Tengine Convert Tool Technical Spec

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OPEN AI LAB

变更记录

日期	版本	说明	作者
2020-12-04	1.0	初版	Zhang Bin

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1 产品介绍

1.1 背景与目的

Tengine Convert Tool 实现将常见的训练框架(Caffe，ONNX，MXNet，TensorFlow，TensorFlow Lite，Darknet)生成的网络模型转换为 Tengine 专属的网络模型格式 tmfile，仅支持 FP32 的网络模型转换。

1.2 产品特点

1) 此工具支持模型转化功能。

2 支持范围

2.1 硬件支持

2.2 操作系统支持

- Ubuntu 18.04 以上

2.3 算子支持

2.3.1 Tengine 算子支持

详见附录 1。

卷积计算方法包括：

- Direct Convolution
- Winograd Convolution
- Gemm Convolution

2.4 FP32 模型支持

2.4.1 Caffe 模型支持

Alexnet	**faster_rcnn**	**googlenet**	**inception_v3**	**inception_v4**
lighten_cnn	**mobileface**	**Mobilenet_v1**	**mobilenet_ssd**	**mtcnn**
resnet50	**squeeznet**	**ssd**	**vgg16**	**vgg19**
yolov2	**yufacedetect**	**Mobilenet_v2**	**Mobilenet_v3**	**Shufflenet_1xg3**
Mnasnet	**Shufflenet_v2**			

2.4.2 ONNX 模型支持

squeeznet	**MobileNetV3**	**ShuffleNetV2**

2.4.3 MXNet 模型支持

mobileface	**mobilenet**	**squeeznet**	**Mobilenet_v2**	**Inception_v3**
Resnet50	**Vgg16**	**alexnet**	**Resnet18_v2**	

2.4.4 TensorFlow 模型支持

inception_v3	**inception_v4**	**Mobilenet_v1**	**Mobilenet_v2**	**ResNet50**
ResNet_v1	**ResNet_v2**	**squeeznet**	**densenet**	**nasnet**
Mobilenet_v1_0.75	**Inception_resnet_v3**			

2.4.5 TensorFlow Lite 模型支持

ResNet_v2	**inception_v3**	**squeeznet**	**Mobilenet_v1**	**Mobilenet_v2**
Inception_v3	**Inception_v4**	**mobilenet_ssd**	**detect**	

2.4.6 Darknet 模型支持

Yolov2	Yolov2 tiny	Yolov3	Yolov3 tiny

附录 1 Tengine Convert Tool 支持算子列表

TENGINE	Caffe		MXNet		TensorFlow	TF-lite	ONNX	Darknet
ACCURACY	√							
BATCHNORMALIZATION	BatchNorm		BatchNorm		FusedBatchNorm		√	
		ComposedBN						
RESIZE						RESIZE_NEAREST_NEIGHBOR		
CONCAT	√	√	CONCATENATION	√	route			
CONST								
CONVOLUTION	√	√	CONV_2D	Conv	convolutional			
	DepthwiseConvolution				DepthwiseConv2dNative	DEPTHWISE_CONV_2D		
	ConvolutionDepthwise							
DECONVOLUTION	√		√		Conv2DBackpropInput			
DETECTIONOUTPUT	√							
DROPOUT	√		Copy		√		√	yolo
ELTWISE	_minus_scalar	Add	ADD	Add	shortcut			
			_mul_scalar		Sub	SUB	Sub	
	elemwise_add		PROD					
					Rsqrt	RSQRT		
	_div_scalar	RealDiv	DIV	Div				
					Log	LOG		
		Exp	EXP	Exp				
					Pow	POW		
		Sqrt	SQRT					
					Floor	FLOOR	Floor	
		Mul	MUL	Mul				
					Minimum			
		AddN						
FLATTEN	√		√		√		√	
FULLYCONNECTED	InnerProduct	√	MatMul	FULLY_CONNECTED	MatMul			
							Gemm	
INPUT	Data		FIFOQueueV2					
	Input							
LRN	√		√					
NORMALIZE	√							
PERMUTE	√	transpose						

