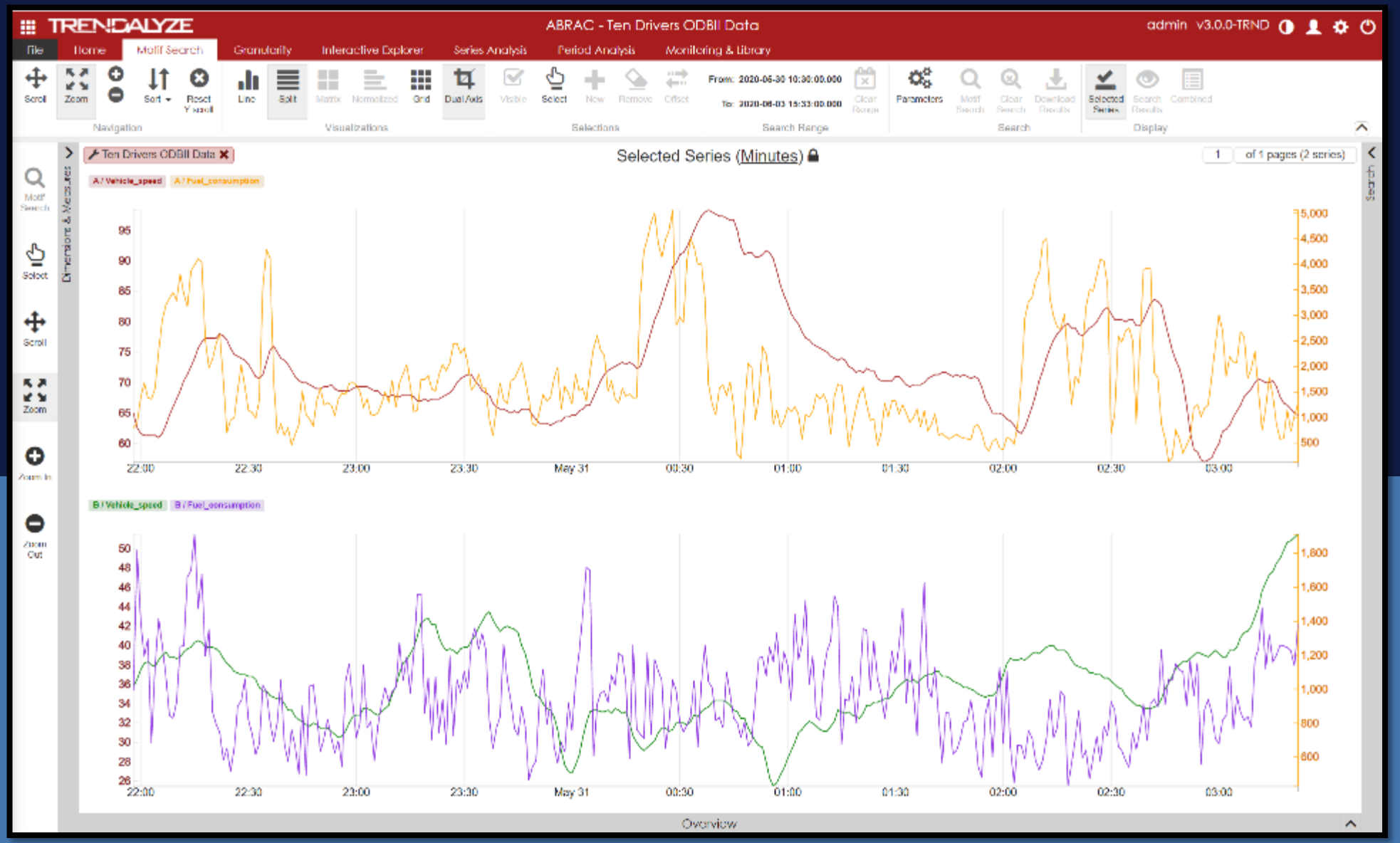


Shape Examples in OBDII Data

(Acceleration and Fuel Concumption)



