

What is micromind?

Goal: unify AI and embedded engineers, by creating tutorials and applications tailored to the two different skill sets.

- **AI recipes:** for real-time, application-oriented tasks such as object detection, sound event detection, keyword spotting, and many more.
- **Edge deployment:** guide the porting of the trained or pre-trained pipelines on edge devices such as MCUs;
- **Exportability:** easy and optimised conversion from pytorch to many inference engines (e.g. OpenVINO, CubeAI, TF lite, and many more);



What are the supported tasks?

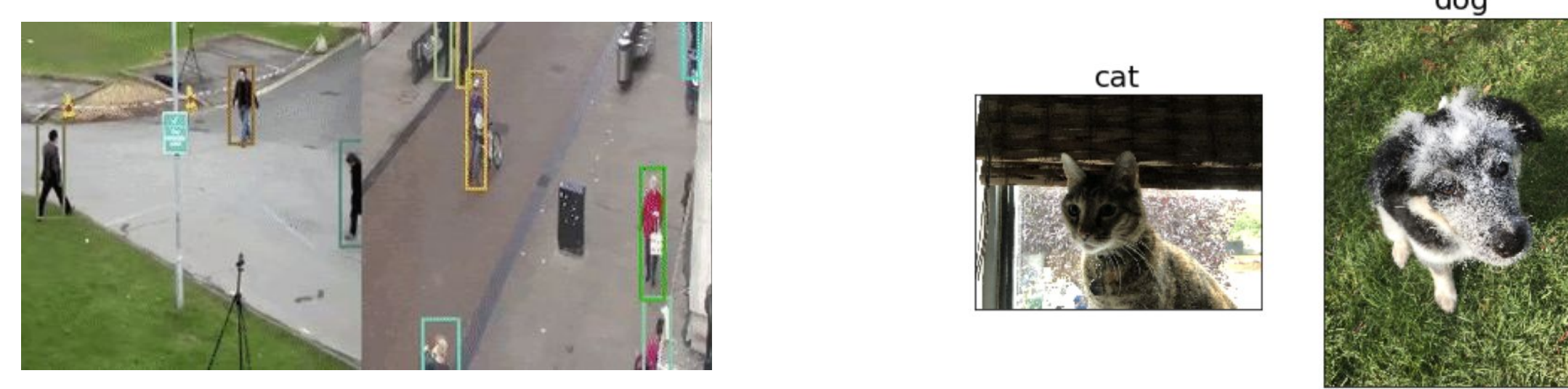
Audio

Sound Event Detection, Keyword Spotting



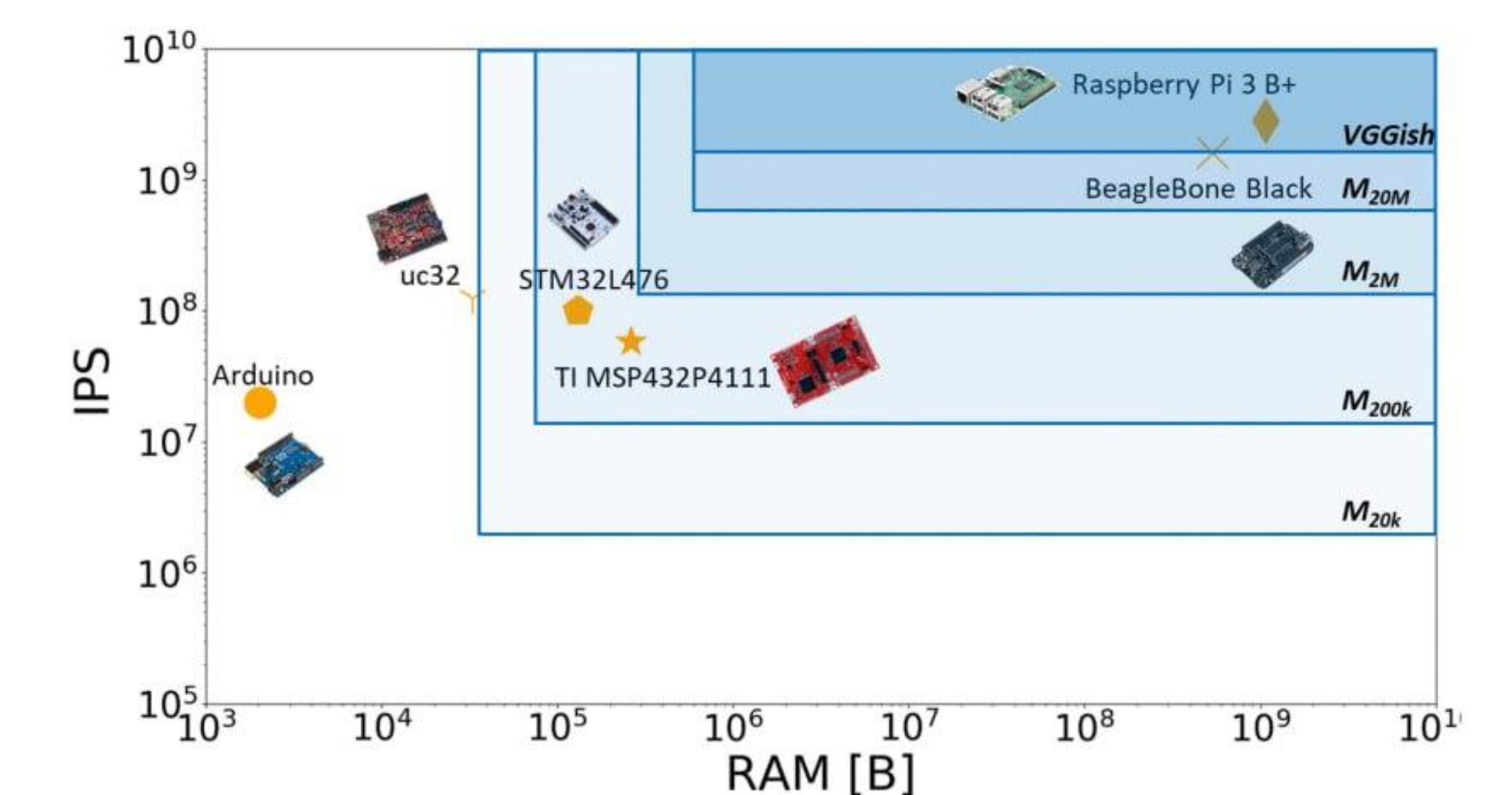
Vision

Object detection, image classification



Edge deployment

In micromind, we have hands-on tutorials on how to deploy the newly trained or pre-trained models directly on the edge, in few steps. Target devices range quite a lot, and contain MCU, but also single-board computers.



Models requirements vs hardware capabilities. These platforms are the target platforms for micromind.

