

tinyML[®] EMEA

Enabling Ultra-low Power Machine Learning at the Edge

tinyML EMEA Technical Forum 2021 Proceedings

June 7 – 10, 2021

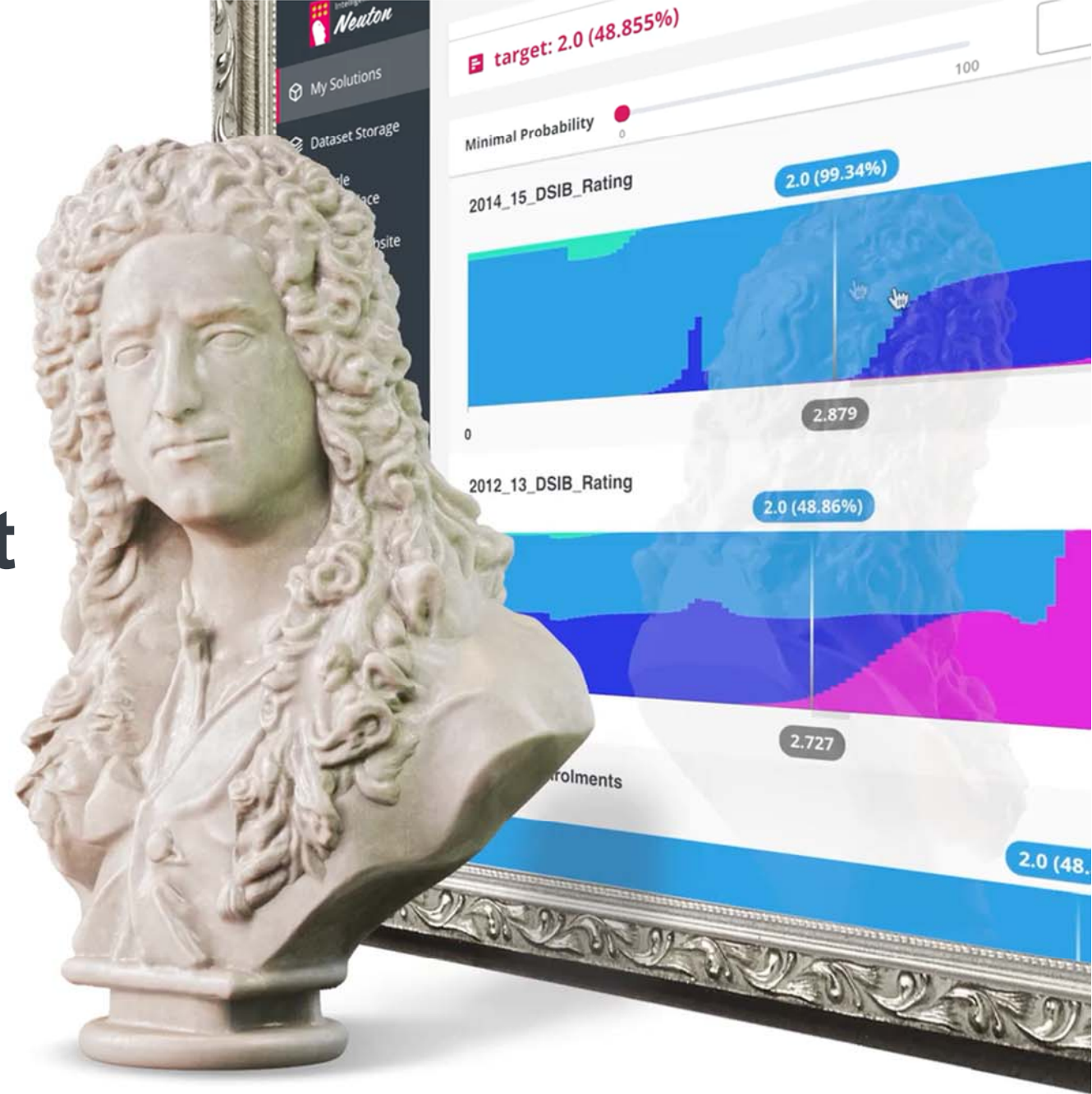
Virtual Event



www.tinyML.org



Explainability as a next chapter for tinyML



+

Great! A model is embedded into a device, but what's next?

