

MuseBox – FPGA Machine Learning Based System For Real-Time Audio Video Applications

INTRODUCTION

MuseBox is a set of AI and Machine Learning models designed for extracting analytics in real time out of multiple video or audio sources and it supports different workloads from AI edge inference to large datacenter AI inference tasks. It can work with live internet streams, for interactive or live applications, as well as with files stored locally.

PRODUCT OVERVIEW

Machine Learning and Artificial Intelligence Tasks

MuseBox currently supports 5 different categories of AI tasks:

- > Face Analysis for cutting edge analytics extraction of a single person
- > People Analysis for crowd metadata extraction
- > Audio Analysis for real-time (<200ms) segmentation and classification
- > Object Analysis for extracting analytics of text and drawings
- > Medical Analysis for Ultrasound and MRI image analysis

Supported Face Analysis tasks:

- > Face Detection
- > Face Landmarking
- > Face Recognition
- > Face Recognition with Mask
- > Glasses Detection
- > Mask Detection
- > Gender Detection
- > Eyes and Blinking Detection
- > Age Detection
- > Emotion Detection
- > Hair segmentation
- > Face decorator

Supported People Analysis tasks:

- > People Tracking
- > Social Distancing
- > People Counting

Supported Object Analysis tasks:

- > Object Detection
- > Object Recognition
- > Text Detection
- > Text Transcription (OCR)
- > Logo Detection
- > Logo Recognition

Supported Audio Analysis tasks:

- > Audio Clustering
- > Audio Filtering
- > Audio Scene Classification
- > Audio Segmentation

Supported Medical Analysis tasks:

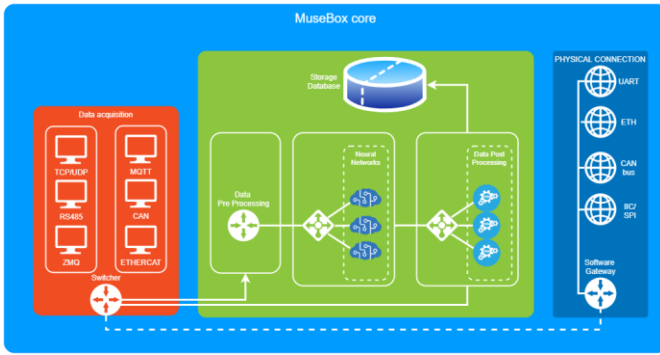
- > Organs Segmentation
- > Liquid Presence
- > Tissue Deformations



Key Features

- > Low Latency, Real-Time, High Throughput
- > SW programmable through simple APIs
- > Easy Integration
- > Faster Time To Market
- > Deployment ready
- > Supports wide range of Xilinx FPGA families: Alveo, UltraScale+, Versal
- > Fine grain modularity and scalability when composing AI and ML task

SOFTWARE ARCHITECTURE



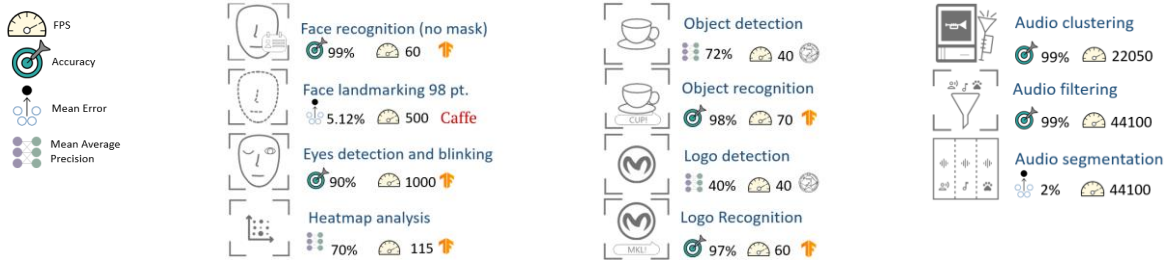
Supported framework and Protocols

MuseBox currently supports 8 different frameworks and network protocol:

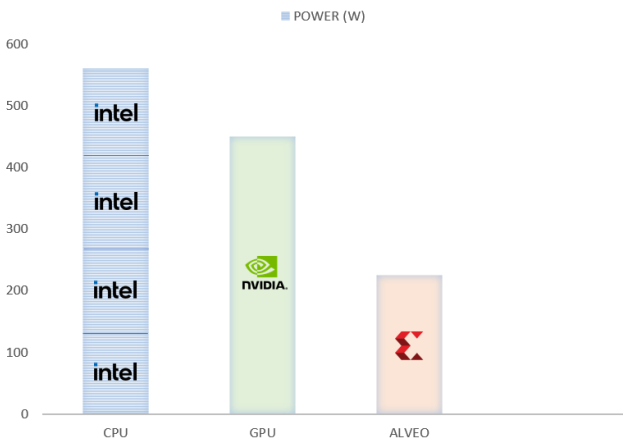
- > ZMQ
- > Socket.IO
- > RabbitMQ
- > PYNQ
- > Websocket
- > Wordpress (as a plugin)
- > ROS and ROS2

USE CASES PERFORMANCES OVERVIEW

Following a table of measured performances on customers' deployed applications using MuseBox



POWER CONSUMPTION



Reference HW:

- > Intel Xeon Gold 5315Y Processor
 - > TDP 140W * 4
- > nVidia Tesla V100
 - > TDP 300W * 1.5
- > Xilinx ALVEO U200
 - > TDP 225W

With CPUs, same performances as an ALVEO U200 are obtained with 4 units (and 4 server systems).

The nVidia GPU meets the same performances of an ALVEO U200 with an increase of 50% of the clock frequency.

The following test has been performed by inferring 2 AI models, Face Detection and Face Recognition, at the base frequencies of the CPU, GPU and FPGA. The AI models are the same across the architectures and deployed with the methodologies and frameworks released by the companies.

TAKE THE NEXT STEP > Visit <https://musebox.it/>

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