Model: "model"

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param # Connected to

==================================================================================================

input\_1 (InputLayer) [(None, 64, 321, 1)] 0 []

conv2d\_2 (Conv2D) (None, 64, 321, 8) 256 ['input\_1[0][0]']

conv2d\_4 (Conv2D) (None, 64, 321, 16) 1024 ['input\_1[0][0]']

batch\_normalization\_3 (Bat (None, 64, 321, 8) 32 ['conv2d\_2[0][0]']

chNormalization)

batch\_normalization\_6 (Bat (None, 64, 321, 16) 64 ['conv2d\_4[0][0]']

chNormalization)

conv2d (Conv2D) (None, 64, 321, 4) 64 ['input\_1[0][0]']

depthwise\_conv2d\_1 (Depthw (None, 1, 321, 16) 1024 ['batch\_normalization\_3[0][0]'

iseConv2D) ]

depthwise\_conv2d\_2 (Depthw (None, 1, 321, 32) 2048 ['batch\_normalization\_6[0][0]'

iseConv2D) ]

batch\_normalization (Batch (None, 64, 321, 4) 16 ['conv2d[0][0]']

Normalization)

batch\_normalization\_4 (Bat (None, 1, 321, 16) 64 ['depthwise\_conv2d\_1[0][0]']

chNormalization)

batch\_normalization\_7 (Bat (None, 1, 321, 32) 128 ['depthwise\_conv2d\_2[0][0]']

chNormalization)

depthwise\_conv2d (Depthwis (None, 1, 321, 8) 512 ['batch\_normalization[0][0]']

eConv2D)

activation\_3 (Activation) (None, 1, 321, 16) 0 ['batch\_normalization\_4[0][0]'

]

activation\_6 (Activation) (None, 1, 321, 32) 0 ['batch\_normalization\_7[0][0]'

]

batch\_normalization\_1 (Bat (None, 1, 321, 8) 32 ['depthwise\_conv2d[0][0]']

chNormalization)

average\_pooling2d\_2 (Avera (None, 1, 80, 16) 0 ['activation\_3[0][0]']

gePooling2D)

average\_pooling2d\_4 (Avera (None, 1, 80, 32) 0 ['activation\_6[0][0]']

gePooling2D)

activation (Activation) (None, 1, 321, 8) 0 ['batch\_normalization\_1[0][0]'

]

dropout (Dropout) (None, 1, 80, 16) 0 ['average\_pooling2d\_2[0][0]']

dropout\_2 (Dropout) (None, 1, 80, 32) 0 ['average\_pooling2d\_4[0][0]']

average\_pooling2d (Average (None, 1, 80, 8) 0 ['activation[0][0]']

Pooling2D)

separable\_conv2d\_1 (Separa (None, 1, 80, 16) 512 ['dropout[0][0]']

bleConv2D)

separable\_conv2d\_2 (Separa (None, 1, 80, 32) 1536 ['dropout\_2[0][0]']

bleConv2D)

separable\_conv2d (Separabl (None, 1, 80, 8) 192 ['average\_pooling2d[0][0]']

eConv2D)

batch\_normalization\_5 (Bat (None, 1, 80, 16) 64 ['separable\_conv2d\_1[0][0]']

chNormalization)

batch\_normalization\_8 (Bat (None, 1, 80, 32) 128 ['separable\_conv2d\_2[0][0]']

chNormalization)

batch\_normalization\_2 (Bat (None, 1, 80, 8) 32 ['separable\_conv2d[0][0]']

chNormalization)

activation\_4 (Activation) (None, 1, 80, 16) 0 ['batch\_normalization\_5[0][0]'

]

activation\_7 (Activation) (None, 1, 80, 32) 0 ['batch\_normalization\_8[0][0]'

]

activation\_1 (Activation) (None, 1, 80, 8) 0 ['batch\_normalization\_2[0][0]'

]

average\_pooling2d\_3 (Avera (None, 1, 10, 16) 0 ['activation\_4[0][0]']

gePooling2D)

average\_pooling2d\_5 (Avera (None, 1, 10, 32) 0 ['activation\_7[0][0]']

gePooling2D)

average\_pooling2d\_1 (Avera (None, 1, 10, 8) 0 ['activation\_1[0][0]']

gePooling2D)

dropout\_1 (Dropout) (None, 1, 10, 16) 0 ['average\_pooling2d\_3[0][0]']

dropout\_3 (Dropout) (None, 1, 10, 32) 0 ['average\_pooling2d\_5[0][0]']

global\_average\_pooling2d ( (None, 8) 0 ['average\_pooling2d\_1[0][0]']

GlobalAveragePooling2D)

global\_max\_pooling2d (Glob (None, 8) 0 ['average\_pooling2d\_1[0][0]']

alMaxPooling2D)

global\_average\_pooling2d\_1 (None, 16) 0 ['dropout\_1[0][0]']

(GlobalAveragePooling2D)

global\_max\_pooling2d\_1 (Gl (None, 16) 0 ['dropout\_1[0][0]']

obalMaxPooling2D)

global\_average\_pooling2d\_2 (None, 32) 0 ['dropout\_3[0][0]']

(GlobalAveragePooling2D)

global\_max\_pooling2d\_2 (Gl (None, 32) 0 ['dropout\_3[0][0]']

obalMaxPooling2D)

dense (Dense) (None, 4) 32 ['global\_average\_pooling2d[0][

0]',

'global\_max\_pooling2d[0][0]']

dense\_2 (Dense) (None, 2) 32 ['global\_average\_pooling2d\_1[0

][0]',

'global\_max\_pooling2d\_1[0][0]

']

dense\_4 (Dense) (None, 4) 128 ['global\_average\_pooling2d\_2[0

][0]',

'global\_max\_pooling2d\_2[0][0]

']

dense\_1 (Dense) (None, 8) 32 ['dense[0][0]',

'dense[1][0]']

dense\_3 (Dense) (None, 16) 32 ['dense\_2[0][0]',

'dense\_2[1][0]']

dense\_5 (Dense) (None, 32) 128 ['dense\_4[0][0]',

'dense\_4[1][0]']

tf.\_\_operators\_\_.add (TFOp (None, 8) 0 ['dense\_1[0][0]',

Lambda) 'dense\_1[1][0]']

tf.\_\_operators\_\_.add\_1 (TF (None, 16) 0 ['dense\_3[0][0]',

OpLambda) 'dense\_3[1][0]']

tf.\_\_operators\_\_.add\_2 (TF (None, 32) 0 ['dense\_5[0][0]',

OpLambda) 'dense\_5[1][0]']

activation\_2 (Activation) (None, 8) 0 ['tf.\_\_operators\_\_.add[0][0]']

activation\_5 (Activation) (None, 16) 0 ['tf.\_\_operators\_\_.add\_1[0][0]

']

activation\_8 (Activation) (None, 32) 0 ['tf.\_\_operators\_\_.add\_2[0][0]

']

multiply (Multiply) (None, 1, 10, 8) 0 ['average\_pooling2d\_1[0][0]',

'activation\_2[0][0]']

multiply\_2 (Multiply) (None, 1, 10, 16) 0 ['dropout\_1[0][0]',

'activation\_5[0][0]']

multiply\_4 (Multiply) (None, 1, 10, 32) 0 ['dropout\_3[0][0]',

'activation\_8[0][0]']

tf.math.reduce\_mean (TFOpL (None, 1, 10) 0 ['multiply[0][0]']

ambda)

tf.math.reduce\_max (TFOpLa (None, 1, 10) 0 ['multiply[0][0]']

mbda)

tf.math.reduce\_mean\_1 (TFO (None, 1, 10) 0 ['multiply\_2[0][0]']

pLambda)

tf.math.reduce\_max\_1 (TFOp (None, 1, 10) 0 ['multiply\_2[0][0]']

Lambda)

tf.math.reduce\_mean\_2 (TFO (None, 1, 10) 0 ['multiply\_4[0][0]']

pLambda)

tf.math.reduce\_max\_2 (TFOp (None, 1, 10) 0 ['multiply\_4[0][0]']

Lambda)

tf.expand\_dims (TFOpLambda (None, 1, 10, 1) 0 ['tf.math.reduce\_mean[0][0]']