In the context of making our devices AI driven, **explainability** is essential





+

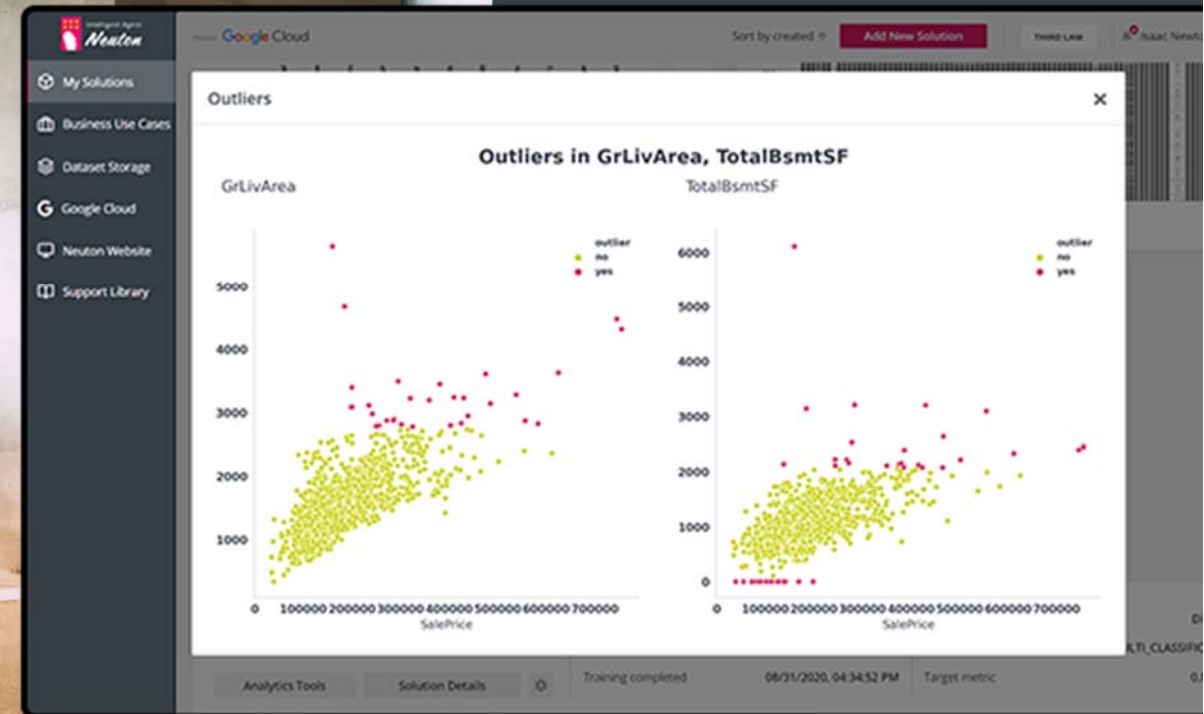
The 4 W's we should ask ourselves in order to relay on our model:

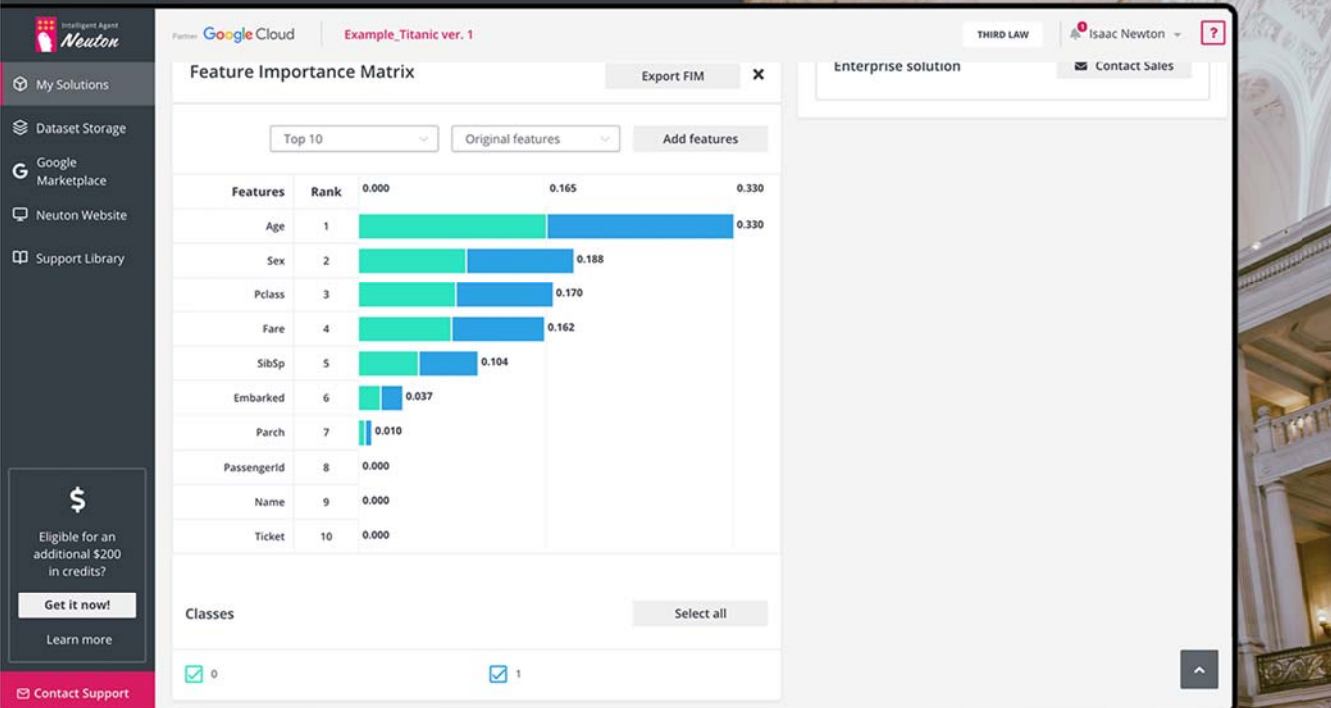
- 1 **What** does my data consist of?
- 2 **Where** are the important features?
- 3 **Why** the model are making certain Predictions?
- 4 **When** should I consider retraining my model?

