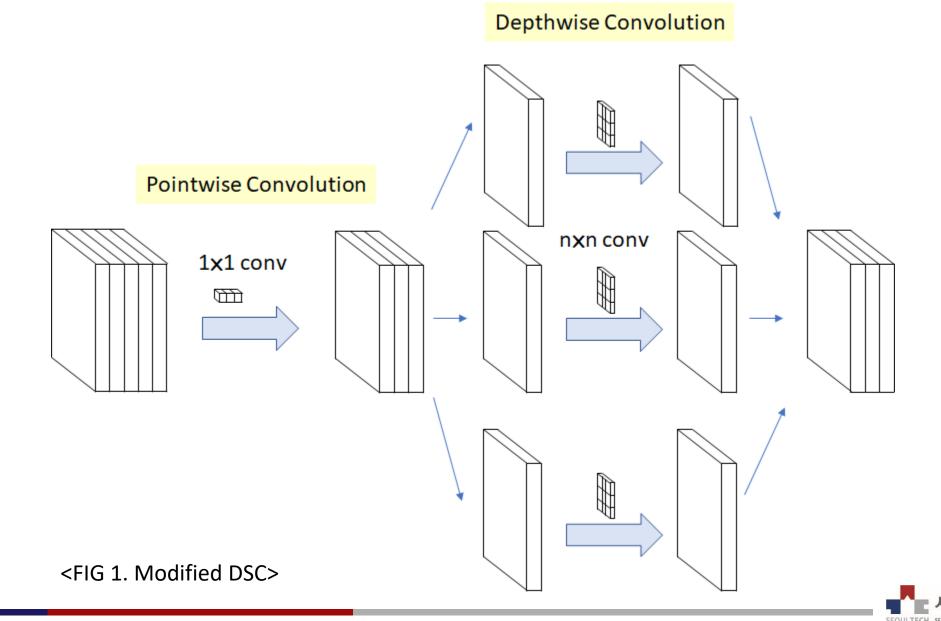
Xception



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Xception – Depthwise Separable Convolution

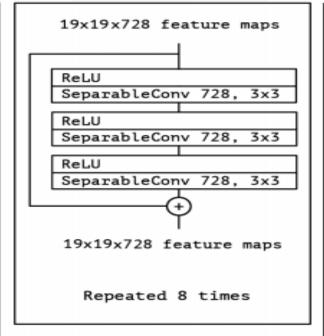


Xception – Architecture

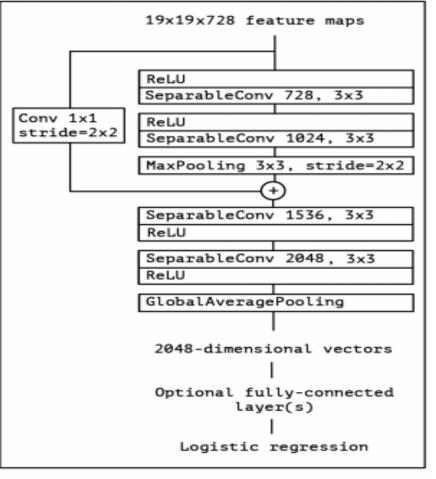
Entry flow

299x299x3 images Conv 32, 3x3, stride=2x2 ReLU Conv 64, 3x3 ReLU SeparableConv 128, 3x3 ReLU Conv 1x1 stride=2x2 SeparableConv 128, 3x3 MaxPooling 3x3, stride=2x2 ReLU SeparableConv 256, 3x3 Conv 1x1 ReLU stride=2x2 SeparableConv 256, 3x3 MaxPooling 3x3, stride=2x2 ReLU SeparableConv 728, 3x3 Conv 1x1 ReLU stride=2x2 SeparableConv 728. 3x3 MaxPooling 3x3, stride=2x2 19x19x728 feature maps

Middle flow



Exit flow



<FIG 2. Xception Architecture>

Xception – Code (SeparableConv)

```
def block(input_tensor, filters, kernel_size=3, strides=1, padding='same', use_bias=False):
    x = SeparableConv2D(filters, kernel_size, strides=strides, padding=padding, use_bias=use_bias)(input_tensor)
    x = BatchNormalization()(x)
    x = Activation('relu')(x)
    return x
```