)

tf.expand\_dims\_1 (TFOpLamb (None, 1, 10, 1) 0 ['tf.math.reduce\_max[0][0]']

da)

tf.expand\_dims\_2 (TFOpLamb (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_1[0][0]'

da) ]

tf.expand\_dims\_3 (TFOpLamb (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_1[0][0]']

da)

tf.expand\_dims\_4 (TFOpLamb (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_2[0][0]'

da) ]

tf.expand\_dims\_5 (TFOpLamb (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_2[0][0]']

da)

concatenate (Concatenate) (None, 1, 10, 2) 0 ['tf.expand\_dims[0][0]',

'tf.expand\_dims\_1[0][0]']

concatenate\_1 (Concatenate (None, 1, 10, 2) 0 ['tf.expand\_dims\_2[0][0]',

) 'tf.expand\_dims\_3[0][0]']

concatenate\_2 (Concatenate (None, 1, 10, 2) 0 ['tf.expand\_dims\_4[0][0]',

) 'tf.expand\_dims\_5[0][0]']

conv2d\_1 (Conv2D) (None, 1, 10, 1) 9 ['concatenate[0][0]']

conv2d\_3 (Conv2D) (None, 1, 10, 1) 33 ['concatenate\_1[0][0]']

conv2d\_5 (Conv2D) (None, 1, 10, 1) 9 ['concatenate\_2[0][0]']

multiply\_1 (Multiply) (None, 1, 10, 8) 0 ['multiply[0][0]',

'conv2d\_1[0][0]']

multiply\_3 (Multiply) (None, 1, 10, 16) 0 ['multiply\_2[0][0]',

'conv2d\_3[0][0]']

multiply\_5 (Multiply) (None, 1, 10, 32) 0 ['multiply\_4[0][0]',

'conv2d\_5[0][0]']

flatten (Flatten) (None, 80) 0 ['multiply\_1[0][0]']

flatten\_1 (Flatten) (None, 160) 0 ['multiply\_3[0][0]']

flatten\_2 (Flatten) (None, 320) 0 ['multiply\_5[0][0]']

concatenate\_3 (Concatenate (None, 560) 0 ['flatten[0][0]',

) 'flatten\_1[0][0]',

'flatten\_2[0][0]']

dense\_6 (Dense) (None, 4) 2244 ['concatenate\_3[0][0]']

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Total params: 10407 (40.65 KB)

Trainable params: 10127 (39.56 KB)

Non-trainable params: 280 (1.09 KB)

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Epoch 1/10

353/353 - 62s - loss: 1.2004 - accuracy: 0.4724 - val\_loss: 1.1316 - val\_accuracy: 0.5571 - 62s/epoch - 176ms/step

Epoch 2/10

353/353 - 58s - loss: 1.1037 - accuracy: 0.5417 - val\_loss: 1.0950 - val\_accuracy: 0.5450 - 58s/epoch - 163ms/step

Epoch 3/10

353/353 - 57s - loss: 1.0668 - accuracy: 0.5649 - val\_loss: 1.0526 - val\_accuracy: 0.5663 - 57s/epoch - 162ms/step

Epoch 4/10

353/353 - 58s - loss: 1.0436 - accuracy: 0.5791 - val\_loss: 1.0370 - val\_accuracy: 0.5790 - 58s/epoch - 163ms/step

Epoch 5/10

353/353 - 57s - loss: 1.0306 - accuracy: 0.5914 - val\_loss: 1.0423 - val\_accuracy: 0.5826 - 57s/epoch - 161ms/step

Epoch 6/10

353/353 - 57s - loss: 1.0157 - accuracy: 0.5924 - val\_loss: 1.0245 - val\_accuracy: 0.5889 - 57s/epoch - 162ms/step

Epoch 7/10

353/353 - 57s - loss: 1.0046 - accuracy: 0.6002 - val\_loss: 1.0146 - val\_accuracy: 0.5918 - 57s/epoch - 163ms/step

Epoch 8/10

353/353 - 57s - loss: 1.0032 - accuracy: 0.5912 - val\_loss: 1.0352 - val\_accuracy: 0.5755 - 57s/epoch - 163ms/step

Epoch 9/10

353/353 - 58s - loss: 0.9939 - accuracy: 0.6027 - val\_loss: 1.0155 - val\_accuracy: 0.5847 - 58s/epoch - 163ms/step

Epoch 10/10

353/353 - 57s - loss: 0.9811 - accuracy: 0.6110 - val\_loss: 1.0188 - val\_accuracy: 0.5882 - 57s/epoch - 161ms/step

56/56 - 2s - loss: 0.9800 - accuracy: 0.6100 - 2s/epoch - 39ms/step

Test loss: 0.9799805283546448

Test accuracy: 0.6099773049354553

56/56 [==============================] - 3s 41ms/step

Model: "model\_1"

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param # Connected to

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input\_2 (InputLayer) [(None, 64, 321, 1)] 0 []

conv2d\_8 (Conv2D) (None, 64, 321, 8) 256 ['input\_2[0][0]']

conv2d\_10 (Conv2D) (None, 64, 321, 16) 1024 ['input\_2[0][0]']

batch\_normalization\_12 (Ba (None, 64, 321, 8) 32 ['conv2d\_8[0][0]']

tchNormalization)

batch\_normalization\_15 (Ba (None, 64, 321, 16) 64 ['conv2d\_10[0][0]']

tchNormalization)

conv2d\_6 (Conv2D) (None, 64, 321, 4) 64 ['input\_2[0][0]']

depthwise\_conv2d\_4 (Depthw (None, 1, 321, 16) 1024 ['batch\_normalization\_12[0][0]

iseConv2D) ']

depthwise\_conv2d\_5 (Depthw (None, 1, 321, 32) 2048 ['batch\_normalization\_15[0][0]

iseConv2D) ']

batch\_normalization\_9 (Bat (None, 64, 321, 4) 16 ['conv2d\_6[0][0]']

chNormalization)

batch\_normalization\_13 (Ba (None, 1, 321, 16) 64 ['depthwise\_conv2d\_4[0][0]']

tchNormalization)

batch\_normalization\_16 (Ba (None, 1, 321, 32) 128 ['depthwise\_conv2d\_5[0][0]']

tchNormalization)

depthwise\_conv2d\_3 (Depthw (None, 1, 321, 8) 512 ['batch\_normalization\_9[0][0]'

iseConv2D) ]

activation\_12 (Activation) (None, 1, 321, 16) 0 ['batch\_normalization\_13[0][0]

']

activation\_15 (Activation) (None, 1, 321, 32) 0 ['batch\_normalization\_16[0][0]

']

batch\_normalization\_10 (Ba (None, 1, 321, 8) 32 ['depthwise\_conv2d\_3[0][0]']

tchNormalization)

average\_pooling2d\_8 (Avera (None, 1, 80, 16) 0 ['activation\_12[0][0]']

gePooling2D)

average\_pooling2d\_10 (Aver (None, 1, 80, 32) 0 ['activation\_15[0][0]']

agePooling2D)

activation\_9 (Activation) (None, 1, 321, 8) 0 ['batch\_normalization\_10[0][0]

']

dropout\_4 (Dropout) (None, 1, 80, 16) 0 ['average\_pooling2d\_8[0][0]']

dropout\_6 (Dropout) (None, 1, 80, 32) 0 ['average\_pooling2d\_10[0][0]']

average\_pooling2d\_6 (Avera (None, 1, 80, 8) 0 ['activation\_9[0][0]']

gePooling2D)

separable\_conv2d\_4 (Separa (None, 1, 80, 16) 512 ['dropout\_4[0][0]']

bleConv2D)

separable\_conv2d\_5 (Separa (None, 1, 80, 32) 1536 ['dropout\_6[0][0]']

bleConv2D)

separable\_conv2d\_3 (Separa (None, 1, 80, 8) 192 ['average\_pooling2d\_6[0][0]']

bleConv2D)

batch\_normalization\_14 (Ba (None, 1, 80, 16) 64 ['separable\_conv2d\_4[0][0]']

tchNormalization)

batch\_normalization\_17 (Ba (None, 1, 80, 32) 128 ['separable\_conv2d\_5[0][0]']

tchNormalization)

batch\_normalization\_11 (Ba (None, 1, 80, 8) 32 ['separable\_conv2d\_3[0][0]']

tchNormalization)

activation\_13 (Activation) (None, 1, 80, 16) 0 ['batch\_normalization\_14[0][0]

