TCS Sensor Data Analytics Framework
Putting IoT Sensor Data to Work With Advanced Data Management and AI

Digital Enterprise Unit
How Do You Put IoT Big Data to Work?

More and more companies in more and more industries are deploying sensors in products and equipment to generate data that helps them improve performance and find new ways to serve customers more effectively. In today’s world, generating data is the easy part. In fact, it’s too easy: Sensor data has turned into “Big Data.”

The sheer volume of sensor data makes it incredibly valuable—but it also makes the challenges of managing data more and more difficult. Sensor data demands an efficient solution that facilitates storage, retrieval, processing, and application.

The configurable TCS Sensor Data Analytics Framework (SDAF) helps you rapidly acquire, transform, analyze, report on, and understand all types of sensor or log data. The SDAF consolidates and maps data from multiple sensors, and improves its relevance by enriching the data with additional insights such as geographic information or weather conditions. SDAF is built on Big Data technologies to deliver scalability and flexibility, processing high volume sensor streams to let you find relevant, useful business insights.

But increasingly, IoT sensor data demands solutions powered by advanced data management systems in conjunction with artificial intelligence. More and more, SDAF applies deep learning—using GPU-accelerated learning and automated feature learning—to generate accurate models and insights.

Benefits

**Accelerated deep learning:** SDAF can use GPUs (NVIDIA’s “GPUs in the Cloud”) to accelerate deep learning and inference and solve the issue of computer bandwidth; GPUs enable scalable, real-time learning of models with millions of parameters and patterns.

**Intelligent capable edge devices:** Improve performance of sensor data by moving algorithms to capable edge devices. SDAF can use local MQTT smart clients on the edge that work with online and offline clouds providing local ingestion, analytics, security, and application services.

**Accelerate time to market:** SDAF’s ready-to-use components with built-in capabilities such as data extraction, reporting, and deep dive analytics make uncovering insights faster.

**Correlate multiple sources:** Improve the relevance of decision making by leveraging cross-functional insights based on data from different sensor devices available in different data formats.

**Reduce data management overhead:** A single IoT Big Data solution can reduce support and maintenance costs as well as upfront investment; the SDAF can facilitate the analysis of geospatial data, time-series data, telematics data, and large machine-generated log files.

**Improve processing time:** SDAF’s distributed analytical models leverage machine learning algorithms to reduce processing time by 70 percent (when compared to traditional analytical models).

**New ways of deployment:** Deploy serverless endpoints on the cloud to provide continuous scaling, independence from provisioning, and granular billing.

Overview

With the number of sensor-embedded intelligent devices increasing exponentially, enterprises struggle to effectively manage voluminous sensor data. Different sensors generate different data formats, which can be difficult to correlate. Creating analytical models for diverse Big Data to provide alerts to end-users in real time can be challenging. But extracting value from sensor data is vital. Enterprises are working hard to leverage sensor data to uncover strategic insights in the ongoing quest for competitive advantage.

The TCS Sensor Data Analytics Framework addresses these challenges. It enables you to collect, process, store, and analyze large volumes of Big Data. Its powerful analytics engine leverages the MapReduce paradigm of Big Data processing to analyze data in parallel and generate actionable insights fast. With the capability to configure and integrate various data sources and formats, SDAF ensures data quality and facilitates analysis of integrated high-volume sensor streams. Its built-in correlation engine analyzes fragmented data, identifies events, and triggers counter-actions based on preconfigured rules. Our SDAF offering extends support for enterprise log management and analytics, harnessing Big Data technologies to deliver faster, more accurate insights.

Another powerful aspect of the SDAF is the ability to incorporate deep learning. At TCS, we are using GPUs (graphics processing units) to accelerate learning and inference, which make Big Data even more useful and valuable.
The SDAF leverages the extensive domain understanding and technology expertise of TCS, which adds value in several ways:

**Highly configurable framework:** SDAF offers the flexibility to configure multiple data sources using an intuitive web interface for data acquisition, data transformation, and reporting.

**Distributed analytical models:** SDAF delivers a comprehensive mix of generic and domain-specific analytical models, developed in conjunction with the TCS Innovation Lab. These mature assets leverage the combined benefits of machine learning algorithms and the distributed processing approach.

**Support for multiple data sources and formats:** A hallmark of the SDAF framework is its ability to connect to different sensor sources like PLC, SCADA, Historian, and others to acquire data. It supports data ingestion from SFTP servers, Java Message Service, Web Services, or any relational database management system. Finally, the SDAF supports voluminous log files for log event correlation and analytics.

**Real-time Data Analytics:** More and more, the ability to capture streaming data in real time is crucial to analytics, and SDAF can handle high-frequency data from multiple sources and perform real-time analytics to enable quick responses.

**Automated Deep Learning:** By incorporating GPUs through the SDAF, we enable the application of deep learning algorithms to sensor data analytics, creating the capability to make systems capable of inference.

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**Figure 1:** Intelligent edge devices provide fast data ingestion for IoT systems.

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**Figure 2:** Our IoT architecture is driven by state-of-the-art deep learning technologies.
About the TCS Digital Enterprise Unit

TCS adapts the capabilities of the digital five forces—Mobility and Pervasive Computing, Big Data and Analytics, Social Media, Cloud, and Artificial Intelligence and Robotics—to the unique needs and opportunities of each industry. We leverage a combination of these technologies to help clients digitally reimagine their business models, products and services, customer segments, channels, business processes, and workplaces to gain sustained competitive advantage.

Our experienced global team includes strategy experts, business analysts, digital marketers, user experience designers, data scientists, and engineers trained and certified in the latest technologies. By combining our technology vendor partnerships, our pre-built customizable products and reusable assets, and our deep industry expertise, we offer enterprises everything they need for a complete digital transformation—from strategy and use cases to system implementation and maintenance—and everything in between.

Contact

To learn more about the TCS Sensor Data Analytics Framework, contact digital.enterprise@tcs.com

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Tata Consultancy Services is an IT services, consulting, and business solutions organization that delivers real results to global business, ensuring a level of certainty no other firm can match. TCS offers a consulting-led, integrated portfolio of IT and IT-enabled infrastructure, engineering, and assurance services. This is delivered through its unique Global Network Delivery Model™, recognized as the benchmark of excellence in software development. A part of the Tata Group, India’s largest industrial conglomerate, TCS has a global footprint and is listed on the National Stock Exchange and Bombay Stock Exchange in India.

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