Driver Benchmarking

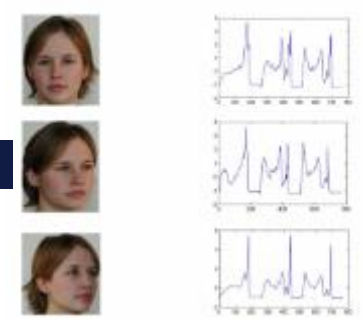


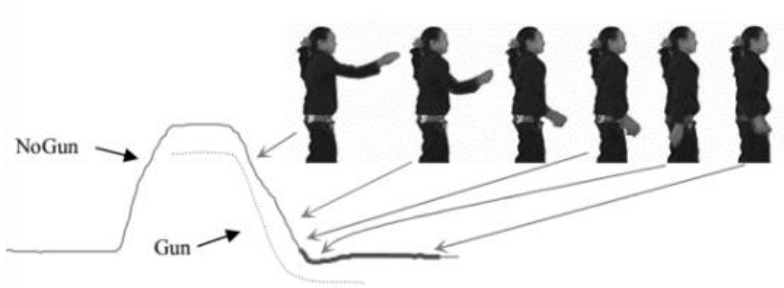
Our Approach

Shape Intelligence: Learning the Language of Machine Data

R&D

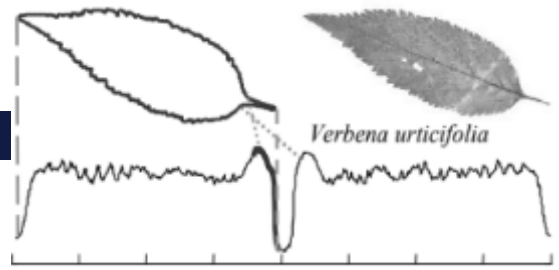
Face Detection





Gesture Detection

Object Detection



Process Monitoring

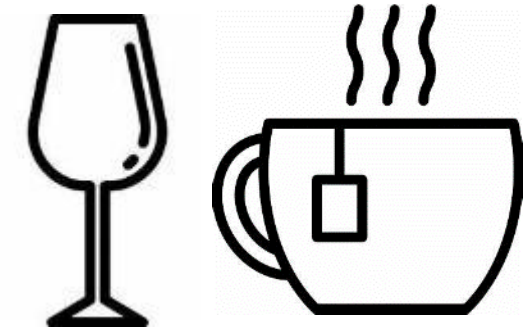
DARPA

"Past DARPA AI investments facilitated the advancement of "first wave" (rule and "second wave" (statistical learning based) AI technologies. DARPA is now interested in researching and developing "third wave" AI theory and applications that address the limitations of first and second wave technologies."

Shape Intelligence: Learning the Language of Machine Data

R&D

How do humans and machines learn the differences between these two shapes?



Human Learning:

- Recognize shape differences immediately
- Learn the differences from a few examples
- Identify known shapes instantly

Machine Learning:

- Requires thousands of pictures to train the model
- All pictures have to be labeled precisely by humans
- Small shape differences confuse machines