']

activation\_16 (Activation) (None, 1, 80, 32) 0 ['batch\_normalization\_17[0][0]

']

activation\_10 (Activation) (None, 1, 80, 8) 0 ['batch\_normalization\_11[0][0]

']

average\_pooling2d\_9 (Avera (None, 1, 10, 16) 0 ['activation\_13[0][0]']

gePooling2D)

average\_pooling2d\_11 (Aver (None, 1, 10, 32) 0 ['activation\_16[0][0]']

agePooling2D)

average\_pooling2d\_7 (Avera (None, 1, 10, 8) 0 ['activation\_10[0][0]']

gePooling2D)

dropout\_5 (Dropout) (None, 1, 10, 16) 0 ['average\_pooling2d\_9[0][0]']

dropout\_7 (Dropout) (None, 1, 10, 32) 0 ['average\_pooling2d\_11[0][0]']

global\_average\_pooling2d\_3 (None, 8) 0 ['average\_pooling2d\_7[0][0]']

(GlobalAveragePooling2D)

global\_max\_pooling2d\_3 (Gl (None, 8) 0 ['average\_pooling2d\_7[0][0]']

obalMaxPooling2D)

global\_average\_pooling2d\_4 (None, 16) 0 ['dropout\_5[0][0]']

(GlobalAveragePooling2D)

global\_max\_pooling2d\_4 (Gl (None, 16) 0 ['dropout\_5[0][0]']

obalMaxPooling2D)

global\_average\_pooling2d\_5 (None, 32) 0 ['dropout\_7[0][0]']

(GlobalAveragePooling2D)

global\_max\_pooling2d\_5 (Gl (None, 32) 0 ['dropout\_7[0][0]']

obalMaxPooling2D)

dense\_7 (Dense) (None, 4) 32 ['global\_average\_pooling2d\_3[0

][0]',

'global\_max\_pooling2d\_3[0][0]

']

dense\_9 (Dense) (None, 2) 32 ['global\_average\_pooling2d\_4[0

][0]',

'global\_max\_pooling2d\_4[0][0]

']

dense\_11 (Dense) (None, 4) 128 ['global\_average\_pooling2d\_5[0

][0]',

'global\_max\_pooling2d\_5[0][0]

']

dense\_8 (Dense) (None, 8) 32 ['dense\_7[0][0]',

'dense\_7[1][0]']

dense\_10 (Dense) (None, 16) 32 ['dense\_9[0][0]',

'dense\_9[1][0]']

dense\_12 (Dense) (None, 32) 128 ['dense\_11[0][0]',

'dense\_11[1][0]']

tf.\_\_operators\_\_.add\_3 (TF (None, 8) 0 ['dense\_8[0][0]',

OpLambda) 'dense\_8[1][0]']

tf.\_\_operators\_\_.add\_4 (TF (None, 16) 0 ['dense\_10[0][0]',

OpLambda) 'dense\_10[1][0]']

tf.\_\_operators\_\_.add\_5 (TF (None, 32) 0 ['dense\_12[0][0]',

OpLambda) 'dense\_12[1][0]']

activation\_11 (Activation) (None, 8) 0 ['tf.\_\_operators\_\_.add\_3[0][0]

']

activation\_14 (Activation) (None, 16) 0 ['tf.\_\_operators\_\_.add\_4[0][0]

']

activation\_17 (Activation) (None, 32) 0 ['tf.\_\_operators\_\_.add\_5[0][0]

']

multiply\_6 (Multiply) (None, 1, 10, 8) 0 ['average\_pooling2d\_7[0][0]',

'activation\_11[0][0]']

multiply\_8 (Multiply) (None, 1, 10, 16) 0 ['dropout\_5[0][0]',

'activation\_14[0][0]']

multiply\_10 (Multiply) (None, 1, 10, 32) 0 ['dropout\_7[0][0]',

'activation\_17[0][0]']

tf.math.reduce\_mean\_3 (TFO (None, 1, 10) 0 ['multiply\_6[0][0]']

pLambda)

tf.math.reduce\_max\_3 (TFOp (None, 1, 10) 0 ['multiply\_6[0][0]']

Lambda)

tf.math.reduce\_mean\_4 (TFO (None, 1, 10) 0 ['multiply\_8[0][0]']

pLambda)

tf.math.reduce\_max\_4 (TFOp (None, 1, 10) 0 ['multiply\_8[0][0]']

Lambda)

tf.math.reduce\_mean\_5 (TFO (None, 1, 10) 0 ['multiply\_10[0][0]']

pLambda)

tf.math.reduce\_max\_5 (TFOp (None, 1, 10) 0 ['multiply\_10[0][0]']

Lambda)

tf.expand\_dims\_6 (TFOpLamb (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_3[0][0]'

da) ]

tf.expand\_dims\_7 (TFOpLamb (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_3[0][0]']

da)

tf.expand\_dims\_8 (TFOpLamb (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_4[0][0]'

da) ]

tf.expand\_dims\_9 (TFOpLamb (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_4[0][0]']

da)

tf.expand\_dims\_10 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_5[0][0]'

bda) ]

tf.expand\_dims\_11 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_5[0][0]']

bda)

concatenate\_4 (Concatenate (None, 1, 10, 2) 0 ['tf.expand\_dims\_6[0][0]',

) 'tf.expand\_dims\_7[0][0]']

concatenate\_5 (Concatenate (None, 1, 10, 2) 0 ['tf.expand\_dims\_8[0][0]',

) 'tf.expand\_dims\_9[0][0]']

concatenate\_6 (Concatenate (None, 1, 10, 2) 0 ['tf.expand\_dims\_10[0][0]',

) 'tf.expand\_dims\_11[0][0]']

conv2d\_7 (Conv2D) (None, 1, 10, 1) 9 ['concatenate\_4[0][0]']

conv2d\_9 (Conv2D) (None, 1, 10, 1) 33 ['concatenate\_5[0][0]']

conv2d\_11 (Conv2D) (None, 1, 10, 1) 9 ['concatenate\_6[0][0]']

multiply\_7 (Multiply) (None, 1, 10, 8) 0 ['multiply\_6[0][0]',

'conv2d\_7[0][0]']

multiply\_9 (Multiply) (None, 1, 10, 16) 0 ['multiply\_8[0][0]',

'conv2d\_9[0][0]']

multiply\_11 (Multiply) (None, 1, 10, 32) 0 ['multiply\_10[0][0]',

'conv2d\_11[0][0]']

flatten\_3 (Flatten) (None, 80) 0 ['multiply\_7[0][0]']

flatten\_4 (Flatten) (None, 160) 0 ['multiply\_9[0][0]']

flatten\_5 (Flatten) (None, 320) 0 ['multiply\_11[0][0]']

concatenate\_7 (Concatenate (None, 560) 0 ['flatten\_3[0][0]',

) 'flatten\_4[0][0]',

'flatten\_5[0][0]']

dense\_13 (Dense) (None, 4) 2244 ['concatenate\_7[0][0]']

==================================================================================================

Total params: 10407 (40.65 KB)

Trainable params: 10127 (39.56 KB)

Non-trainable params: 280 (1.09 KB)

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Epoch 1/10

353/353 - 61s - loss: 1.2057 - accuracy: 0.4756 - val\_loss: 1.1549 - val\_accuracy: 0.5365 - 61s/epoch - 173ms/step

Epoch 2/10

353/353 - 57s - loss: 1.0975 - accuracy: 0.5486 - val\_loss: 1.0962 - val\_accuracy: 0.5386 - 57s/epoch - 163ms/step

Epoch 3/10

353/353 - 57s - loss: 1.0608 - accuracy: 0.5632 - val\_loss: 1.0502 - val\_accuracy: 0.5833 - 57s/epoch - 163ms/step

Epoch 4/10

353/353 - 58s - loss: 1.0388 - accuracy: 0.5793 - val\_loss: 1.0323 - val\_accuracy: 0.5769 - 58s/epoch - 165ms/step