<FIG 3. SeparableConv Code>



Xception – Code (Entry Flow)

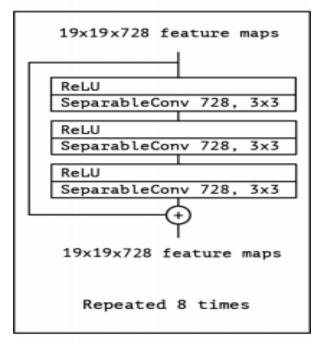
```
def Custom(input shape=(299, 299, 3), num classes=100):
                                                                                 Entry flow
   img input = Input(shape=input shape)
                                                                                           299x299x3 images
   # Entry flow
   x = Conv2D(32, 3, strides=2, padding='same', use bias=False)(img input)
                                                                                   Conv 32, 3x3, stride=2x2
   x = BatchNormalization()(x)
                                                                                   ReLU
   x = Activation('relu')(x)
                                                                                   Conv 64, 3x3
   x = Conv2D(64, 3, padding='same', use bias=False)(x)
                                                                                   ReLU
   x = BatchNormalization()(x)
   x = Activation('relu')(x)
                                                                                   SeparableConv 128, 3x3
   residual = Conv2D(128, 1, strides=2, padding='same', use_bias=False)(x)
                                                                                   ReLU
                                                                 Conv 1x1
   residual = BatchNormalization()(residual)
                                                                 stride=2x2
                                                                                   SeparableConv 128, 3x3
                                                                                   MaxPooling 3x3, stride=2x2
   x = block(x, 128)
   x = block(x, 128)
   x = MaxPooling2D(3, strides=2, padding='same')(x)
                                                                                    ReLU
   x = Add()([x, residual])
                                                                                   SeparableConv 256, 3x3
                                                                 Conv 1x1
                                                                                   ReLU
   residual = Conv2D(256, 1, strides=2, padding='same', use_bias=False)(x)
                                                                 stride=2x2
                                                                                   SeparableConv 256, 3x3
   residual = BatchNormalization()(residual)
                                                                                   MaxPooling 3x3, stride=2x2
   x = block(x, 256)
   x = block(x, 256)
   x = MaxPooling2D(3, strides=2, padding='same')(x)
                                                                                   ReLU
   x = Add()([x, residual])
                                                                                   SeparableConv 728,
                                                                                                                3 \times 3
                                                                 Conv 1x1
                                                                                   ReLU
   residual = Conv2D(728, 1, strides=2, padding='same', use bias=False)(x)
                                                                 stride=2x2
                                                                                   SeparableConv 728, 3x3
   residual = BatchNormalization()(residual)
                                                                                   MaxPooling 3x3, stride=2x2
   x = block(x, 728)
   x = block(x, 728)
   x = MaxPooling2D(3, strides=2, padding='same')(x)
                                                                                      19x19x728 feature maps
   x = Add()([x, residual])
```

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Xception – Code (Middle Flow)

```
# Middle flow
for _ in range(8):
   residual = x
   x = block(x, 728)
   x = block(x, 728)
   x = block(x, 728)
   x = Add()([x, residual])
```

