Tengine Quant Tool Technical Spec

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变更记录

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1 产品介绍

1.1 背景与目的

Tengine Quant Tool 是针对 Tengine 进行的模型量化工具,支持将现有多框架的 FP32 模型转换并量化、压缩成 UINT8 模型。

- 1.2 产品特点
- 1) 此工具支持模型转化、压缩、量化功能。
- 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 UINT8 量化模型支持

2.4.1 Caffe 模型支持

Shufflenet_v2	googlenet	inception_v3
mobileface	Mobilenet_v1	mobilenet_ssd
squeeznet	resnet50	vgg16
Mobilenet_v3	Mobilenet_v2	

2.4.2 ONNX 模型支持

Shufflenet_v2	googlenet	inception_v3
mobileface	Mobilenet_v1	mobilenet_ssd
squeeznet	resnet50	vgg16
Mobilenet_v3	Mobilenet_v2	

2.4.3 MXNet 模型支持

Retinaface

附录 1 Tengine Quant Tool 支持算子列表

TENGINE		Caffe		MXNet		TensorFlow	TF-lite	ONNX	Darkn et
ACCURACY	√ √								
BATCHNORMALI	ZATION	BatchNorm		BatchNorm		FusedBatchNorm		$\sqrt{}$	
			ComposedBN						
RESIZE							RESIZE_NEAREST_NEI		
				CONCATENATI			GHBOR		
CONCAT	√	\checkmark	ConcatV2	CONCATENATI ON	$\sqrt{}$	route			
CONST				ON					
	√	√	Conv2D	CONV 2D	Conv	convolutional			
CONVOLUTION	V	1		CONV_2D	Conv	DepthwiseConv2d			
		DepthwiseConv	olution			Native	DEPTHWISE_CONV_2D		
	ConvolutionDept					Tuttie			
	hwise								
DECOMPOLITIC		√		√		Conv2DBackpropI			
DECONVOLUTIO	N	V		V		nput			
DETECTIONOU	1	'				•			
TPUT DROPOUT		√		Comv		V		\checkmark	yolo
ELTWISE	√	_minus_scalar	Add	Copy ADD	Add	shortcut		V	yolo
ELI WISE	V	_IIIIIus_scalai	Auu	mul scalar	Add	Sub	SUB	Sub	
		elemwise add		PROD		Suo	SCB	Sub	
		cieniwise_add		TROD		Rsqrt	RSQRT		
		div scalar	RealDiv	DIV	Div	resq.v	115 (111		
						Log	LOG		
			Exp	EXP	Exp	- U			
					•	Pow	POW		
		1	Sqrt	SQRT					
						Floor	FLOOR	Floor	
			Mul	MUL	Mul				
						Minimum			
			AddN			,		,	
FLATTEN		1		√		$\sqrt{}$		$\sqrt{}$	
FULLYCONNEC	InnerProduct	$\sqrt{}$	MatMul	FULLY_CONNE	MatMul				
TED				CTED				C	
INDLIT	Data		EIEOOyaya V2					Gemm	
INPUT	Data	Input	FIFOQueueV2						
LRN	√	mput	1						
NORMALIZE	·	√	V						
PERMUTE	√	transpose							

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TENGINE		Caffe		MXNet		TensorFlow	TF-lite	ONNX	Darkn et
POOLING		V		V		AvgPool	AVERAGE_POOL_2D	AverageP ool	
					GlobalAverage Pool			001	
					1 001	MaxPool	MAX POOL 2D	MaxPool	maxpo
PRELU	√	LeakyReLU			PRelu				ol
PRIORBOX	V	√			rkeiu				
REGION	√	V				region			
RELU	V	√		Activation		Relu		Relu	
KELU		LeakyReLU		Activation	LeakyRelu	Reiu		Kelu	
RELU6		√		clip	LeakyReiu	Relu6			
REORG	\	1 4		Спр		reorg			
RESHAPE	,	√		V		V	RESHAPE	\checkmark	
ROIPOOLING	√	'						,	
RPN	,	√							
SCALE	V	,							
SLICE	,	√							
SOFTMAX	√	Activation	V	SOFTMAX	V			·	
501111111	,	SoftmaxWithLos	SS	551111111					
		SoftmaxOutput	-						
				SoftmaxActivation					
SPLIT	√		$\sqrt{}$		$\sqrt{}$				
DETECTIONPOST	ΓPROCESS						TFLite_Detection_PostPro		
GEMM							cess		
GEMINI									
GENERIC			DecodeWav						
GENERIC			Becode way			AudioSpectrogram			
			Mfcc			Tuuroopeenogram			
LOGISTIC							LOGISTIC		
LSTM		RNN	V				25 515 116		
RNN						$\sqrt{}$			
TANH	TanH	Activation	√	_	$\sqrt{}$,			
SIGMOID	100011	170011011		Activation	,	$\sqrt{}$		$\sqrt{}$	
SQUEEZE		,		SQUEEZE	V	,		·	
PAD				SQUEEE	,	$\sqrt{}$			
			MirrorPad						
STRIDEDSLICE						$\sqrt{}$	STRIDED_SLICE		
REDUCTION	√	1	Sum	SUM					
						Mean	MEAN	ReduceM	
			A					ean	
			Asum			Carrina			
			Man			Sqsum			
			Max			Min			
			Duod			Min			
			Prod			L2			
						L2			