Epoch 5/10

353/353 - 58s - loss: 1.0243 - accuracy: 0.5844 - val\_loss: 1.0528 - val\_accuracy: 0.5670 - 58s/epoch - 163ms/step

Epoch 6/10

353/353 - 57s - loss: 1.0089 - accuracy: 0.5924 - val\_loss: 1.0299 - val\_accuracy: 0.5663 - 57s/epoch - 163ms/step

Epoch 7/10

353/353 - 58s - loss: 0.9967 - accuracy: 0.5991 - val\_loss: 1.0025 - val\_accuracy: 0.5939 - 58s/epoch - 163ms/step

Epoch 8/10

353/353 - 57s - loss: 0.9776 - accuracy: 0.6116 - val\_loss: 1.0058 - val\_accuracy: 0.5974 - 57s/epoch - 162ms/step

Epoch 9/10

353/353 - 58s - loss: 0.9680 - accuracy: 0.6052 - val\_loss: 0.9941 - val\_accuracy: 0.6010 - 58s/epoch - 163ms/step

Epoch 10/10

353/353 - 58s - loss: 0.9647 - accuracy: 0.6128 - val\_loss: 0.9978 - val\_accuracy: 0.5996 - 58s/epoch - 163ms/step

56/56 - 2s - loss: 1.0419 - accuracy: 0.5635 - 2s/epoch - 40ms/step

Test loss: 1.0419445037841797

Test accuracy: 0.5634920597076416

56/56 [==============================] - 3s 42ms/step

Model: "model\_2"

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param # Connected to

==================================================================================================

input\_3 (InputLayer) [(None, 64, 321, 1)] 0 []

conv2d\_14 (Conv2D) (None, 64, 321, 8) 256 ['input\_3[0][0]']

conv2d\_16 (Conv2D) (None, 64, 321, 16) 1024 ['input\_3[0][0]']

batch\_normalization\_21 (Ba (None, 64, 321, 8) 32 ['conv2d\_14[0][0]']

tchNormalization)

batch\_normalization\_24 (Ba (None, 64, 321, 16) 64 ['conv2d\_16[0][0]']

tchNormalization)

conv2d\_12 (Conv2D) (None, 64, 321, 4) 64 ['input\_3[0][0]']

depthwise\_conv2d\_7 (Depthw (None, 1, 321, 16) 1024 ['batch\_normalization\_21[0][0]

iseConv2D) ']

depthwise\_conv2d\_8 (Depthw (None, 1, 321, 32) 2048 ['batch\_normalization\_24[0][0]

iseConv2D) ']

batch\_normalization\_18 (Ba (None, 64, 321, 4) 16 ['conv2d\_12[0][0]']

tchNormalization)

batch\_normalization\_22 (Ba (None, 1, 321, 16) 64 ['depthwise\_conv2d\_7[0][0]']

tchNormalization)

batch\_normalization\_25 (Ba (None, 1, 321, 32) 128 ['depthwise\_conv2d\_8[0][0]']

tchNormalization)

depthwise\_conv2d\_6 (Depthw (None, 1, 321, 8) 512 ['batch\_normalization\_18[0][0]

iseConv2D) ']

activation\_21 (Activation) (None, 1, 321, 16) 0 ['batch\_normalization\_22[0][0]

']

activation\_24 (Activation) (None, 1, 321, 32) 0 ['batch\_normalization\_25[0][0]

']

batch\_normalization\_19 (Ba (None, 1, 321, 8) 32 ['depthwise\_conv2d\_6[0][0]']

tchNormalization)

average\_pooling2d\_14 (Aver (None, 1, 80, 16) 0 ['activation\_21[0][0]']

agePooling2D)

average\_pooling2d\_16 (Aver (None, 1, 80, 32) 0 ['activation\_24[0][0]']

agePooling2D)

activation\_18 (Activation) (None, 1, 321, 8) 0 ['batch\_normalization\_19[0][0]

']

dropout\_8 (Dropout) (None, 1, 80, 16) 0 ['average\_pooling2d\_14[0][0]']

dropout\_10 (Dropout) (None, 1, 80, 32) 0 ['average\_pooling2d\_16[0][0]']

average\_pooling2d\_12 (Aver (None, 1, 80, 8) 0 ['activation\_18[0][0]']

agePooling2D)

separable\_conv2d\_7 (Separa (None, 1, 80, 16) 512 ['dropout\_8[0][0]']

bleConv2D)

separable\_conv2d\_8 (Separa (None, 1, 80, 32) 1536 ['dropout\_10[0][0]']

bleConv2D)

separable\_conv2d\_6 (Separa (None, 1, 80, 8) 192 ['average\_pooling2d\_12[0][0]']

bleConv2D)

batch\_normalization\_23 (Ba (None, 1, 80, 16) 64 ['separable\_conv2d\_7[0][0]']

tchNormalization)

batch\_normalization\_26 (Ba (None, 1, 80, 32) 128 ['separable\_conv2d\_8[0][0]']

tchNormalization)

batch\_normalization\_20 (Ba (None, 1, 80, 8) 32 ['separable\_conv2d\_6[0][0]']

tchNormalization)

activation\_22 (Activation) (None, 1, 80, 16) 0 ['batch\_normalization\_23[0][0]

']

activation\_25 (Activation) (None, 1, 80, 32) 0 ['batch\_normalization\_26[0][0]

']

activation\_19 (Activation) (None, 1, 80, 8) 0 ['batch\_normalization\_20[0][0]

']

average\_pooling2d\_15 (Aver (None, 1, 10, 16) 0 ['activation\_22[0][0]']

agePooling2D)

average\_pooling2d\_17 (Aver (None, 1, 10, 32) 0 ['activation\_25[0][0]']

agePooling2D)

average\_pooling2d\_13 (Aver (None, 1, 10, 8) 0 ['activation\_19[0][0]']

agePooling2D)

dropout\_9 (Dropout) (None, 1, 10, 16) 0 ['average\_pooling2d\_15[0][0]']

dropout\_11 (Dropout) (None, 1, 10, 32) 0 ['average\_pooling2d\_17[0][0]']

global\_average\_pooling2d\_6 (None, 8) 0 ['average\_pooling2d\_13[0][0]']

(GlobalAveragePooling2D)

global\_max\_pooling2d\_6 (Gl (None, 8) 0 ['average\_pooling2d\_13[0][0]']

obalMaxPooling2D)

global\_average\_pooling2d\_7 (None, 16) 0 ['dropout\_9[0][0]']

(GlobalAveragePooling2D)

global\_max\_pooling2d\_7 (Gl (None, 16) 0 ['dropout\_9[0][0]']

obalMaxPooling2D)

global\_average\_pooling2d\_8 (None, 32) 0 ['dropout\_11[0][0]']

(GlobalAveragePooling2D)

global\_max\_pooling2d\_8 (Gl (None, 32) 0 ['dropout\_11[0][0]']

obalMaxPooling2D)

dense\_14 (Dense) (None, 4) 32 ['global\_average\_pooling2d\_6[0

][0]',

'global\_max\_pooling2d\_6[0][0]

']

dense\_16 (Dense) (None, 2) 32 ['global\_average\_pooling2d\_7[0

][0]',

'global\_max\_pooling2d\_7[0][0]

']

dense\_18 (Dense) (None, 4) 128 ['global\_average\_pooling2d\_8[0

][0]',

'global\_max\_pooling2d\_8[0][0]

']

dense\_15 (Dense) (None, 8) 32 ['dense\_14[0][0]',

'dense\_14[1][0]']

dense\_17 (Dense) (None, 16) 32 ['dense\_16[0][0]',

'dense\_16[1][0]']

dense\_19 (Dense) (None, 32) 128 ['dense\_18[0][0]',

'dense\_18[1][0]']

tf.\_\_operators\_\_.add\_6 (TF (None, 8) 0 ['dense\_15[0][0]',

OpLambda) 'dense\_15[1][0]']

tf.\_\_operators\_\_.add\_7 (TF (None, 16) 0 ['dense\_17[0][0]',

OpLambda) 'dense\_17[1][0]']

tf.\_\_operators\_\_.add\_8 (TF (None, 32) 0 ['dense\_19[0][0]',

OpLambda) 'dense\_19[1][0]']

activation\_20 (Activation) (None, 8) 0 ['tf.\_\_operators\_\_.add\_6[0][0]