Alleviating the Key Pain Points of Machine Learning

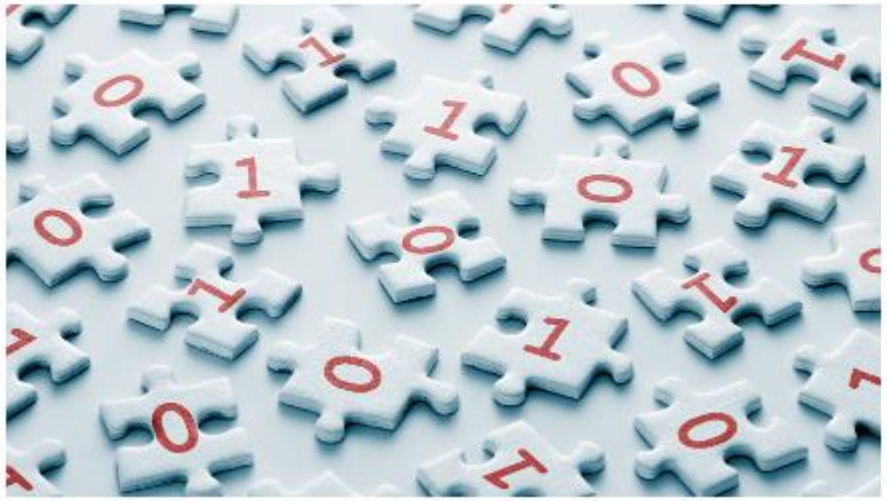
Harvard Business Review

Small Data Can Play a Big Role in AI

by H. James Wilson and Paul R. Daugherty

February 17, 2020

Summary Save Share Print $8.95 Buy Copies



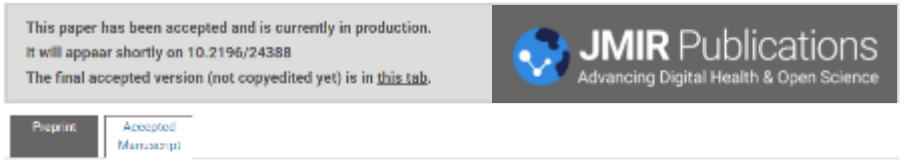
MIT Technology Review

The way we train AI is fundamentally flawed

The process used to build most of the machine-learning models we use today can't tell if they will work in the real world or not—and that's a problem.

Peer-Reviewed Research and R&D Grants

R&D



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.

JMIR Publications
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Preprint | Accepted Manuscript

