ICT GROUP

Finding the needle in the haystack

Sifting through an enormous amount of sensor data

Sam Smetsers & Anna Somoza
ICT Group – Center of Excellence
Bits & Chips event | 20 – 11 - 2025

ICT High Tech

We solve complex software challenges for high tech customers and make their operations more efficient, more secure and more sustainable.

Semiconductor | Agri-Tech | Energy | Healthcare | Machine Building | Material Handling | Defence & Maritime

- Project-based Solutions
- Consultancy
- Managed Services
- System Engineering
- European Delivery
- Training
- Products

- We make machines smarter, more reliable & connected
- We optimize R&D processes by using emerging technologies
- We transform data into knowledge

We help customers to stay ahead of competition by reducing their time to market

Firmware | Machine control | Applications | Mobile app | IoT & Cloud

About the Center of Excellence

The Center of Excellence is the place where the High Tech Experts explore and develop innovative solutions by using emerging technologies to solve customers problems.

We achieve this through the implementation of pilot projects and providing consultancy services.

What makes us experts

- Multi-Disciplinary Software Expertises in High Tech Domain
- Exploring New Trends and Ways of Working
- Strong Focus on Market Trends
- From Idea to Solution Approach

Why look at your sensors in the first place?

Testing/Validation

Fault identification

Performance monitoring

Predictive maintenance

What do you need to get value out of your sensor data

Data knowledge

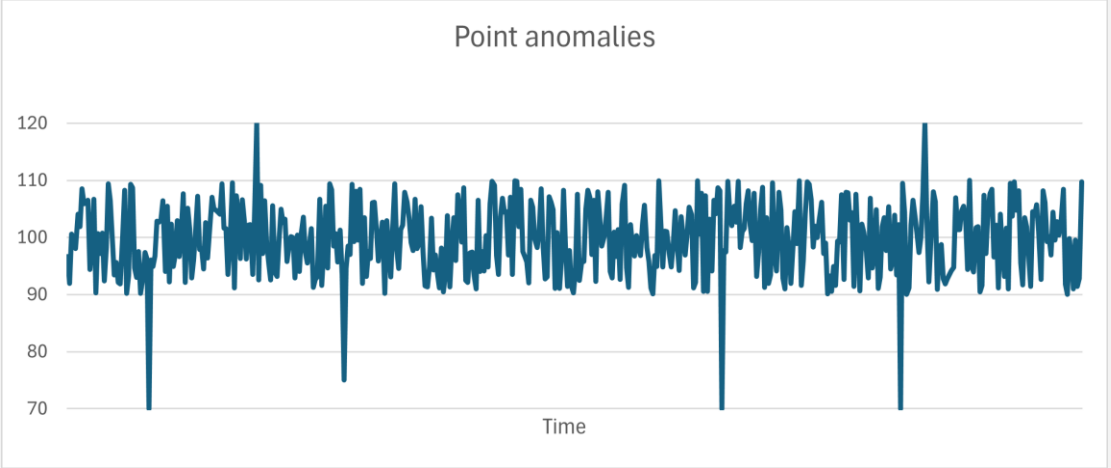
Domain knowledge

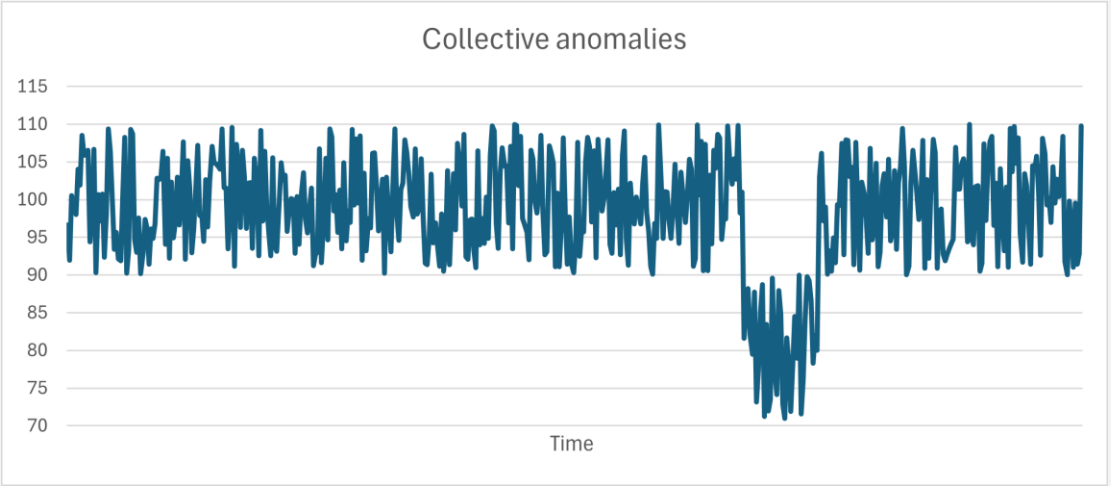
Potential Issues

	Anomaly Surfer	Flow Surfer
 Too many sensors / too much data	✓	✓
 Unable to identify valuable behavior	✓	✓
 Siloed (domain) knowledge	?	✓

What do we consider (time series) anomalies?