']

activation\_23 (Activation) (None, 16) 0 ['tf.\_\_operators\_\_.add\_7[0][0]

']

activation\_26 (Activation) (None, 32) 0 ['tf.\_\_operators\_\_.add\_8[0][0]

']

multiply\_12 (Multiply) (None, 1, 10, 8) 0 ['average\_pooling2d\_13[0][0]',

'activation\_20[0][0]']

multiply\_14 (Multiply) (None, 1, 10, 16) 0 ['dropout\_9[0][0]',

'activation\_23[0][0]']

multiply\_16 (Multiply) (None, 1, 10, 32) 0 ['dropout\_11[0][0]',

'activation\_26[0][0]']

tf.math.reduce\_mean\_6 (TFO (None, 1, 10) 0 ['multiply\_12[0][0]']

pLambda)

tf.math.reduce\_max\_6 (TFOp (None, 1, 10) 0 ['multiply\_12[0][0]']

Lambda)

tf.math.reduce\_mean\_7 (TFO (None, 1, 10) 0 ['multiply\_14[0][0]']

pLambda)

tf.math.reduce\_max\_7 (TFOp (None, 1, 10) 0 ['multiply\_14[0][0]']

Lambda)

tf.math.reduce\_mean\_8 (TFO (None, 1, 10) 0 ['multiply\_16[0][0]']

pLambda)

tf.math.reduce\_max\_8 (TFOp (None, 1, 10) 0 ['multiply\_16[0][0]']

Lambda)

tf.expand\_dims\_12 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_6[0][0]'

bda) ]

tf.expand\_dims\_13 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_6[0][0]']

bda)

tf.expand\_dims\_14 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_7[0][0]'

bda) ]

tf.expand\_dims\_15 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_7[0][0]']

bda)

tf.expand\_dims\_16 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_8[0][0]'

bda) ]

tf.expand\_dims\_17 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_8[0][0]']

bda)

concatenate\_8 (Concatenate (None, 1, 10, 2) 0 ['tf.expand\_dims\_12[0][0]',

) 'tf.expand\_dims\_13[0][0]']

concatenate\_9 (Concatenate (None, 1, 10, 2) 0 ['tf.expand\_dims\_14[0][0]',

) 'tf.expand\_dims\_15[0][0]']

concatenate\_10 (Concatenat (None, 1, 10, 2) 0 ['tf.expand\_dims\_16[0][0]',

e) 'tf.expand\_dims\_17[0][0]']

conv2d\_13 (Conv2D) (None, 1, 10, 1) 9 ['concatenate\_8[0][0]']

conv2d\_15 (Conv2D) (None, 1, 10, 1) 33 ['concatenate\_9[0][0]']

conv2d\_17 (Conv2D) (None, 1, 10, 1) 9 ['concatenate\_10[0][0]']

multiply\_13 (Multiply) (None, 1, 10, 8) 0 ['multiply\_12[0][0]',

'conv2d\_13[0][0]']

multiply\_15 (Multiply) (None, 1, 10, 16) 0 ['multiply\_14[0][0]',

'conv2d\_15[0][0]']

multiply\_17 (Multiply) (None, 1, 10, 32) 0 ['multiply\_16[0][0]',

'conv2d\_17[0][0]']

flatten\_6 (Flatten) (None, 80) 0 ['multiply\_13[0][0]']

flatten\_7 (Flatten) (None, 160) 0 ['multiply\_15[0][0]']

flatten\_8 (Flatten) (None, 320) 0 ['multiply\_17[0][0]']

concatenate\_11 (Concatenat (None, 560) 0 ['flatten\_6[0][0]',

e) 'flatten\_7[0][0]',

'flatten\_8[0][0]']

dense\_20 (Dense) (None, 4) 2244 ['concatenate\_11[0][0]']

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Total params: 10407 (40.65 KB)

Trainable params: 10127 (39.56 KB)

Non-trainable params: 280 (1.09 KB)

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Epoch 1/10

353/353 - 61s - loss: 1.2115 - accuracy: 0.4670 - val\_loss: 1.1701 - val\_accuracy: 0.5060 - 61s/epoch - 173ms/step

Epoch 2/10

353/353 - 57s - loss: 1.1160 - accuracy: 0.5380 - val\_loss: 1.0977 - val\_accuracy: 0.5571 - 57s/epoch - 162ms/step

Epoch 3/10

353/353 - 57s - loss: 1.0884 - accuracy: 0.5557 - val\_loss: 1.0763 - val\_accuracy: 0.5592 - 57s/epoch - 162ms/step

Epoch 4/10

353/353 - 58s - loss: 1.0582 - accuracy: 0.5642 - val\_loss: 1.0675 - val\_accuracy: 0.5705 - 58s/epoch - 163ms/step

Epoch 5/10

353/353 - 57s - loss: 1.0407 - accuracy: 0.5805 - val\_loss: 1.0438 - val\_accuracy: 0.5648 - 57s/epoch - 162ms/step

Epoch 6/10

353/353 - 57s - loss: 1.0225 - accuracy: 0.5903 - val\_loss: 1.0425 - val\_accuracy: 0.5776 - 57s/epoch - 162ms/step

Epoch 7/10

353/353 - 57s - loss: 1.0198 - accuracy: 0.5929 - val\_loss: 1.0504 - val\_accuracy: 0.5726 - 57s/epoch - 162ms/step

Epoch 8/10

353/353 - 57s - loss: 1.0047 - accuracy: 0.5976 - val\_loss: 1.0290 - val\_accuracy: 0.5769 - 57s/epoch - 162ms/step

Epoch 9/10

353/353 - 57s - loss: 0.9915 - accuracy: 0.6039 - val\_loss: 1.0595 - val\_accuracy: 0.5606 - 57s/epoch - 162ms/step

Epoch 10/10

353/353 - 57s - loss: 0.9901 - accuracy: 0.6004 - val\_loss: 1.0355 - val\_accuracy: 0.5726 - 57s/epoch - 163ms/step

56/56 - 2s - loss: 0.9586 - accuracy: 0.6185 - 2s/epoch - 41ms/step

Test loss: 0.9586448669433594

Test accuracy: 0.6184807419776917

56/56 [==============================] - 3s 41ms/step

Model: "model\_3"

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Layer (type) Output Shape Param # Connected to

==================================================================================================

input\_4 (InputLayer) [(None, 64, 321, 1)] 0 []

conv2d\_20 (Conv2D) (None, 64, 321, 8) 256 ['input\_4[0][0]']

conv2d\_22 (Conv2D) (None, 64, 321, 16) 1024 ['input\_4[0][0]']

batch\_normalization\_30 (Ba (None, 64, 321, 8) 32 ['conv2d\_20[0][0]']

tchNormalization)

batch\_normalization\_33 (Ba (None, 64, 321, 16) 64 ['conv2d\_22[0][0]']

tchNormalization)

conv2d\_18 (Conv2D) (None, 64, 321, 4) 64 ['input\_4[0][0]']

depthwise\_conv2d\_10 (Depth (None, 1, 321, 16) 1024 ['batch\_normalization\_30[0][0]

wiseConv2D) ']

depthwise\_conv2d\_11 (Depth (None, 1, 321, 32) 2048 ['batch\_normalization\_33[0][0]

wiseConv2D) ']

batch\_normalization\_27 (Ba (None, 64, 321, 4) 16 ['conv2d\_18[0][0]']

tchNormalization)

batch\_normalization\_31 (Ba (None, 1, 321, 16) 64 ['depthwise\_conv2d\_10[0][0]']

tchNormalization)

batch\_normalization\_34 (Ba (None, 1, 321, 32) 128 ['depthwise\_conv2d\_11[0][0]']

tchNormalization)

depthwise\_conv2d\_9 (Depthw (None, 1, 321, 8) 512 ['batch\_normalization\_27[0][0]

iseConv2D) ']

activation\_30 (Activation) (None, 1, 321, 16) 0 ['batch\_normalization\_31[0][0]