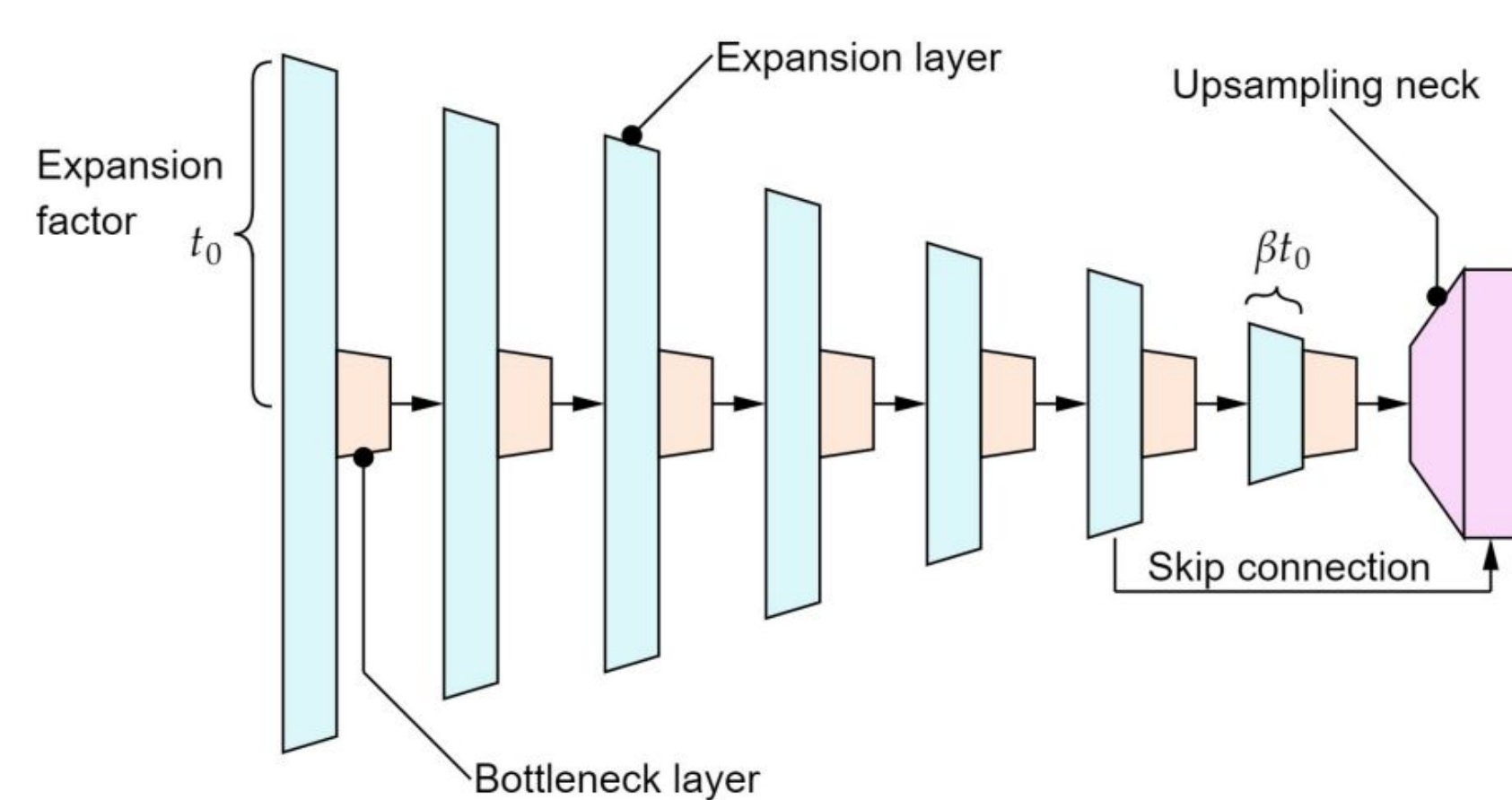
Supported neural architectures

These networks are automatically tested and guaranteed to be exportable using micromind's CI pipeline, more will be added in the future.

Model factory and extensions: support models from timm model factory (MobileNet to ViT) and MCUNet, microNet. This enable benchmarking of different backbones both on GPUs and embedded systems. You can try also our efficient architectures:

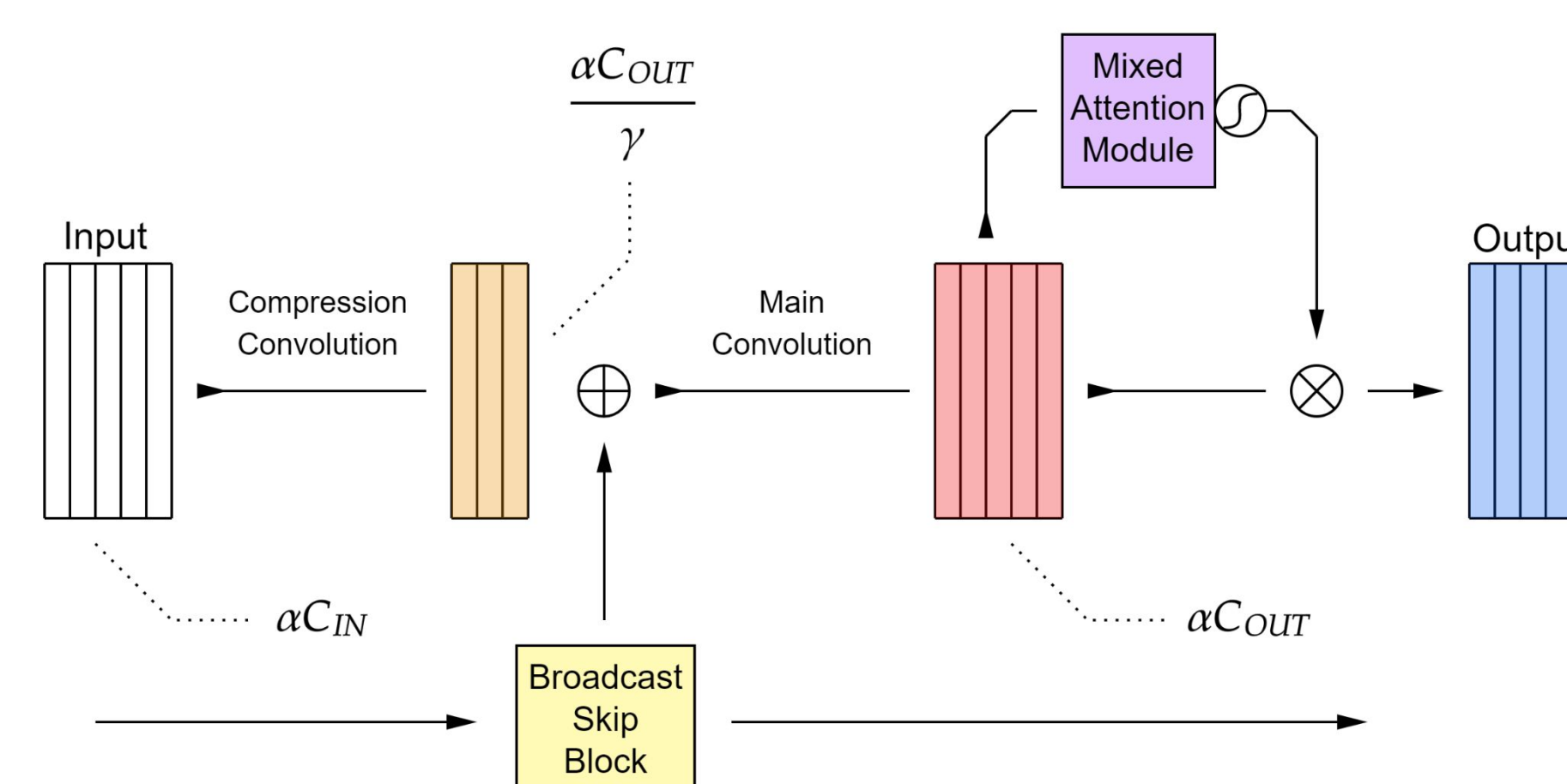
PhiNets [1]

- small footprint neural networks designed to adapt to changing RAM, FLASH and MAC requirements;
- have a great performance-complexity trade-off when couple with Hardware Aware Scaling;



XiNets [2]

- designed after an hands-on benchmarking of different neural network layers on a variety of edge devices;
- optimize the performance-energy trade-off;



[1] Paissan*, Ancilotto*, Farella "PhiNets: a scalable backbone for low-power AI at the edge", ACM TECS 2023
[2] Ancilotto*, Paissan*, Farella "XiNet: efficient neural networks for tinyML", under review

Project agenda

Currently, we are working towards solving this tasks inside micromind:

- **Additional tasks:** extend the amount of tasks supported by micromind (object segmentation, style transfer, keypoint detection);
- **Network profiling:** debug your neural network in few steps to see how to improve the performance on edge devices;
- **Automatic network design/scaling:** like in Hardware aware scaling, you should be able to define your network based on the hardware requirements of your applications;
- and many more..

If you are working on these topics and are interested in collaborating or having your technology inside micromind, reach out and contribute!

Scan and give a ★ if you like the project.