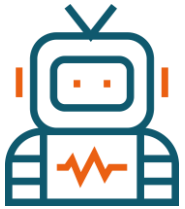
- **“Unexpected or unusual patterns or behaviors ”**
- **Different types:**
  - Point anomalies
  - Collective anomalies
  - *Contextual anomalies*



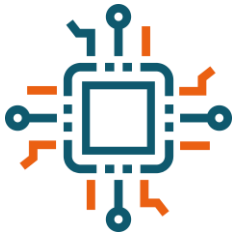


Introducing the **Anomaly Surfer**

Detects anomalies or abnormal behavior in one or multiple sensors

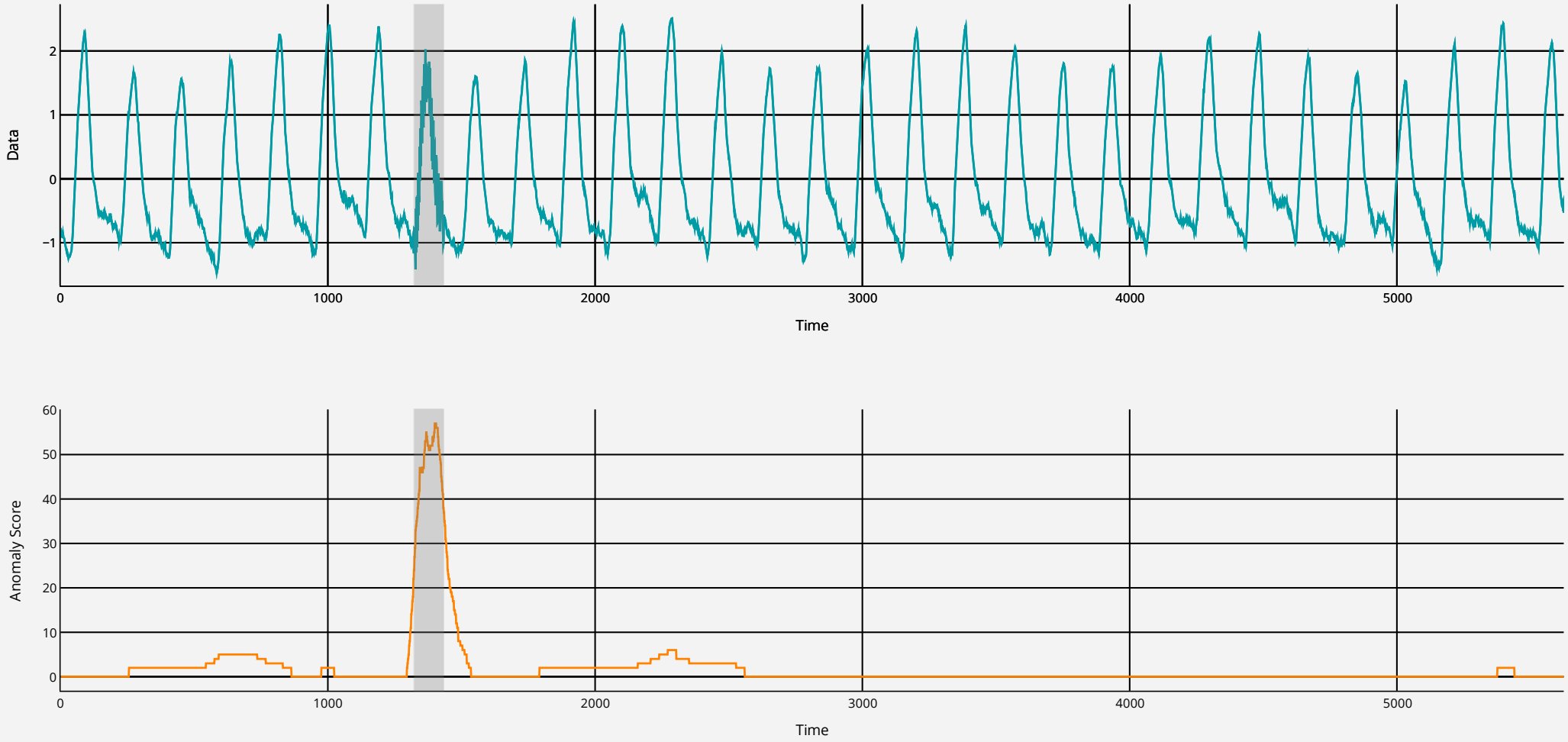


State-of-the-art deep learning model based on wavelet transform technology

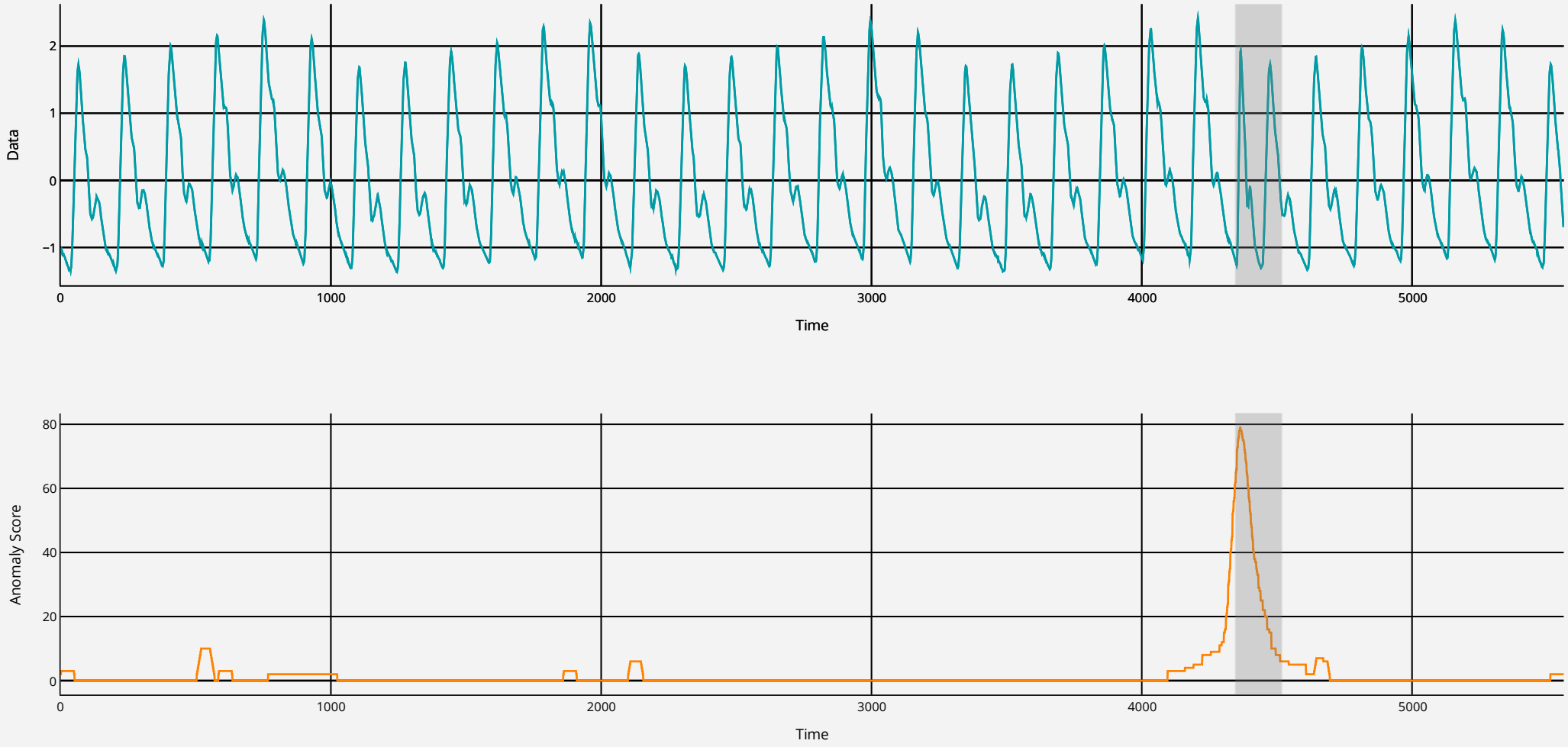