']

activation\_33 (Activation) (None, 1, 321, 32) 0 ['batch\_normalization\_34[0][0]

']

batch\_normalization\_28 (Ba (None, 1, 321, 8) 32 ['depthwise\_conv2d\_9[0][0]']

tchNormalization)

average\_pooling2d\_20 (Aver (None, 1, 80, 16) 0 ['activation\_30[0][0]']

agePooling2D)

average\_pooling2d\_22 (Aver (None, 1, 80, 32) 0 ['activation\_33[0][0]']

agePooling2D)

activation\_27 (Activation) (None, 1, 321, 8) 0 ['batch\_normalization\_28[0][0]

']

dropout\_12 (Dropout) (None, 1, 80, 16) 0 ['average\_pooling2d\_20[0][0]']

dropout\_14 (Dropout) (None, 1, 80, 32) 0 ['average\_pooling2d\_22[0][0]']

average\_pooling2d\_18 (Aver (None, 1, 80, 8) 0 ['activation\_27[0][0]']

agePooling2D)

separable\_conv2d\_10 (Separ (None, 1, 80, 16) 512 ['dropout\_12[0][0]']

ableConv2D)

separable\_conv2d\_11 (Separ (None, 1, 80, 32) 1536 ['dropout\_14[0][0]']

ableConv2D)

separable\_conv2d\_9 (Separa (None, 1, 80, 8) 192 ['average\_pooling2d\_18[0][0]']

bleConv2D)

batch\_normalization\_32 (Ba (None, 1, 80, 16) 64 ['separable\_conv2d\_10[0][0]']

tchNormalization)

batch\_normalization\_35 (Ba (None, 1, 80, 32) 128 ['separable\_conv2d\_11[0][0]']

tchNormalization)

batch\_normalization\_29 (Ba (None, 1, 80, 8) 32 ['separable\_conv2d\_9[0][0]']

tchNormalization)

activation\_31 (Activation) (None, 1, 80, 16) 0 ['batch\_normalization\_32[0][0]

']

activation\_34 (Activation) (None, 1, 80, 32) 0 ['batch\_normalization\_35[0][0]

']

activation\_28 (Activation) (None, 1, 80, 8) 0 ['batch\_normalization\_29[0][0]

']

average\_pooling2d\_21 (Aver (None, 1, 10, 16) 0 ['activation\_31[0][0]']

agePooling2D)

average\_pooling2d\_23 (Aver (None, 1, 10, 32) 0 ['activation\_34[0][0]']

agePooling2D)

average\_pooling2d\_19 (Aver (None, 1, 10, 8) 0 ['activation\_28[0][0]']

agePooling2D)

dropout\_13 (Dropout) (None, 1, 10, 16) 0 ['average\_pooling2d\_21[0][0]']

dropout\_15 (Dropout) (None, 1, 10, 32) 0 ['average\_pooling2d\_23[0][0]']

global\_average\_pooling2d\_9 (None, 8) 0 ['average\_pooling2d\_19[0][0]']

(GlobalAveragePooling2D)

global\_max\_pooling2d\_9 (Gl (None, 8) 0 ['average\_pooling2d\_19[0][0]']

obalMaxPooling2D)

global\_average\_pooling2d\_1 (None, 16) 0 ['dropout\_13[0][0]']

0 (GlobalAveragePooling2D)

global\_max\_pooling2d\_10 (G (None, 16) 0 ['dropout\_13[0][0]']

lobalMaxPooling2D)

global\_average\_pooling2d\_1 (None, 32) 0 ['dropout\_15[0][0]']

1 (GlobalAveragePooling2D)

global\_max\_pooling2d\_11 (G (None, 32) 0 ['dropout\_15[0][0]']

lobalMaxPooling2D)

dense\_21 (Dense) (None, 4) 32 ['global\_average\_pooling2d\_9[0

][0]',

'global\_max\_pooling2d\_9[0][0]

']

dense\_23 (Dense) (None, 2) 32 ['global\_average\_pooling2d\_10[

0][0]',

'global\_max\_pooling2d\_10[0][0

]']

dense\_25 (Dense) (None, 4) 128 ['global\_average\_pooling2d\_11[

0][0]',

'global\_max\_pooling2d\_11[0][0

]']

dense\_22 (Dense) (None, 8) 32 ['dense\_21[0][0]',

'dense\_21[1][0]']

dense\_24 (Dense) (None, 16) 32 ['dense\_23[0][0]',

'dense\_23[1][0]']

dense\_26 (Dense) (None, 32) 128 ['dense\_25[0][0]',

'dense\_25[1][0]']

tf.\_\_operators\_\_.add\_9 (TF (None, 8) 0 ['dense\_22[0][0]',

OpLambda) 'dense\_22[1][0]']

tf.\_\_operators\_\_.add\_10 (T (None, 16) 0 ['dense\_24[0][0]',

FOpLambda) 'dense\_24[1][0]']

tf.\_\_operators\_\_.add\_11 (T (None, 32) 0 ['dense\_26[0][0]',

FOpLambda) 'dense\_26[1][0]']

activation\_29 (Activation) (None, 8) 0 ['tf.\_\_operators\_\_.add\_9[0][0]

']

activation\_32 (Activation) (None, 16) 0 ['tf.\_\_operators\_\_.add\_10[0][0

]']

activation\_35 (Activation) (None, 32) 0 ['tf.\_\_operators\_\_.add\_11[0][0

]']

multiply\_18 (Multiply) (None, 1, 10, 8) 0 ['average\_pooling2d\_19[0][0]',

'activation\_29[0][0]']

multiply\_20 (Multiply) (None, 1, 10, 16) 0 ['dropout\_13[0][0]',

'activation\_32[0][0]']

multiply\_22 (Multiply) (None, 1, 10, 32) 0 ['dropout\_15[0][0]',

'activation\_35[0][0]']

tf.math.reduce\_mean\_9 (TFO (None, 1, 10) 0 ['multiply\_18[0][0]']

pLambda)

tf.math.reduce\_max\_9 (TFOp (None, 1, 10) 0 ['multiply\_18[0][0]']

Lambda)

tf.math.reduce\_mean\_10 (TF (None, 1, 10) 0 ['multiply\_20[0][0]']

OpLambda)

tf.math.reduce\_max\_10 (TFO (None, 1, 10) 0 ['multiply\_20[0][0]']

pLambda)

tf.math.reduce\_mean\_11 (TF (None, 1, 10) 0 ['multiply\_22[0][0]']

OpLambda)

tf.math.reduce\_max\_11 (TFO (None, 1, 10) 0 ['multiply\_22[0][0]']

pLambda)

tf.expand\_dims\_18 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_9[0][0]'

bda) ]

tf.expand\_dims\_19 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_9[0][0]']

bda)

tf.expand\_dims\_20 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_10[0][0]

bda) ']

tf.expand\_dims\_21 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_10[0][0]'

bda) ]

tf.expand\_dims\_22 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_11[0][0]

bda) ']

tf.expand\_dims\_23 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_11[0][0]'

bda) ]

concatenate\_12 (Concatenat (None, 1, 10, 2) 0 ['tf.expand\_dims\_18[0][0]',

e) 'tf.expand\_dims\_19[0][0]']

concatenate\_13 (Concatenat (None, 1, 10, 2) 0 ['tf.expand\_dims\_20[0][0]',

e) 'tf.expand\_dims\_21[0][0]']

concatenate\_14 (Concatenat (None, 1, 10, 2) 0 ['tf.expand\_dims\_22[0][0]',

e) 'tf.expand\_dims\_23[0][0]']

conv2d\_19 (Conv2D) (None, 1, 10, 1) 9 ['concatenate\_12[0][0]']

conv2d\_21 (Conv2D) (None, 1, 10, 1) 33 ['concatenate\_13[0][0]']

conv2d\_23 (Conv2D) (None, 1, 10, 1) 9 ['concatenate\_14[0][0]']

multiply\_19 (Multiply) (None, 1, 10, 8) 0 ['multiply\_18[0][0]',

'conv2d\_19[0][0]']

multiply\_21 (Multiply) (None, 1, 10, 16) 0 ['multiply\_20[0][0]',

'conv2d\_21[0][0]']

multiply\_23 (Multiply) (None, 1, 10, 32) 0 ['multiply\_22[0][0]',

'conv2d\_23[0][0]']

flatten\_9 (Flatten) (None, 80) 0 ['multiply\_19[0][0]']

flatten\_10 (Flatten) (None, 160) 0 ['multiply\_21[0][0]']

flatten\_11 (Flatten) (None, 320) 0 ['multiply\_23[0][0]']

concatenate\_15 (Concatenat (None, 560) 0 ['flatten\_9[0][0]',

e) 'flatten\_10[0][0]',

'flatten\_11[0][0]']

dense\_27 (Dense) (None, 4) 2244 ['concatenate\_15[0][0]']

