CNN

Operating system	Linux
Image preprocessing	• Demosaicing • AOI • Resolution scaling • CNN preprocessing modes o zeroto255 o zerotoone • CNN preprocessing modes from keras.applications.imagenet_utils.preprocess_input o tf o caffe o torch
Data postprocessing on CPU	• Softmax operation for classification • Box regression for object detection • User programmable processing on Dual Core ARM Cortex-A53

deep ocean core

Input data formats	• Up to 512 x 512 pixels • Tensor of shape (x, y, 3) for color • Tensor of shape (x, y, 1) for mono
Output data formats	• Float • Shape formatting can be defined in post-processing (depending on model and task)
Internal number format	• 16-bit fixed point • Integer and fractional bits individually optimized for each layer
Maximum number of layers in model	• 180 layers
Maximum model size	Any size fitting the RAM size (maximum 245 MB (1,6 MP mono), minimum 160 MB (6 MP color)
Supported operations/layers	• 2D convolution layer • Depthwise separable convolution layer • Average pooling layer • Max. pooling layer • Dense layer • Add layer • Concatenate layer

Subject to technical modifications (2023-10-23)

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Dimbacher Str. 10 · 74182 Obersulm · Phone +49 7134 96196-0 · Email: info@ids-imaging.com

	• Squeeze-and-Excitation layer • ReLU activation • ReLU6 activation • Swish activation • Sigmoid activation • Batch normalization
Filter kernel/pooling parameters	• Kernel/pooling window: any rectangle up to 15 x 15 pixels • Kernel depth: any depth • Kernel/pooling stride: up to 15 pixels
Inference time	See Benchmark

Benchmark

Reference models from tensorflow.keras.applications

Architecture	Input format → output format	Single image inference time [ms]
MobileNet V1 α=1.0	(224, 224, 3) → (1000)	66
MobileNet V1 α=0.75	(224, 224, 3) → (1000)	50
MobileNet V1 α=0.5	(224, 224, 3) → (1000)	37
MobileNet V1 α=0.5	(128, 128, 3) → (1000)	14
MobileNet V1 α=0.25	(224, 224, 3) → (1000)	28
MobileNet V1 α=0.25	(128, 128, 3) → (1000)	10
MobileNet V2 α=1.0	(224, 224, 3) → (1000)	67
MobileNet V3 large alpha 1.0	(224, 224, 3) → (1000)	64
MobileNet V3 large alpha 0.75	(224, 224, 3) → (1000)	55
MobileNet V3 small alpha 1.0	(224, 224, 3) → (1000)	35
ResNet50	(224, 224, 3) → (1000)	285
MobileNet_V1_SSD	(300, 300, 3) → (scores: (3323, 81), boxes: (3323, 4), anchors: (3323, 4))	132

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IDS NXT ferry 2.2.0

Supported model formats	tensorflow.keras .h5 models
Compatible Keras/Tensorflow versions	Tensorflow 2.3 - 2.5
Supported CNNs	Tested CNNs from tensorflow.keras.applications • MobileNet • MobileNet V2 • MobileNet V3 • ResNet50 The support of further published CNNs, like SqueezeNet or self-created CNNs is possible, as long as the restrictions listed under CNN are considered. "Single Shot Detector" architectures based on MobileNet are used for object detection.

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