Configurable to work with all types of sensor/signal data

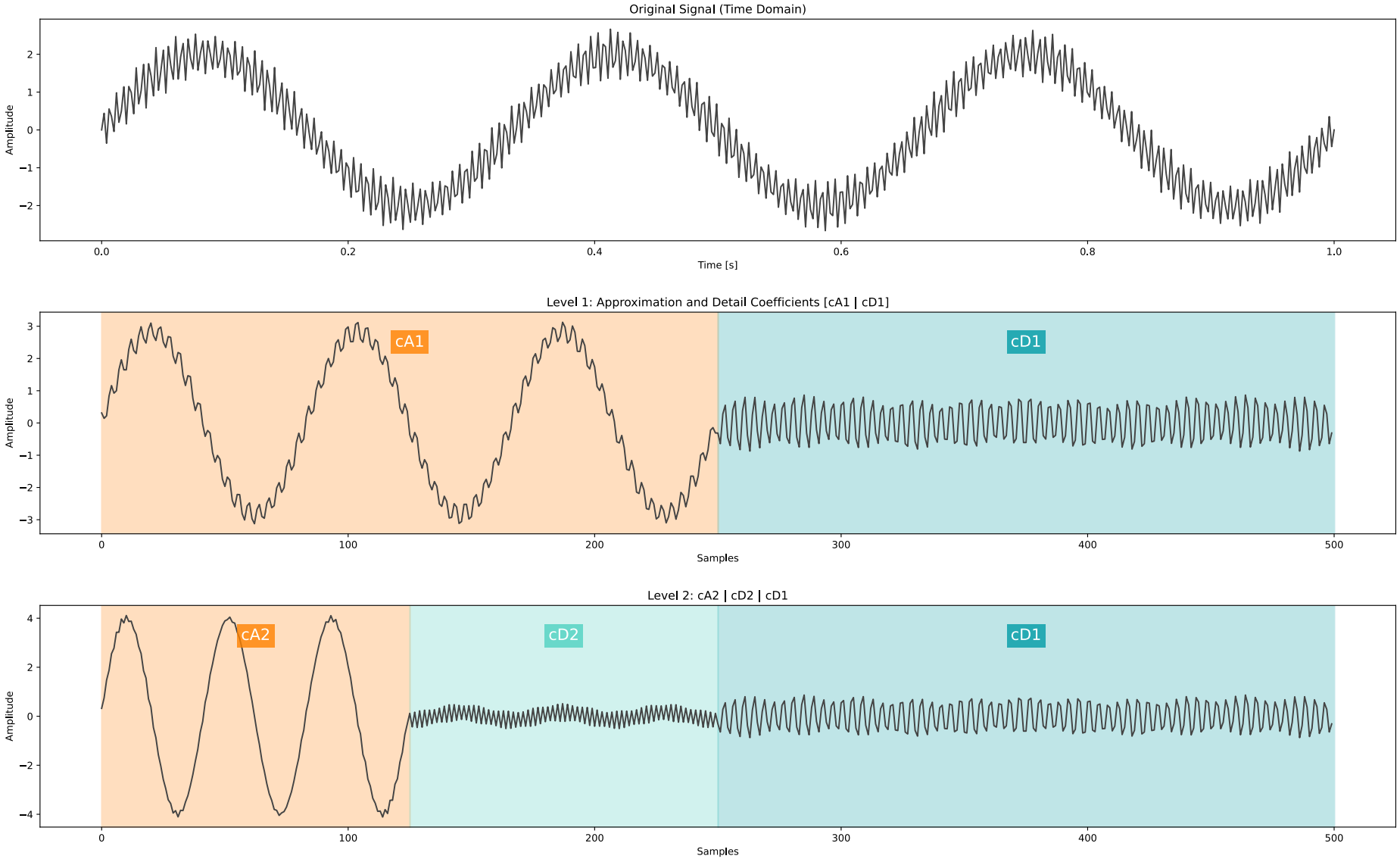
An example


Data
2
1
0
−1
0
1000
2000
3000
4000
5000
Time
Anomaly Score
60
50
40
30
20
10
0
0
1000
2000
3000
4000
5000
Time