+

What does my data consist of?

Exploratory Data Analysis - graphical data analysis
and the most important statistics





+

Where are the important features in my dataset?

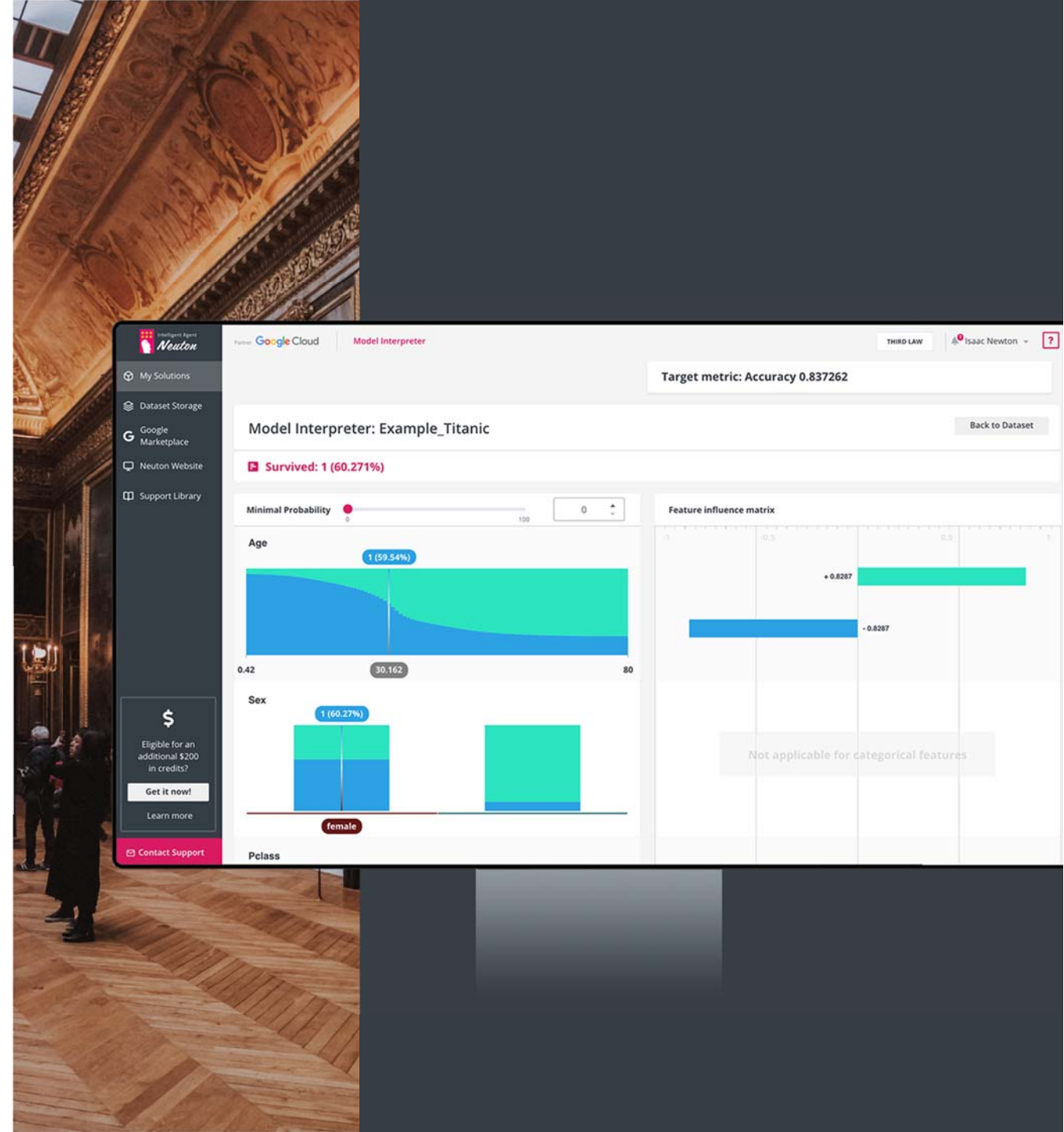
Feature Importance Matrix a chart with features that had the most significant impact on the model prediction power.