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Total params: 10407 (40.65 KB)

Trainable params: 10127 (39.56 KB)

Non-trainable params: 280 (1.09 KB)

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Epoch 1/10

353/353 - 61s - loss: 1.2168 - accuracy: 0.4701 - val\_loss: 1.1625 - val\_accuracy: 0.5181 - 61s/epoch - 172ms/step

Epoch 2/10

353/353 - 57s - loss: 1.0699 - accuracy: 0.5589 - val\_loss: 1.0681 - val\_accuracy: 0.5585 - 57s/epoch - 162ms/step

Epoch 3/10

353/353 - 57s - loss: 1.0263 - accuracy: 0.5827 - val\_loss: 1.0308 - val\_accuracy: 0.5974 - 57s/epoch - 160ms/step

Epoch 4/10

353/353 - 57s - loss: 1.0051 - accuracy: 0.5912 - val\_loss: 1.0510 - val\_accuracy: 0.5634 - 57s/epoch - 161ms/step

Epoch 5/10

353/353 - 57s - loss: 0.9961 - accuracy: 0.5963 - val\_loss: 1.0232 - val\_accuracy: 0.5925 - 57s/epoch - 161ms/step

Epoch 6/10

353/353 - 57s - loss: 0.9800 - accuracy: 0.6027 - val\_loss: 1.0271 - val\_accuracy: 0.5953 - 57s/epoch - 162ms/step

Epoch 7/10

353/353 - 57s - loss: 0.9623 - accuracy: 0.6160 - val\_loss: 1.0393 - val\_accuracy: 0.5833 - 57s/epoch - 162ms/step

Epoch 8/10

353/353 - 57s - loss: 0.9535 - accuracy: 0.6160 - val\_loss: 1.0036 - val\_accuracy: 0.6017 - 57s/epoch - 161ms/step

Epoch 9/10

353/353 - 57s - loss: 0.9459 - accuracy: 0.6213 - val\_loss: 1.0226 - val\_accuracy: 0.5939 - 57s/epoch - 163ms/step

Epoch 10/10

353/353 - 57s - loss: 0.9297 - accuracy: 0.6202 - val\_loss: 1.0241 - val\_accuracy: 0.5889 - 57s/epoch - 161ms/step

56/56 - 2s - loss: 1.1746 - accuracy: 0.5244 - 2s/epoch - 40ms/step

Test loss: 1.1745542287826538

Test accuracy: 0.524376392364502

56/56 [==============================] - 3s 41ms/step

Model: "model\_4"

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Layer (type) Output Shape Param # Connected to

==================================================================================================

input\_5 (InputLayer) [(None, 64, 321, 1)] 0 []

conv2d\_26 (Conv2D) (None, 64, 321, 8) 256 ['input\_5[0][0]']

conv2d\_28 (Conv2D) (None, 64, 321, 16) 1024 ['input\_5[0][0]']

batch\_normalization\_39 (Ba (None, 64, 321, 8) 32 ['conv2d\_26[0][0]']

tchNormalization)

batch\_normalization\_42 (Ba (None, 64, 321, 16) 64 ['conv2d\_28[0][0]']

tchNormalization)

conv2d\_24 (Conv2D) (None, 64, 321, 4) 64 ['input\_5[0][0]']

depthwise\_conv2d\_13 (Depth (None, 1, 321, 16) 1024 ['batch\_normalization\_39[0][0]

wiseConv2D) ']

depthwise\_conv2d\_14 (Depth (None, 1, 321, 32) 2048 ['batch\_normalization\_42[0][0]

wiseConv2D) ']

batch\_normalization\_36 (Ba (None, 64, 321, 4) 16 ['conv2d\_24[0][0]']

tchNormalization)

batch\_normalization\_40 (Ba (None, 1, 321, 16) 64 ['depthwise\_conv2d\_13[0][0]']

tchNormalization)

batch\_normalization\_43 (Ba (None, 1, 321, 32) 128 ['depthwise\_conv2d\_14[0][0]']

tchNormalization)

depthwise\_conv2d\_12 (Depth (None, 1, 321, 8) 512 ['batch\_normalization\_36[0][0]

wiseConv2D) ']

activation\_39 (Activation) (None, 1, 321, 16) 0 ['batch\_normalization\_40[0][0]

']

activation\_42 (Activation) (None, 1, 321, 32) 0 ['batch\_normalization\_43[0][0]

']

batch\_normalization\_37 (Ba (None, 1, 321, 8) 32 ['depthwise\_conv2d\_12[0][0]']

tchNormalization)

average\_pooling2d\_26 (Aver (None, 1, 80, 16) 0 ['activation\_39[0][0]']

agePooling2D)

average\_pooling2d\_28 (Aver (None, 1, 80, 32) 0 ['activation\_42[0][0]']

agePooling2D)

activation\_36 (Activation) (None, 1, 321, 8) 0 ['batch\_normalization\_37[0][0]

']

dropout\_16 (Dropout) (None, 1, 80, 16) 0 ['average\_pooling2d\_26[0][0]']

dropout\_18 (Dropout) (None, 1, 80, 32) 0 ['average\_pooling2d\_28[0][0]']

average\_pooling2d\_24 (Aver (None, 1, 80, 8) 0 ['activation\_36[0][0]']

agePooling2D)

separable\_conv2d\_13 (Separ (None, 1, 80, 16) 512 ['dropout\_16[0][0]']

ableConv2D)

separable\_conv2d\_14 (Separ (None, 1, 80, 32) 1536 ['dropout\_18[0][0]']

ableConv2D)

separable\_conv2d\_12 (Separ (None, 1, 80, 8) 192 ['average\_pooling2d\_24[0][0]']

ableConv2D)

batch\_normalization\_41 (Ba (None, 1, 80, 16) 64 ['separable\_conv2d\_13[0][0]']

tchNormalization)

batch\_normalization\_44 (Ba (None, 1, 80, 32) 128 ['separable\_conv2d\_14[0][0]']

tchNormalization)

batch\_normalization\_38 (Ba (None, 1, 80, 8) 32 ['separable\_conv2d\_12[0][0]']

tchNormalization)

activation\_40 (Activation) (None, 1, 80, 16) 0 ['batch\_normalization\_41[0][0]

']

activation\_43 (Activation) (None, 1, 80, 32) 0 ['batch\_normalization\_44[0][0]

']

activation\_37 (Activation) (None, 1, 80, 8) 0 ['batch\_normalization\_38[0][0]

']

average\_pooling2d\_27 (Aver (None, 1, 10, 16) 0 ['activation\_40[0][0]']

agePooling2D)

average\_pooling2d\_29 (Aver (None, 1, 10, 32) 0 ['activation\_43[0][0]']

agePooling2D)

average\_pooling2d\_25 (Aver (None, 1, 10, 8) 0 ['activation\_37[0][0]']

agePooling2D)

dropout\_17 (Dropout) (None, 1, 10, 16) 0 ['average\_pooling2d\_27[0][0]']

dropout\_19 (Dropout) (None, 1, 10, 32) 0 ['average\_pooling2d\_29[0][0]']

global\_average\_pooling2d\_1 (None, 8) 0 ['average\_pooling2d\_25[0][0]']

2 (GlobalAveragePooling2D)

global\_max\_pooling2d\_12 (G (None, 8) 0 ['average\_pooling2d\_25[0][0]']

lobalMaxPooling2D)

global\_average\_pooling2d\_1 (None, 16) 0 ['dropout\_17[0][0]']

