Monocular depth estimation is an appealing technique to estimate dense depth maps leveraging unconstrained imaging sensors. State-of-the-art technique [1] deploys energy-hungry deep networks.

Architecture

Whereas state-of-the-art models [1] count millions of parameters, have large memory footprints and are far from real-time computation on low powered devices, PyD-Net [2] is compact (1.9M vs more than 30M params) and runs at around 1 FPS on Raspberry Pi 3 with comparable accuracy.

Moreover, PyDNet is an energy-scalable architecture with better performance than more complex models like [1].

Energy-Quality Scaling

- **Coarse-Gain Knob**: PyD-Net infers disparity maps at different resolutions. Its reconfigurable architecture enables to scale energy with output resolution.

- **Fine-Grain Knob**: in-house neural kernels enables to scale energy with precision. The optimization flow sketched on the left guarantees marginal loss in output quality at lower bit-widths.

A sensing technology [3] with such ability to implement accuracy-energy scaling represents a practical option for adaptive embedded systems: contexts or applications which tolerate lower accuracy might pursue higher energy efficiency by tuning resolution and precision.