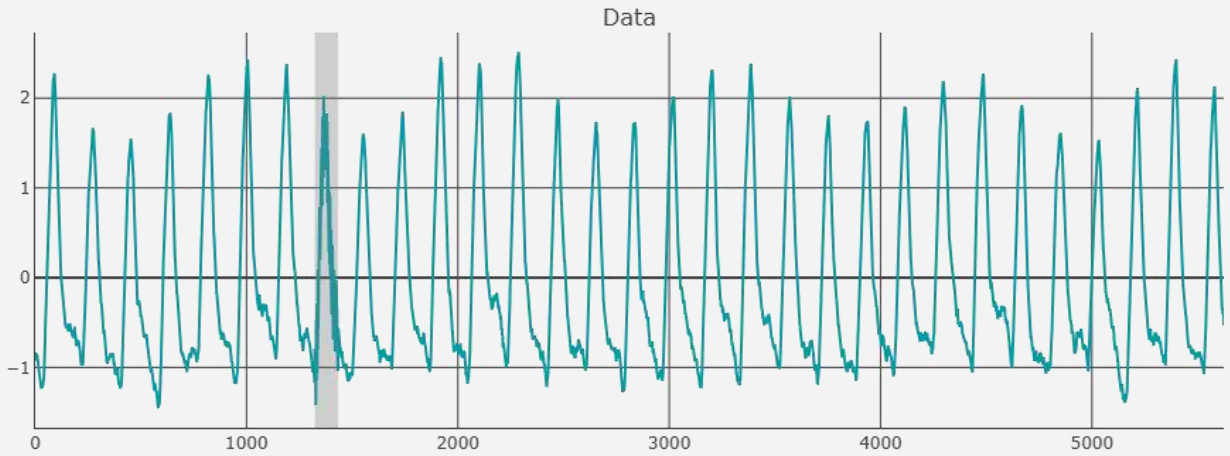
A slightly more difficult example

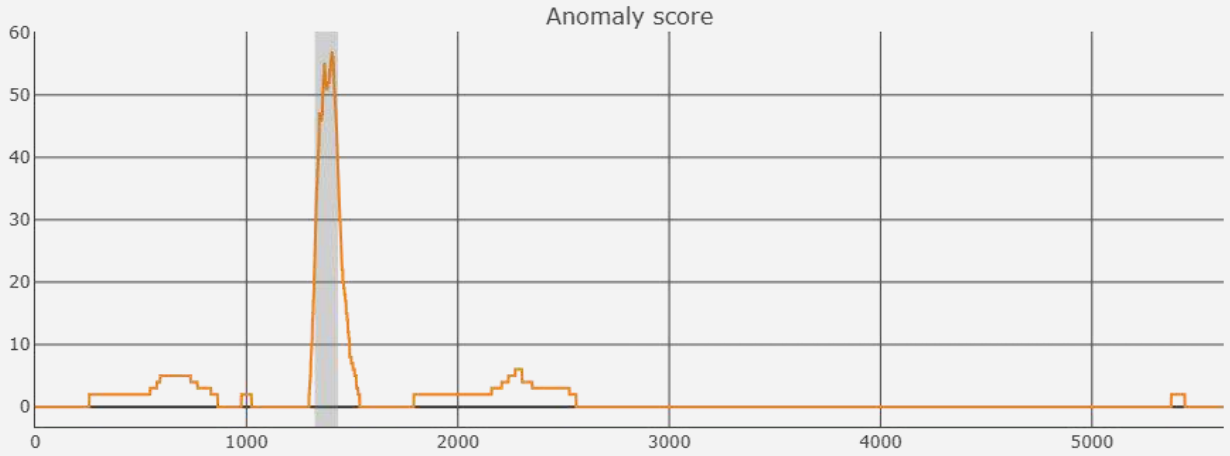


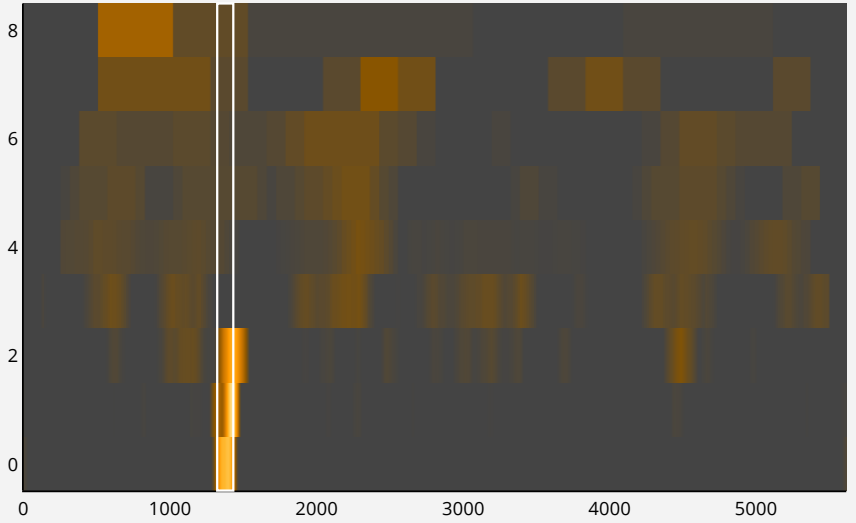
Why wavelet transform?

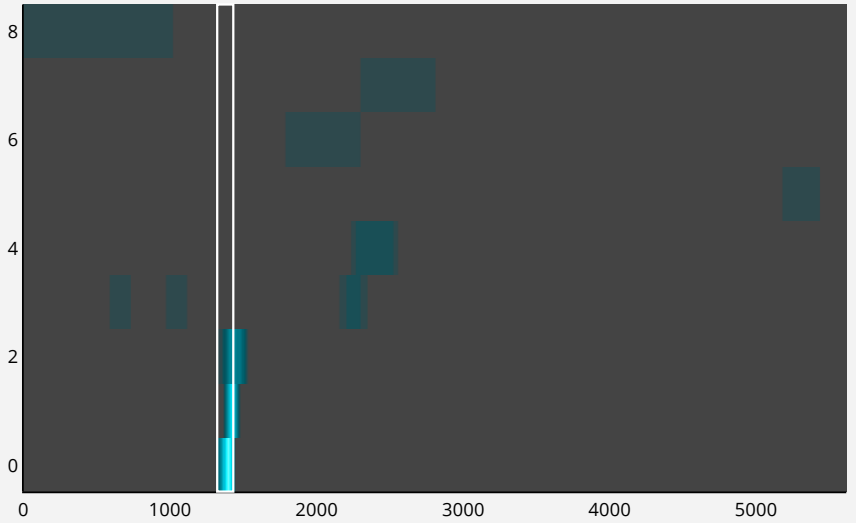


“Noisy anomalies”









