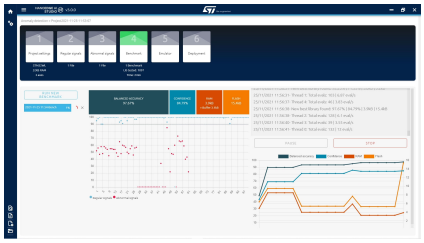
NanoEdgeAIStudio

Data brief

Automated machine learning (ML) tool for STM32 microcontrollers



Product status link
NanoEdgeAIStudio

NANOEDGE AI STUDIO

Features

- Desktop tool for the design and generation of STM32-optimized libraries with small datasets:
  - Anomaly detection libraries: Learn normality directly on the STM32 microcontroller and detect defects in real time
  - One-class classification libraries: Perform the acquisition during normal equipment operation and detect any abnormal pattern deviation
  - N-class classification libraries: Classify signals in real time
  - Extrapolation libraries: Predict discrete values based on data patterns never seen before
- Support for any type of sensor for a variety of physical quantities: multi-axis acceleration, current, magnetic field, voltage, temperature, acoustic pressure, and more
- Millions of possible algorithms are available to find the optimal library in terms of accuracy, confidence, inference time, and memory footprint
- Generation of very small footprint libraries running down to the smallest Arm® Cortex®-M0 microcontrollers
- Integrated tools such as:
  - Sampling finder tool to select the right data rate and the right data length easily
  - Datalogger generator to get ready to log data in a few clicks
  - Data manipulation tool for datasets
  - ML libraries benchmark to find the best combination between preprocessing and machine learning models
  - Embedded emulator to test library performance live with an attached STM32 board or from test data files
  - Validation tool to compare the libraries given by NanoEdge™
- Embedded emulator to test library performance live with an attached STM32 board or from test data files
- Native support for STM32 development boards, no configuration required, and easy portability across the various STM32 microcontroller series

1 Description

NanoEdge™ AI Studio (NanoEdgeAIStudio) is a new machine learning (ML) technology to bring true innovation easily to the end-users. In just a few steps, developers can create an optimal ML library for their project, based on a minimal amount of data.

NanoEdge™ AI Studio, also called the Studio, is a PC-based push-button development studio for developers, which runs on Windows® or Linux® Ubuntu®.

One of its significant advantages is that NanoEdge™ AI Studio requires no advanced data science skills. Any software developer using the Studio can create optimal ML libraries from its user-friendly environment with no artificial intelligence (AI) skills.

The Studio can generate four types of libraries: anomaly detection, outlier detection, classification, and regression libraries.

These libraries can be combined and chained: anomaly or outlier detection to detect a problem on the equipment, classification to identify the source of the problem, and regression to extrapolate information and provide real insight to the maintenance team.

The input signals can range from vibration to pressure, sound, magnetic, time of flight just to name a few, or even a combination of several signals. Multiple sensors can be combined, either in a single library, or using multiple libraries concurrently.

Both learning and inference are done directly inside the microcontroller by means of the NanoEdge™ AI self-learning library, which streamlines the AI process and significantly reduces development effort, cost and therefore time to market.

2 General information

NanoEdge™ AI Studio (NanoEdgeAIStudio) provides libraries for STM32 microcontrollers based on the Arm® Cortex®-M processor.

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

2.1 Ordering information

NanoEdge™ AI Studio (NanoEdgeAIStudio) is available to download from the STM32 AI website at stm32ai.st.com/nanoedge-ai, as described in Table 1. It is available free of charge for every development on an STM32 development board.

Table 1. NanoEdgeAIStudio free evaluation license

License	Detailed information	Technical support	Target STM32 MCU
STNEAISTUDIO	Free of charge for development purpose	Basic support from STMicroelectronics field application engineers	On supported STM32 Nucleo boards and Discovery kits

For production, contact STMicroelectronics sales office or distributors to purchase the NanoEdge™ AI Studio libraries right of use. The libraries generated with NanoEdge™ AI Studio can run on any STM32 microcontrollers during development and are subject to licensed conditions for production.

Table 2. NanoEdgeAIStudio commercial offer

Order code	Detailed information	Technical support	Target STM32 MCU
STNEAILIB	Right of use the NanoEdge™ AI Studio libraries for production	Basic support from STMicroelectronics field application engineers	Any STM32 microcontroller

For more details and pricing information, contact the local STMicroelectronics sales office or distributors.

2.2 System requirements

- Personal computer
- Multi-OS support: Windows® or Linux® Ubuntu®

Note: Windows is a trademark of the Microsoft group of companies.

Linux® is a registered trademark of Linus Torvalds.

Ubuntu® is a registered trademark of Canonical Ltd.

3 License

For NanoEdge™ AI Studio (NanoEdgeAIStudio) license information, visit its resource page on the STM32 Edge AI website at stm32ai.st.com.

Revision history

Table 3. **Document revision history**

Date	Revision	Changes
15-Sep-2021	1	Initial release.
5-Nov-2021	2	Updated product ordering and associated license descriptions in *Description* and *Ordering information*.
8-Dec-2021	3	Added library descriptions in *Features* and *Description*: • One-class classification libraries (outlier detection) • Regression libraries (extrapolation) Free evaluation license extended from two weeks to three months in *Ordering information*.
14-Feb-2023	4	Updated *Description*, *Ordering information*, and *License*: • Free development license and production right of use • STM32 AI website (stm32ai.st.com)
13-Jul-2023	5	Updated Features: • Updated the presentation of the features • Added the integrated tools, including the sampling finder