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

Rado Kotorov; Lianhua Chi; Min Shen

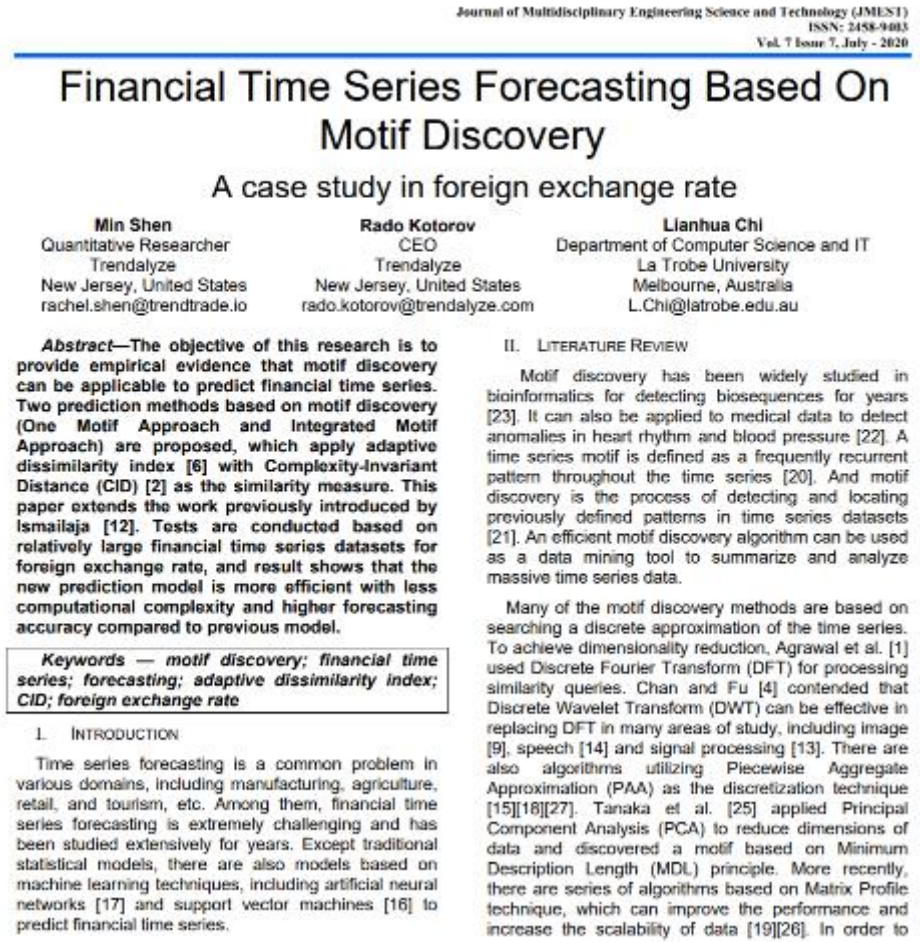
ABSTRACT

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.



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Financial Time Series Forecasting Based On Motif Discovery

A case study in foreign exchange rate

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***Abstract*—The objective of this research is to provide empirical evidence that motif discovery can be applicable to predict financial time series. Two prediction methods based on motif discovery (One Motif Approach and Integrated Motif Approach) are proposed, which apply adaptive dissimilarity index [6] with Complexity-Invariant Distance (CID) [2] as the similarity measure. This paper extends the work previously introduced by Ismailaja [12]. Tests are conducted based on relatively large financial time series datasets for foreign exchange rate, and result shows that the new prediction model is more efficient with less computational complexity and higher forecasting accuracy compared to previous model.**

Keywords — motif discovery; financial time series; forecasting; adaptive dissimilarity index; CID; foreign exchange rate

I. INTRODUCTION

Time series forecasting is a common problem in various domains, including manufacturing, agriculture, retail, and tourism, etc. Among them, financial time series forecasting is extremely challenging and has been studied extensively for years. Except traditional statistical models, there are also models based on machine learning techniques, including artificial neural networks [17] and support vector machines [16] to predict financial time series.

II. LITERATURE REVIEW

Motif discovery has been widely studied in bioinformatics for detecting biosequences for years [23]. It can also be applied to medical data to detect anomalies in heart rhythm and blood pressure [22]. A time series motif is defined as a frequently recurrent pattern throughout the time series [20]. And motif discovery is the process of detecting and locating previously defined patterns in time series datasets [21]. An efficient motif discovery algorithm can be used as a data mining tool to summarize and analyze massive time series data.

Many of the motif discovery methods are based on searching a discrete approximation of the time series. To achieve dimensionality reduction, Agrawal et al. [1] used Discrete Fourier Transform (DFT) for processing similarity queries. Chan and Fu [4] contended that Discrete Wavelet Transform (DWT) can be effective in replacing DFT in many areas of study, including image [9], speech [14] and signal processing [13]. There are also algorithms utilizing Piecewise Aggregate Approximation (PAA) as the discretization technique [15][18][27]. Tanaka et al. [25] applied Principal Component Analysis (PCA) to reduce dimensions of data and discovered a motif based on Minimum Description Length (MDL) principle. More recently, there are series of algorithms based on Matrix Profile technique, which can improve the performance and increase the scalability of data [19][26]. In order to

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

Grant for chronic pain pattern detection and management

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Peer-Reviewed Research & Books

R&D

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

E.B. Mazomenos[1], Dave Watson[2], Rado Kotorov[2] and D. Stoyanov[1]

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[2] *Trendalyze Inc., London, U.K.*