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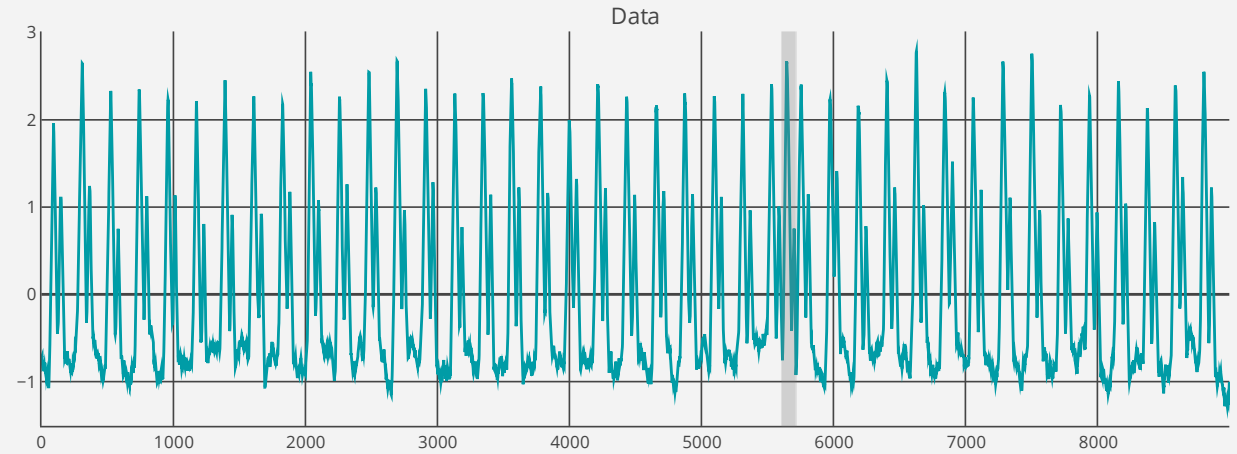
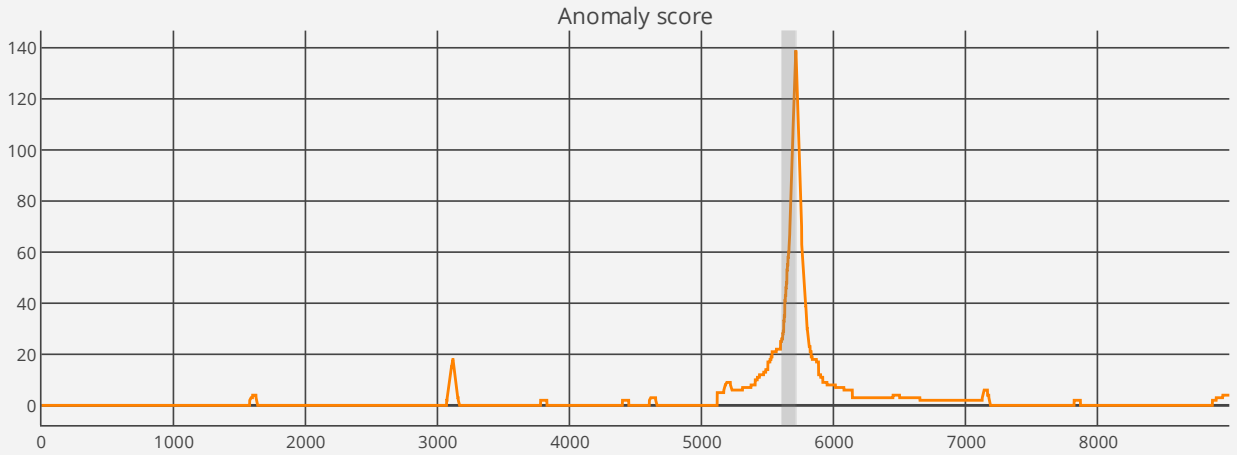
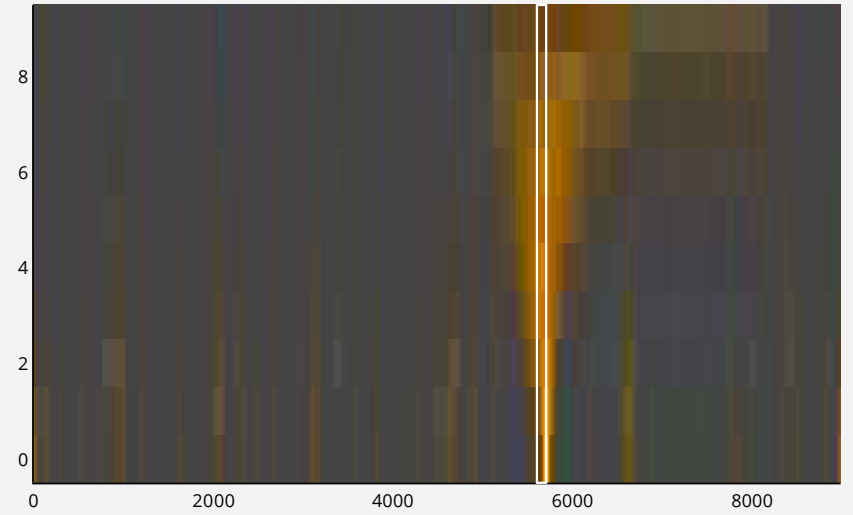
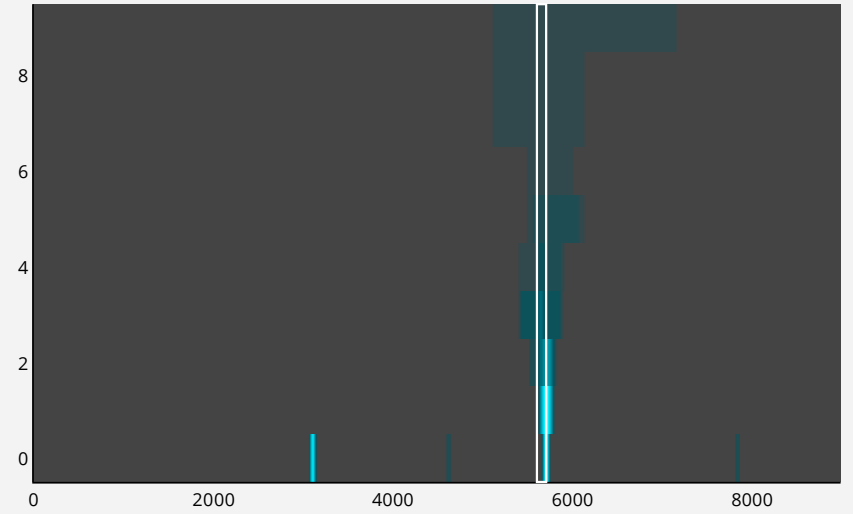
Exploring the stochastic nature









