Klepsydra AI.
High performance AI for the edge

Klepsydra AI is a high performance deep neural network engine for edge computers. Customers can deploy existing or newly trained models on the edge using Klepsydra AI, in the same manner as with standard edge AI solutions. Klepsydra AI offers four main benefits:
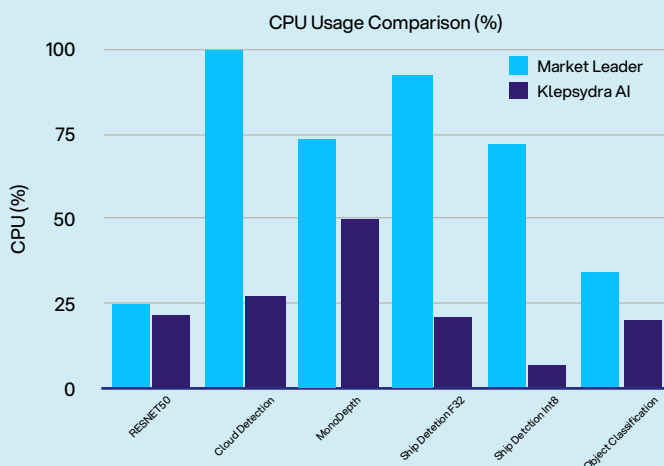
- Boost data processing performance
- Reduce power consumption
- Compatible with main AI formats and software
- Easy adoption and integration

Inspired by high frequency trading technologies, Klepsydra AI outperforms TensorFlowLite and OpenCV in both processing speed and power consumption.
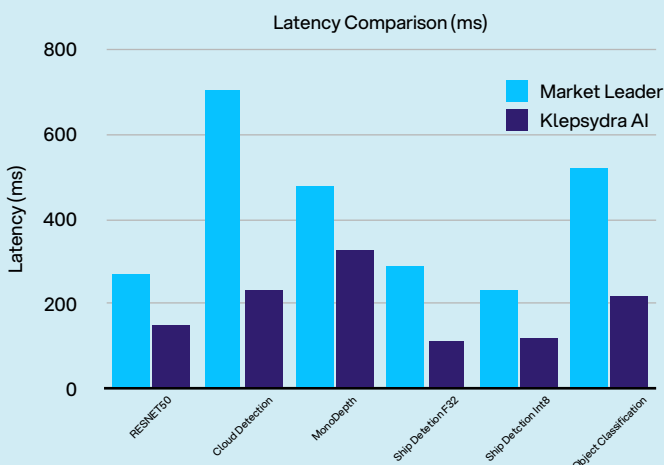
Core Benefits

Performance Increase

Faster and more data processed. Klepsydra AI can process larger volumes of data in real time with market proven low latency.

CPU Usage Comparison (%)
Legend: Market Leader, Klepsydra AI
Y-axis: CPU (%), 0 to 100
X-axis: RESNET50, Cloud Detection, MonoDepth, Ship Detection F32, Ship Detection Int8, Object Classification

Example of performance benchmark.
CPU consumption reduction on Raspberry Pi 5.

Higher accuracy and stability. Klepsydra AI is substantially more stable, predictable and deterministic than other edge solutions.

Latency Comparison (ms)
Legend: Market Leader, Klepsydra AI
Y-axis: Latency (ms), 0 to 800
X-axis: RESNET50, Cloud Detection, MonoDepth, Ship Detection F32, Ship Detection Int8, Object Classification

Example of performance benchmark.
Latency Raspberry Pi 5.

Cost Reduction

Avoid extra costs: For legacy hardware, customers can process more data with less energy avoiding to install more powerful solutions to handle more data.

Optimised costs: For new hardware, customers can optimise their solutions to handle a certain amount of real data with reduced hardware size and less energy needed, resulting in lower costs.

Integration

Wide compatibility: compatible with most common used AI formats and AI software solutions, Klepsydra AI accepts input data in several formats and can be deployed onto several edge computers like Odroid XU4, RaspberryPi4 & 5, Intel NUC, NVIDIA TX2, etc.