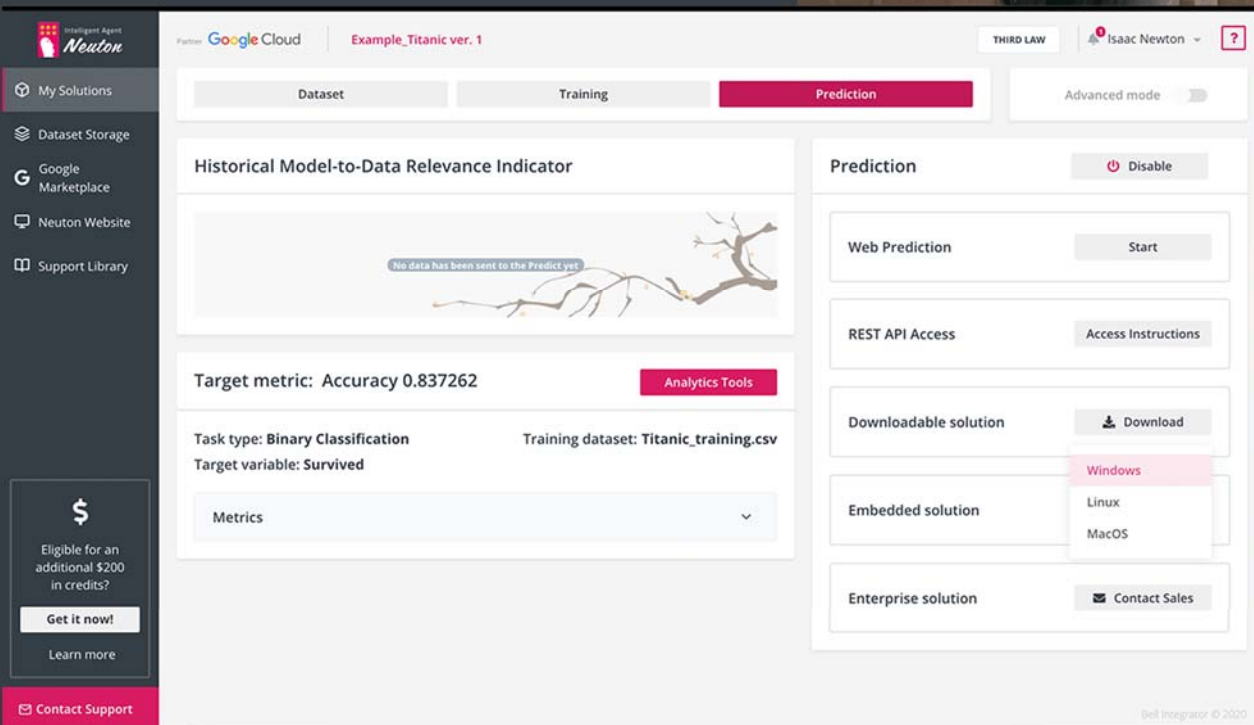


Why

Does my model make certain predictions?

The Model Interpreter allows you to see the logic, direction and the effects of changes in individual variables in the model.





+

When should I consider retraining my model?

Historical Model-to-data Relevance Indicator
allows to manage a model lifecycle by signaling
for models to retrain.



Air Quality Data Set Case Study & Deep Dive

The dataset contains the responses of a gas multisensor device deployed on the field in an Italian city. The device was located on the field in a significantly polluted area, at road level, within an Italian city.

Task description: Predict Benzene concentration (C_6H_6 (GT)) based on the concentration of other recorded compounds.

It is a regression problem.