TENGINE		Caffe		MXNet		TensorFlow	TF-lite	ONNX	Darknet
POOLING		√		√		AvgPool	AVERAGE_POOL_2D	AveragePool	
					GlobalAveragePool				
						MaxPool	MAX_POOL_2D	MaxPool	maxpool
PRELU	√	LeakyReLU			PRelu				
PRIORBOX		√							
REGION	√					region			
RELU		√		Activation		Relu		Relu	
		LeakyReLU			LeakyRelu				
RELU6		√		clip		Relu6			
REORG	√					reorg			
RESHAPE		√		√		√	RESHAPE	√	
ROIPOOLING	√								
RPN		√							
SCALE	√								
SLICE		√						√	
SOFTMAX	√	Activation	√	SOFTMAX	√				
		SoftmaxWithLoss							
		SoftmaxOutput							
				SoftmaxActivation					
SPLIT	√		√		√				
DETECTIONPOSTPROCESS							TFLite_Detection_PostProcess		
GEMM									
GENERIC			DecodeWav						
						AudioSpectrogram			
			Mfcc						
LOGISTIC							LOGISTIC		
LSTM		RNN	√						
RNN						√			
TANH	TanH	Activation	√		√				
SIGMOID		√		Activation		√		√	
SQUEEZE				SQUEEZE	√				
PAD						√			
			MirrorPad						
STRIDEDSLICE						√	STRIDED_SLICE		
REDUCTION	√	√	Sum	SUM					
						Mean	MEAN	ReduceMean	
			Asum						
						Sqsum			
			Max						
						Min			
			Prod						
						L2			

TENGINE	Caffe	MXNet	TensorFlow	TF-lite	ONNX	Darknet
	Logsum					
			Logsumexp			
ARGMAX	√					
ARGMIN			√			
TOPKV2	√					
MAXIMUM			√		Max	
MINIMUM	√					
ADDN		add_n				
SWAPAXIS	√					
GRU		RNN	√			
UPSAMPLE	√		UpSampling			
SHUFFLECHANNEL	√					
RESIZE	√		ResizeNearestNeighbor			
			ResizeBilinear			
SPACETOBATCHND	√					
BATCHTOSPACEND			√			
CROP	√		√			
PSROIPOOLING		_contrib_PSROIPooling				
ROIALIGN	_contrib_ROIAlign					
EXPANDDIMS			ExpandDims			
UNARY	√					
		abs	Abs			
	neg	Neg				
		ceil	Ceil			
	floor	Floor				
		sin	Sin			
	Asin					
		cos	Cos			
	Acos					
		atan	Atan			
	tan	Tan				
	reciprocal	Reciprocal				
			Square			
	Sqrt					
			Rsqrt			
	Exp					
			Log			
BIAS	√					
NOOP						
THRESHOLD	√					
HARDSIGMOID						
EMBEDDING	√	√	√			
INSTANCENORM		√				
MVN	√					

TENGINE	Caffe	MXNet	TensorFlow	TF-lite	ONNX	Darknet
ABSVAL	√					
CAST		√				
HARDSWISH					√	
INTERP	√	UpSampling		Upsample		
SELU						
ELU	√	LeakyReLU	ELU	√		
BROADMUL			broadcast_mul			
LOGICAL			LOGICALOR			
					LOGICALAND	
GATHER			GATHER	√		
TRANSPOSE				√	TRANSPOSE	√
COMPARISON		Equal	EQUAL			
				Greater	GREATER	
		GreaterEqual	GREATER_EQUAL			
				Less	LESS	
		LessEqual				
					LESS_GREATER	
SPACETODEPTH			SPACE_TO_DEPTH			
DEPTHTOSPACE					DEPTH_TO_SPACE	
REVERSE		ReverseV2	REVERSE_V2			
SPARSETODENSE				√	SPARSE_TO_DENSE	
CEIL		√	CEIL			
SQUAREDDIFFERENCE				√	SQUARED_DIFFERENCE	
ROUND		√	ROUND			
ZEROSLIKE						
CLIP	Clip			Clip		
POWER	Power					
TILE	Tile					
L2NORMALIZATION					L2_NORMALIZATION	
L2POOL			L2_POOL_2D			
RELU1					RELU_N1_TO_1	
LOGSOFTMAX			LOG_SOFTMAX			
FLOOR				Floor		
REDUCEL2				√		
UNSQUEEZE						√