Easy to adopt and use: the efficient set of API allows a straight forward adoption and its unique visual autotuning graphical interface allows users to optimise a model for a specific computer in a very easy manner.

Applications

Klepsydra AI can deploy on the edge pre-existing or new models that customers might have developed and trained. Klepsydra AI is used in a large variety of applications including:

- Space: Earth observation, vision based navigation
- Robotics: obstacles avoidance, sensor fusion
- Aerospace: surveillance and security
- Automotive: autonomous driving

Technical Specification

Klepsydra AI uses a high performance 2-dim parallelisation model allowing to run high precision models on the edge, get it running with just 3 lines of code.

- **The Application API** is a simple asynchronous API and follows the predict - callback pattern.

- **The Dynamic Backend API** is for enabling different hardware accelerators and follows the strategy pattern.

Requirements

Klepsydra is platform independent with the following technical requirements:

- Target processor with atomic operation set, including ARM (V8, Cortex A7, Cortex A9), x86 64 and 32 bits, RISC-V RV32GC/RV64GC, Leon4 / Leon5, CuDNN 7 and above, CUDA 10.2 and above.

- Linux, Docker, Yocto, Ubuntu 18.04, RTEMS6 SMP

- C++14 complier for the target computer

Klepsydra AI has four main variations:

- **Standard**. Full-fletched version of the software

- **Minimal**. 4Mb footprint binary

- **Legacy**. Support to older operating systems and compilers

- **Minimal-Legacy**. 4Mb footprint binary with support to older operating systems and compilers.

Compatibility Features

- Support for ONNX and proprietary reduced file size format (KBAIF).

- Supported languages: C++, C, JAVA

- AI Training Framework Support: PyTorch, TensorFlow and ONNX

Klepsydra SDO

- Klepsydra Streaming Distribution Optimiser

- Cloud based software to determine the optimal solution for latency, power consumption, or throughput.

- Requires only a tarball containing the logs from multiple dry runs on the target computer

- Once the logs are uploaded, the software runs an optimizer to determine the optimal solution.

- The software generates a configuration file, which can be copied over to the target computer to implement the optimal solution

Klepsydra Framework

Klepsydra AI is the part of the Klepsydra software framework:

Klepsydra Streaming

- Boost data processing for general and processor intensive algorithms
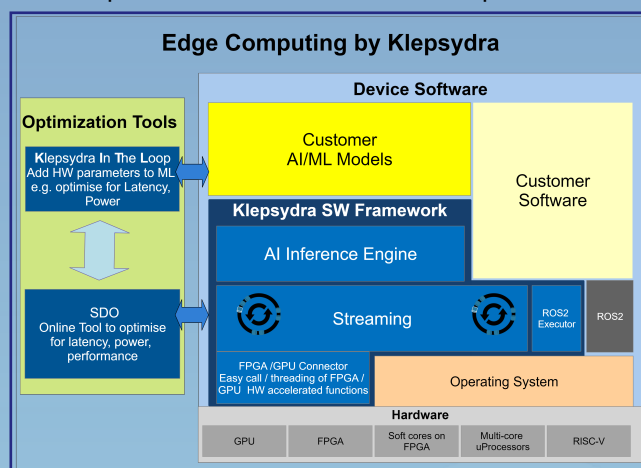
Klepsydra AI

- High performance deep neural network engine to deploy any AI / ML model on any type of processor, including CPU-only.

- Klepsydra GPU AI: GPU extension, doubles data processing rates, maximizes GPU utilization, and ensures low-latency performance.

GPU /FPGA Connector

- High parallelisation on GPU to increase the processing data rate and GPU utilisation

- Easy integration of FPGA HW acceleration

ROS2 Executor

- Executor for ROS2 able to process up to 10 x more data with up to 50% reduction in CPU consumption.

Edge Computing by Klepsydra

In addition Klepsydra offers two web-based optimzation tools , Klepsydra SDO and one to integrated HW performance into ML training

Trial Request

In order to request a trial version, send an email to sales@klepsydra.com or go to the website download section https://www.klepsydra.com/download/

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