Target metric – MAE (Mean Absolute Error)

<https://archive.ics.uci.edu/ml/datasets/Air+Quality>



Explainability office demo



Thank you!

Premier Sponsor



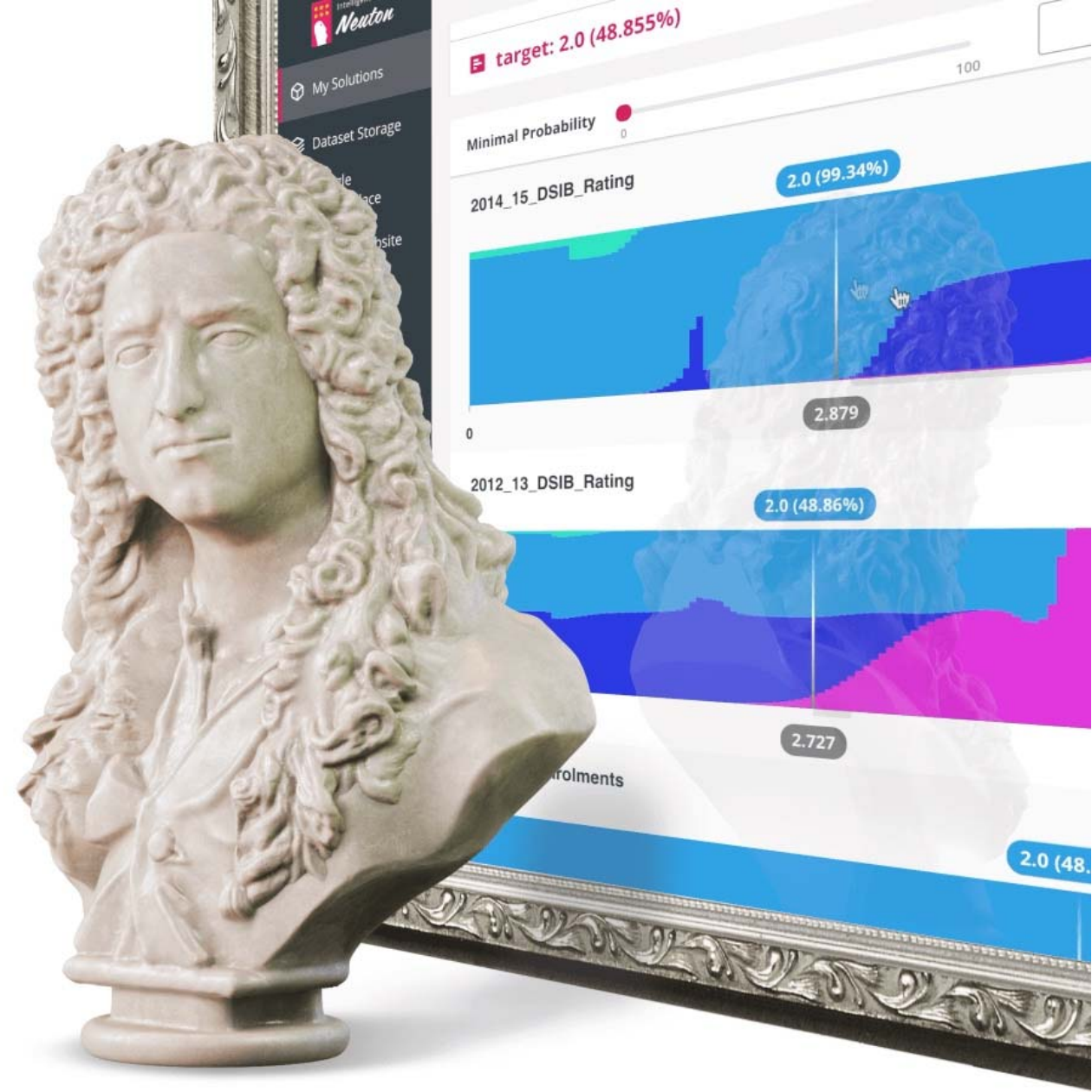
Automated TinyML

Zero-code SaaS solution