3 (GlobalAveragePooling2D)

global\_max\_pooling2d\_13 (G (None, 16) 0 ['dropout\_17[0][0]']

lobalMaxPooling2D)

global\_average\_pooling2d\_1 (None, 32) 0 ['dropout\_19[0][0]']

4 (GlobalAveragePooling2D)

global\_max\_pooling2d\_14 (G (None, 32) 0 ['dropout\_19[0][0]']

lobalMaxPooling2D)

dense\_28 (Dense) (None, 4) 32 ['global\_average\_pooling2d\_12[

0][0]',

'global\_max\_pooling2d\_12[0][0

]']

dense\_30 (Dense) (None, 2) 32 ['global\_average\_pooling2d\_13[

0][0]',

'global\_max\_pooling2d\_13[0][0

]']

dense\_32 (Dense) (None, 4) 128 ['global\_average\_pooling2d\_14[

0][0]',

'global\_max\_pooling2d\_14[0][0

]']

dense\_29 (Dense) (None, 8) 32 ['dense\_28[0][0]',

'dense\_28[1][0]']

dense\_31 (Dense) (None, 16) 32 ['dense\_30[0][0]',

'dense\_30[1][0]']

dense\_33 (Dense) (None, 32) 128 ['dense\_32[0][0]',

'dense\_32[1][0]']

tf.\_\_operators\_\_.add\_12 (T (None, 8) 0 ['dense\_29[0][0]',

FOpLambda) 'dense\_29[1][0]']

tf.\_\_operators\_\_.add\_13 (T (None, 16) 0 ['dense\_31[0][0]',

FOpLambda) 'dense\_31[1][0]']

tf.\_\_operators\_\_.add\_14 (T (None, 32) 0 ['dense\_33[0][0]',

FOpLambda) 'dense\_33[1][0]']

activation\_38 (Activation) (None, 8) 0 ['tf.\_\_operators\_\_.add\_12[0][0

]']

activation\_41 (Activation) (None, 16) 0 ['tf.\_\_operators\_\_.add\_13[0][0

]']

activation\_44 (Activation) (None, 32) 0 ['tf.\_\_operators\_\_.add\_14[0][0

]']

multiply\_24 (Multiply) (None, 1, 10, 8) 0 ['average\_pooling2d\_25[0][0]',

'activation\_38[0][0]']

multiply\_26 (Multiply) (None, 1, 10, 16) 0 ['dropout\_17[0][0]',

'activation\_41[0][0]']

multiply\_28 (Multiply) (None, 1, 10, 32) 0 ['dropout\_19[0][0]',

'activation\_44[0][0]']

tf.math.reduce\_mean\_12 (TF (None, 1, 10) 0 ['multiply\_24[0][0]']

OpLambda)

tf.math.reduce\_max\_12 (TFO (None, 1, 10) 0 ['multiply\_24[0][0]']

pLambda)

tf.math.reduce\_mean\_13 (TF (None, 1, 10) 0 ['multiply\_26[0][0]']

OpLambda)

tf.math.reduce\_max\_13 (TFO (None, 1, 10) 0 ['multiply\_26[0][0]']

pLambda)

tf.math.reduce\_mean\_14 (TF (None, 1, 10) 0 ['multiply\_28[0][0]']

OpLambda)

tf.math.reduce\_max\_14 (TFO (None, 1, 10) 0 ['multiply\_28[0][0]']

pLambda)

tf.expand\_dims\_24 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_12[0][0]

bda) ']

tf.expand\_dims\_25 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_12[0][0]'

bda) ]

tf.expand\_dims\_26 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_13[0][0]

bda) ']

tf.expand\_dims\_27 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_13[0][0]'

bda) ]

tf.expand\_dims\_28 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_mean\_14[0][0]

bda) ']

tf.expand\_dims\_29 (TFOpLam (None, 1, 10, 1) 0 ['tf.math.reduce\_max\_14[0][0]'

bda) ]

concatenate\_16 (Concatenat (None, 1, 10, 2) 0 ['tf.expand\_dims\_24[0][0]',

e) 'tf.expand\_dims\_25[0][0]']

concatenate\_17 (Concatenat (None, 1, 10, 2) 0 ['tf.expand\_dims\_26[0][0]',

e) 'tf.expand\_dims\_27[0][0]']

concatenate\_18 (Concatenat (None, 1, 10, 2) 0 ['tf.expand\_dims\_28[0][0]',

e) 'tf.expand\_dims\_29[0][0]']

conv2d\_25 (Conv2D) (None, 1, 10, 1) 9 ['concatenate\_16[0][0]']

conv2d\_27 (Conv2D) (None, 1, 10, 1) 33 ['concatenate\_17[0][0]']

conv2d\_29 (Conv2D) (None, 1, 10, 1) 9 ['concatenate\_18[0][0]']

multiply\_25 (Multiply) (None, 1, 10, 8) 0 ['multiply\_24[0][0]',

'conv2d\_25[0][0]']

multiply\_27 (Multiply) (None, 1, 10, 16) 0 ['multiply\_26[0][0]',

'conv2d\_27[0][0]']

multiply\_29 (Multiply) (None, 1, 10, 32) 0 ['multiply\_28[0][0]',

'conv2d\_29[0][0]']

flatten\_12 (Flatten) (None, 80) 0 ['multiply\_25[0][0]']

flatten\_13 (Flatten) (None, 160) 0 ['multiply\_27[0][0]']

flatten\_14 (Flatten) (None, 320) 0 ['multiply\_29[0][0]']

concatenate\_19 (Concatenat (None, 560) 0 ['flatten\_12[0][0]',

e) 'flatten\_13[0][0]',

'flatten\_14[0][0]']

dense\_34 (Dense) (None, 4) 2244 ['concatenate\_19[0][0]']

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Total params: 10407 (40.65 KB)

Trainable params: 10127 (39.56 KB)

Non-trainable params: 280 (1.09 KB)

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Epoch 1/10

353/353 - 61s - loss: 1.2257 - accuracy: 0.4699 - val\_loss: 1.1766 - val\_accuracy: 0.5042 - 61s/epoch - 173ms/step

Epoch 2/10

353/353 - 57s - loss: 1.1176 - accuracy: 0.5360 - val\_loss: 1.1136 - val\_accuracy: 0.5205 - 57s/epoch - 162ms/step

Epoch 3/10

353/353 - 57s - loss: 1.0804 - accuracy: 0.5496 - val\_loss: 1.0872 - val\_accuracy: 0.5595 - 57s/epoch - 162ms/step

Epoch 4/10

353/353 - 57s - loss: 1.0490 - accuracy: 0.5705 - val\_loss: 1.0565 - val\_accuracy: 0.5864 - 57s/epoch - 161ms/step

Epoch 5/10

353/353 - 57s - loss: 1.0264 - accuracy: 0.5863 - val\_loss: 1.0799 - val\_accuracy: 0.5531 - 57s/epoch - 162ms/step

Epoch 6/10

353/353 - 56s - loss: 1.0082 - accuracy: 0.5888 - val\_loss: 1.0372 - val\_accuracy: 0.5871 - 56s/epoch - 160ms/step

Epoch 7/10

353/353 - 57s - loss: 0.9933 - accuracy: 0.6022 - val\_loss: 1.0404 - val\_accuracy: 0.5864 - 57s/epoch - 161ms/step

Epoch 8/10

353/353 - 57s - loss: 0.9774 - accuracy: 0.6006 - val\_loss: 1.0259 - val\_accuracy: 0.5878 - 57s/epoch - 161ms/step

Epoch 9/10

353/353 - 57s - loss: 0.9715 - accuracy: 0.6090 - val\_loss: 1.0498 - val\_accuracy: 0.5836 - 57s/epoch - 161ms/step

Epoch 10/10

353/353 - 57s - loss: 0.9565 - accuracy: 0.6201 - val\_loss: 1.0475 - val\_accuracy: 0.5708 - 57s/epoch - 161ms/step

56/56 - 2s - loss: 1.0451 - accuracy: 0.5772 - 2s/epoch - 40ms/step

Test loss: 1.0451027154922485

Test accuracy: 0.5771850347518921

56/56 [==============================] - 3s 41ms/step

Mean loss: 1.0400453686714173

Mean accuracy: 0.5787023067474365