Benchmark study

We implemented the model into a large recent benchmark suite from research

Evaluated the model on 1070 individual datasets (from over 40 dataset archives)

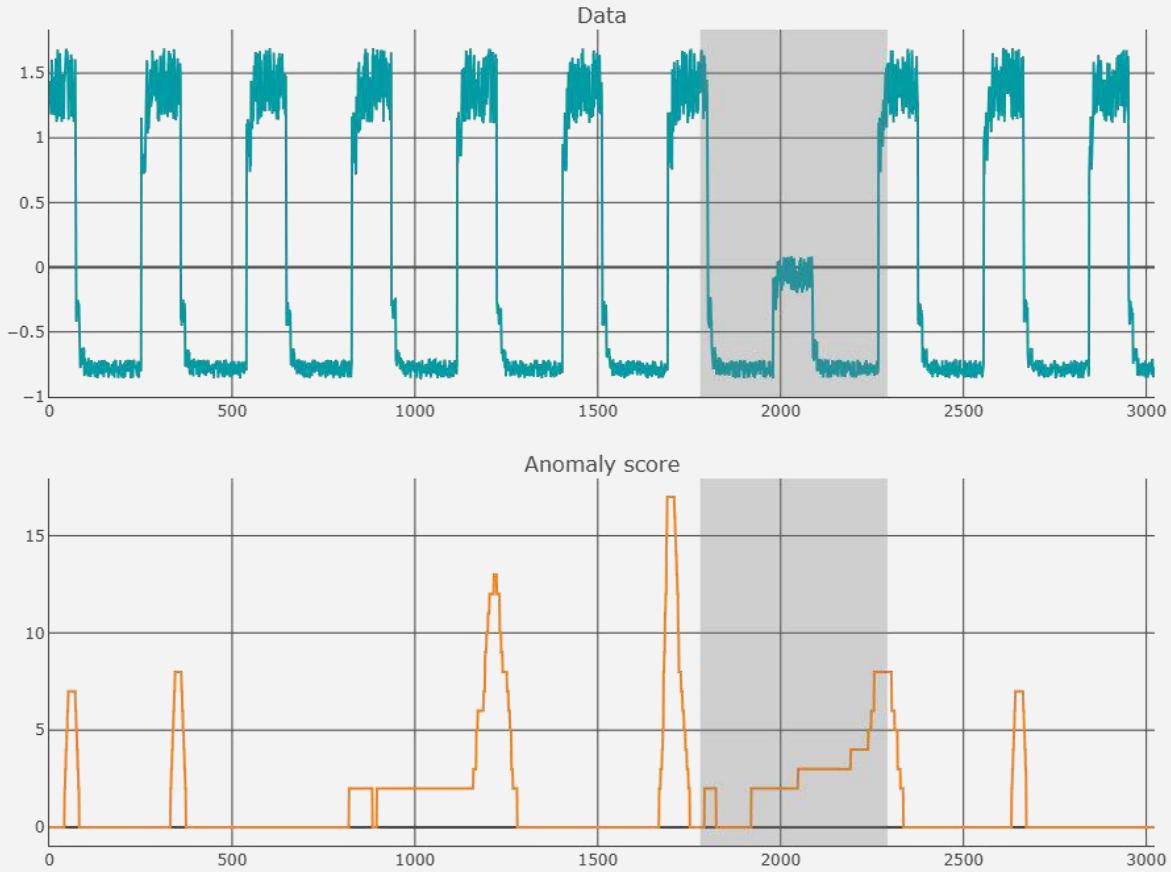
A combination of research datasets and industrial datasets