**Create tiny models, ready for embedding,
in just a few clicks!**

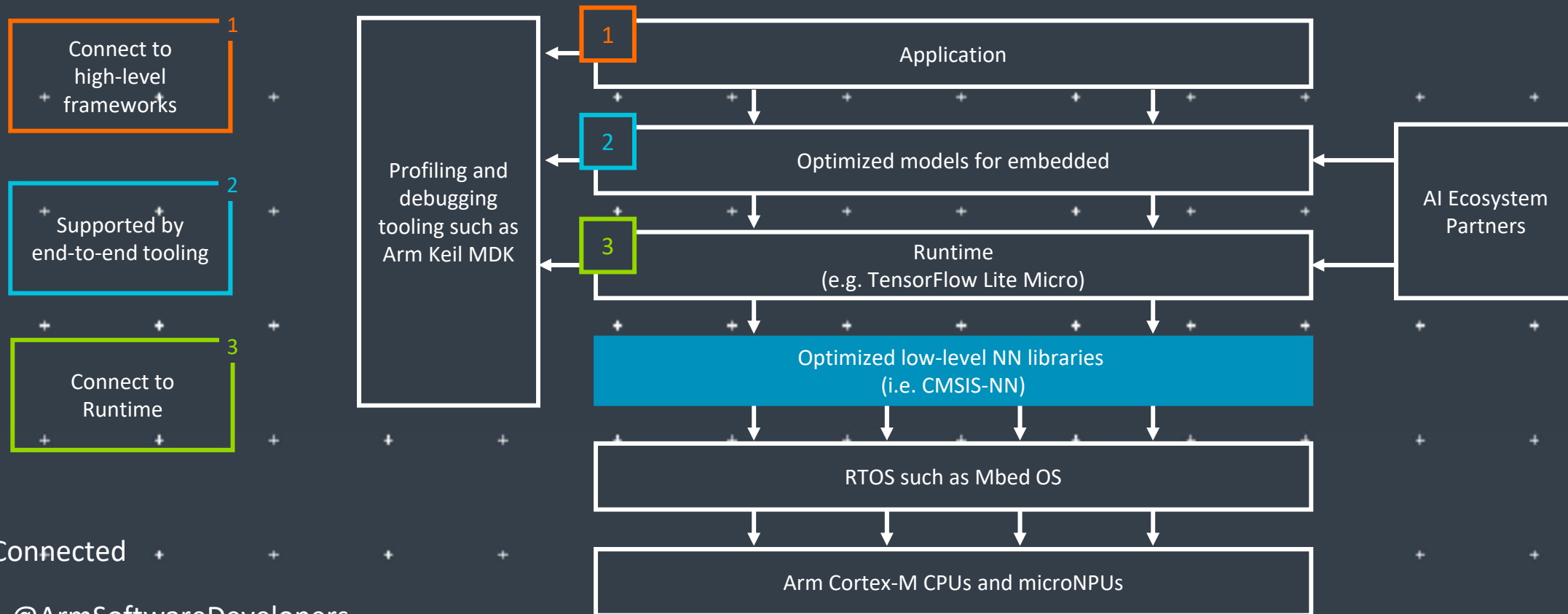
Compare the benchmarks of our compact models to those of TensorFlow and other leading neural network frameworks.

Build Fast. Build Once. Never Compromise.