TENGINE		Caffe		MXNet	TensorFlow	TF-lite	ONNX	Darkn et
			Logsum		_			
ARGMAX			\checkmark		Logsumexp			
ARGMIN			٧		$\sqrt{}$			
TOPKV2			$\sqrt{}$		V			
MAXIMUM			V		\checkmark		Max	
MINIMUM			V		V .		Max	
ADDN			V	add_n				
SWAPAXIS				add_n				
GRU		V		RNN	√			
	1.1	11.0 1.		KININ				
UPSAMPLE	√	UpSampling			upsample			
SHUFFLECHANN	EL	√	D 1 37 371					
RESIZE	√		ResizeNearestNei ghbor					
			S		ResizeBilinear			
SPACETOBATC		1	\checkmark					
HND					I			
BATCHTOSPACE					V			
CROP	√	√		T POPOTR II				
PSROIPOOLING	1			_contrib_PSROIPooling				
ROIALIGN		_contrib_ROI Align						
EXPANDDIMS					ExpandDims			
UNARY			$\sqrt{}$		1			
				abs	Abs			
		neg	Neg					
				ceil	Ceil			
		floor	Floor					
				sin	Sin			
			Asin					
			7.15111	cos	Cos			
			Acos					
				atan	Atan			
		tan	Tan					
		reciprocal	Reciprocal					
		Issipiodai	- Ittopiooni		Square			
			Sqrt		- q			
			Sqrt		Rsqrt			
			Exp		rogit			
			LAP		Log			
BIAS	√				Lug			
NOOP	,							
THRESHOLD	√							
HARDSIGMOID	V							
EMBEDDING	√	V	$\sqrt{}$					
INSTANCENORM		V	V	\checkmark				
MVN				٧				
1V1 V 1V	√							

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TENGINE		Caffe		MXNet		TensorFlow	TF-lite	ONNX	Darkı et
ABSVAL		√							
CAST		,	\checkmark						
HARDSWISH								$\sqrt{}$	
INTERP	√	UpSampling			Upsample				
SELU									
ELU	√	LeakyReLU		ELU	$\sqrt{}$				
BROADMUL				broadcast_mul					
LOGICAL				LOGICALOR					
							LOGICALAND		
GATHER		1		GATHER	$\sqrt{}$				
TRANSPOSE						$\sqrt{}$	TRANSPOSE	\checkmark	
COMPARISON		1	Equal	EQUAL				•	
001111111111111111111111111111111111111			2 quai	240.12	_	Greater	GREATER		
				GREATER_EQU		Greater	GREATER		
			GreaterEqual	AL					
				71L		Less	LESS		
			LessEqual			Less	EESS		
			LessEquai				LESS_GREATER		
SPACETODEPT				SPACE_TO_DEP			ELSS_GREATER		
H				TH					
DEPTHTOSPACE				111			DEPTH TO SPACE		
REVERSE			ReverseV2	REVERSE_V2		<u> </u>	DEI III_IO_SI ACE		
REVERSE SPARSETODENSE			Reverse v 2	KEVERSE_V2	_	V	SPARSE TO DENSE		
CEIL			V	CEIL		V	SI AKSE_IO_DENSE		
CEIL			V	CEIL			SOLIABED DIEEEDENG		
SQUAREDDIFFER	ENCE					$\sqrt{}$	SQUARED_DIFFERENC E		
ROUND			V	ROUND			E		
ZEROSLIKE			V	KOUND					
	C1:				C1:				
CLIP	Clip	D			Clip				
POWER	T:1-	Power							
TILE	Tile						12 NORMALIZATION		
L2NORMALIZATI	UN			La Bool an			L2_NORMALIZATION		
L2POOL				L2_POOL_2D			DELLI MI TO 1		
RELU1				I OG GODDIA			RELU_N1_TO_1		
LOGSOFTMAX				LOG_SOFTMAX					
FLOOR					,	Floor			
REDUCEL2					$\sqrt{}$,	
UNSQUEEZE								$\sqrt{}$	