INTRODUCTION

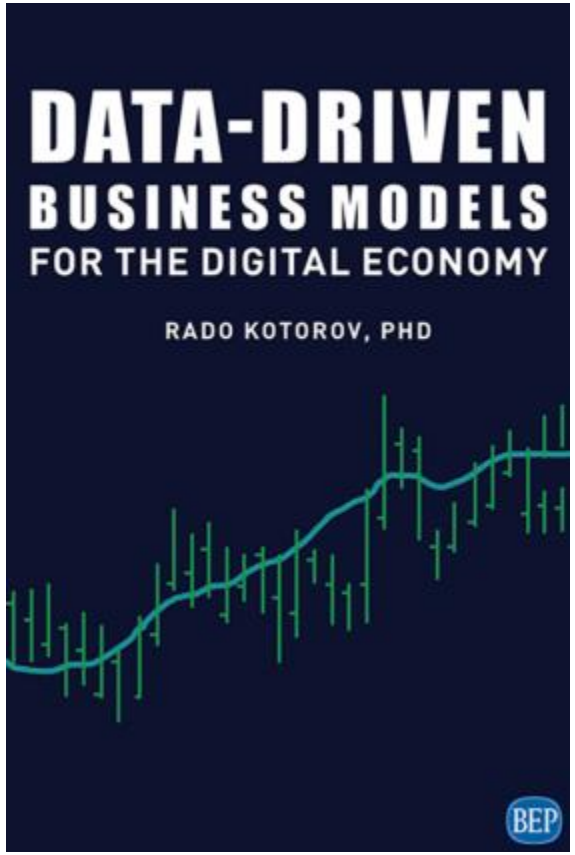
The integration of robotics in minimally-invasive surgery has witnessed remarkable increase over the previous decade. Breakthrough innovations in robotic technology, imaging and sensing facilitated the design of novel surgical systems for a number of different operations (laparoscopy, endovascular surgery). 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.

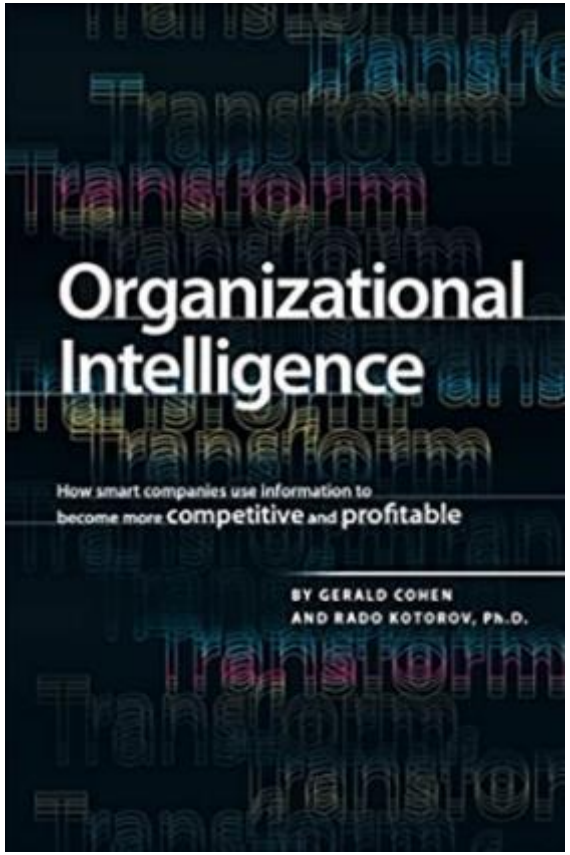
The use of robotic technology offers significant operational advantages like increased maneuverability, reduction of tremor and more precise tool positioning thus minimising intra-operative risk and trauma ultimately leading to a reduction in recovery times [3]. The continuous development of image-guided robotic surgery creates a need for new surgeons to go through analogous training for this type of surgery in order to master the necessary dexterous and technical skills. The currently practiced method of surgical training is heavily based on expert supervision, with faculty surgeons reviewing and evaluating performance through manually assessing global rating scales and task specific checklists. The scoring procedure requires significant amount of time and it is also subjective and prone to interobserver variability. Subsequently, it has been advocated that novel objective methods, focusing on competency metrics should be developed for evaluating 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.

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 resolution. The kinematic data contain 3D position, orientation, velocity and gripper angle values from both the master and slave, left and right manipulators totaling 76 motion-related parameters. The two datastreams are synchronised with the same sampling rate.

Figure. 1. The three surgical tasks performed in JIGSAWS: from left to right – Suturing; Needle Passing; Knot Tying.





Standardize Driving Behaviors with Micro Patterns Benchmarking

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