Executive Sponsors

Arm: The Software and Hardware Foundation for tinyML



Stay Connected



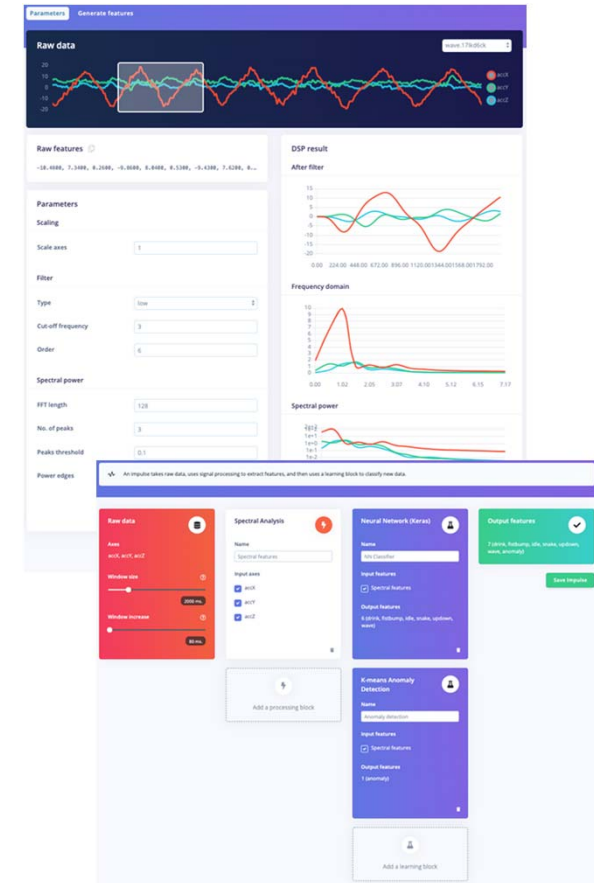
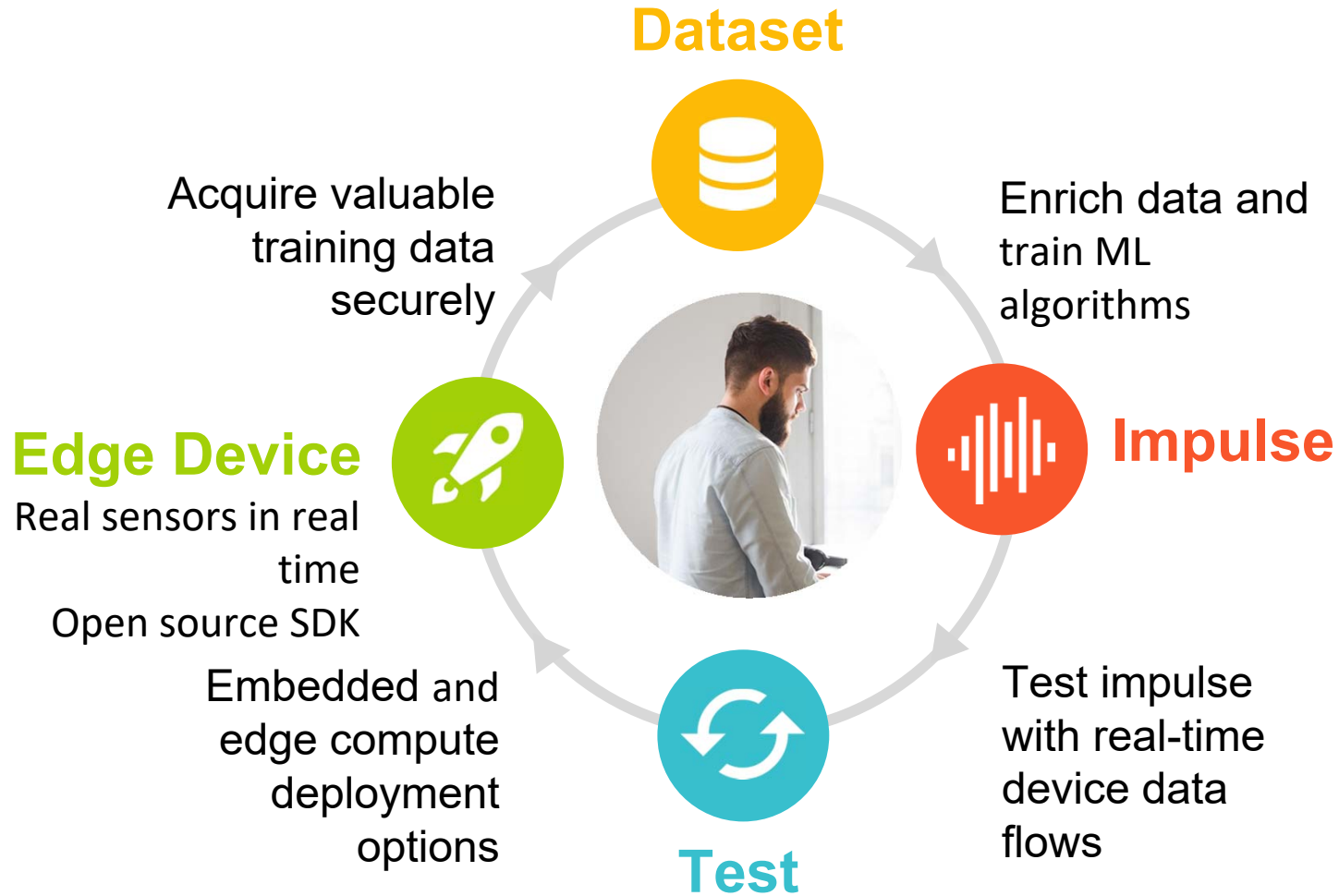
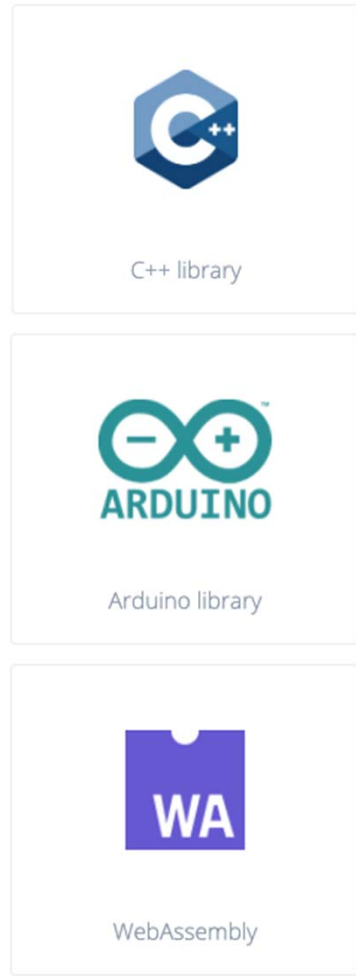
@ArmSoftwareDevelopers