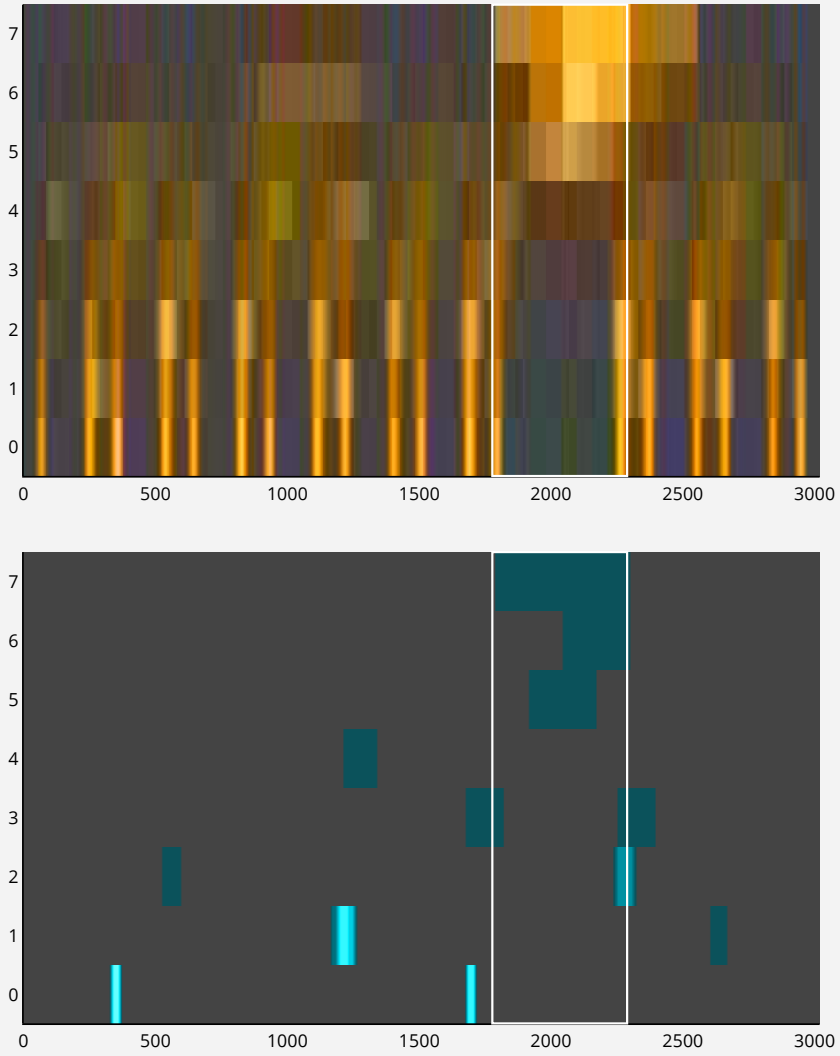
Benchmarked against official results from other state-of-the-art models

The results

	Method	AUC-PR	AUC-ROC	VUS-PR	VUS-ROC	Standard-F_1
Univariate	Sub-PCA	0.37	0.71	0.42	0.76	0.42
	USAD	0.32	0.66	0.36	0.71	0.37
	Sub-KNN	0.27	0.76	0.35	0.79	0.34
	MatrixProfile	0.26	0.73	0.35	0.76	0.33
	CNN	0.33	0.71	0.34	0.79	0.38
	SR	0.32	0.74	0.32	0.81	0.38
	OmniAnomaly	0.27	0.65	0.29	0.72	0.31
	TimesNet	0.18	0.61	0.26	0.72	0.24
	AutoEncoder	0.19	0.63	0.26	0.69	0.25
	AnomalySurfer (default)	0.39	0.90	0.56	0.91	0.46
	AnomalySurfer (fine-tuned)	**0.47**	**0.91**	**0.64**	**0.92**	**0.53**
Multivariate	CNN	0.32	0.73	0.31	0.76	0.37
	OmniAnomaly	0.27	0.65	0.31	0.69	0.32
	PCA	0.31	0.7	0.31	0.74	0.37
	LSTMAD	0.31	0.7	0.31	0.74	0.36
	USAD	0.26	0.64	0.3	0.68	0.31
	AutoEncoder	0.3	0.67	0.3	0.69	0.34
	AnomalySurfer (default)	0.44	0.81	0.49	0.84	0.47
	AnomalySurfer (fine-tuned)	**0.48**	**0.87**	**0.54**	**0.90**	**0.51**

”Contextual anomalies”





Dealing with context

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Anomaly Surfer

Fast and lightweight

Accurate analysis

Ready for edge computing

Flow Surfer

Learns and adapts

Find us at our stand to learn more!