@ArmSoftwareDev

Resources: developer.arm.com/solutions/machine-learning-on-arm

TinyML for all developers



www.edgeimpulse.com



Advancing AI research to make efficient AI ubiquitous

Power efficiency

Model design, compression, quantization, algorithms, efficient hardware, software tool

Personalization

Continuous learning, contextual, always-on, privacy-preserved, distributed learning

Efficient learning

Robust learning through minimal data, unsupervised learning, on-device learning

A platform to scale AI across the industry



Perception

Object detection, speech recognition, contextual fusion



Reasoning

Scene understanding, language understanding, behavior prediction



Action

Reinforcement learning for decision making



Edge cloud



Cloud



IoT/IIoT



Automotive



Mobile

SYNTIANT

[Syntiant Corp.](#) is moving artificial intelligence and machine learning from the cloud to edge devices. Syntiant's chip solutions merge deep learning with semiconductor design to produce ultra-low-power, high performance, deep neural network processors. These network processors enable always-on applications in battery-powered devices, such as smartphones, smart speakers, earbuds, hearing aids, and laptops. Syntiant's Neural Decision Processors™ offer wake word, command word, and event detection in a chip for always-on voice and sensor applications.

Founded in 2017 and headquartered in Irvine, California, the company is backed by Amazon, Applied Materials, Atlantic Bridge Capital, Bosch, Intel Capital, Microsoft, Motorola, and others. Syntiant was recently named a [CES® 2021 Best of Innovation Awards Honoree](#), [shipped over 10M units worldwide](#), and [unveiled the NDP120](#) part of the NDP10x family of inference engines for low-power applications.

www.syntiant.com



@Syntiantcorp

Platinum Sponsors



Part of your life. Part of tomorrow.

www.infineon.com



Reality AI[®]

Add Advanced Sensing to your Product with Edge AI / TinyML

<https://reality.ai>



info@reality.ai



[@SensorAI](https://twitter.com/SensorAI)



[Reality AI](#)

Pre-built Edge AI sensing modules, plus tools to build your own

Reality AI solutions

Prebuilt sound recognition models for
indoor and outdoor use cases

Solution for industrial anomaly detection

Pre-built automotive solution that lets cars
“see with sound”

Reality AI Tools[®] software

Build prototypes, then turn them into
real products

Explain ML models and relate the function
to the physics

Optimize the hardware, including
sensor selection and placement

Gold Sponsors



LatentAI

Adaptive AI for the Intelligent Edge

[Latentai.com](https://latent.ai)



Build Smart IoT Sensor Devices From Data

SensiML pioneered TinyML software tools that auto generate AI code for the intelligent edge.

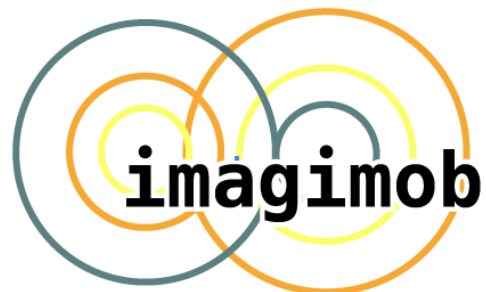
- End-to-end AI workflow
- Multi-user auto-labeling of time-series data
- Code transparency and customization at each step in the pipeline

We enable the creation of production-grade smart sensor devices.



sensiml.com

Silver Sponsors



Copyright Notice

The presentation(s) in this publication comprise the proceedings of tinyML® EMEA Technical Forum 2021. The content reflects the opinion of the authors and their respective companies. This version of the presentation may differ from the version that was presented at tinyML EMEA. The inclusion of presentations in this publication does not constitute an endorsement by tinyML Foundation or the sponsors.

There is no copyright protection claimed by this publication. However, each presentation is the work of the authors and their respective companies and may contain copyrighted material. As such, it is strongly encouraged that any use reflect proper acknowledgement to the appropriate source. Any questions regarding the use of any materials presented should be directed to the author(s) or their companies.

tinyML is a registered trademark of the tinyML Foundation.

www.tinyML.org