Middle flow

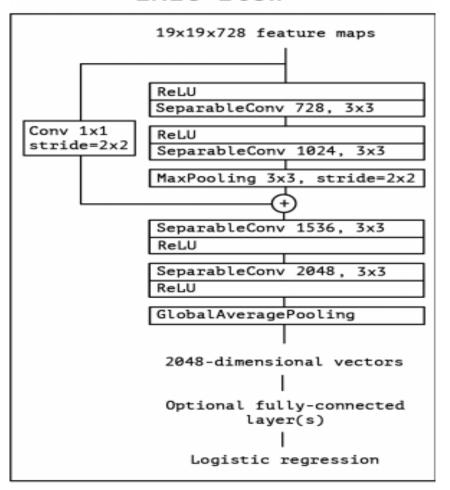




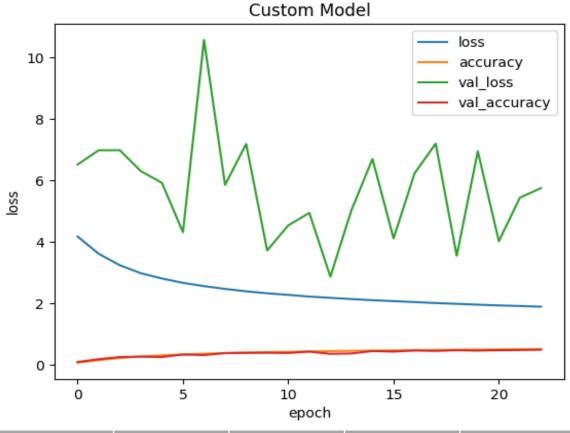
Xception – Code (Entry Flow)

```
# Exit flow
residual = Conv2D(1024, 1, strides=2, padding='same', use_bias=False)(x)
residual = BatchNormalization()(residual)
x = block(x, 728)
x = block(x, 1024)
x = MaxPooling2D(3, strides=2, padding='same')(x)
x = Add()([x, residual])
x = block(x, 1536, kernel size=3, strides=1)
x = block(x, 2048, kernel_size=3, strides=1)
x = GlobalAveragePooling2D()(x)
output = Dense(num_classes, activation='softmax')(x)
```

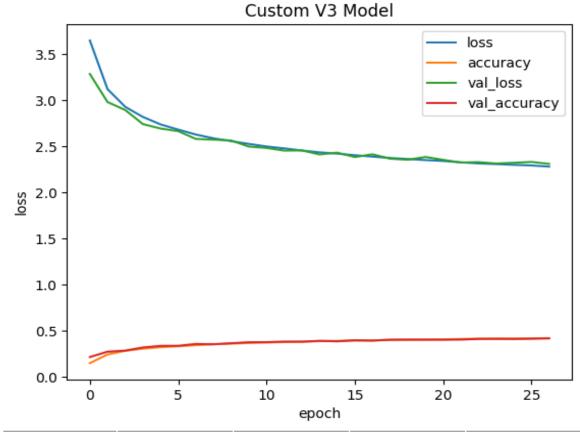
Exit flow



Xception – Result (Compare Last Week)



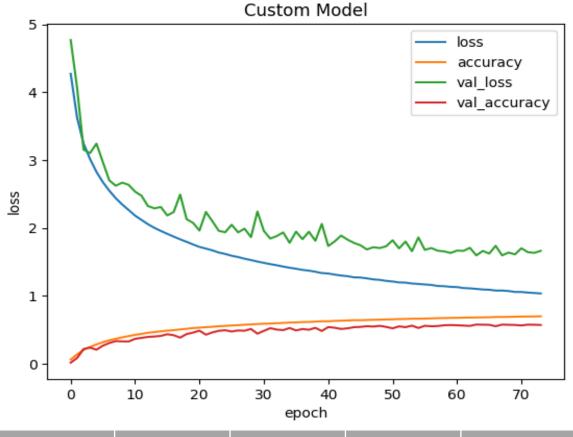
Params	Loss	Val_Loss	ACC	Val_ACC
23,858,788	2.1762	2.8649	0.4408	0.4858



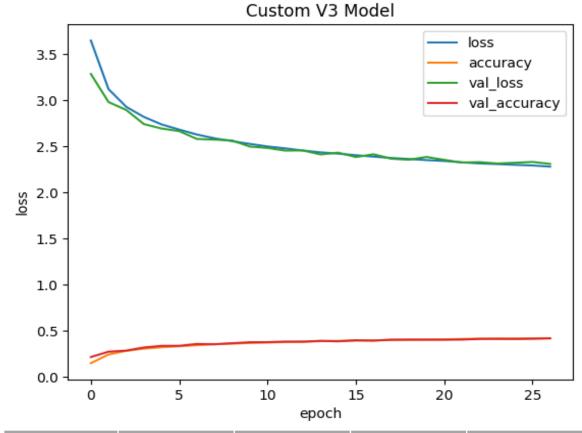
Params	Loss	Val_Loss	ACC	Val_ACC
21,066,380	2.2750	2.2833	0.4211	0.4208



Xception – Result (Compare Best Result)



Params	Loss	Val_Loss	ACC	Val_ACC
45,295,884	1.1039	1.5973	0.6834	0.5788



Params	Loss	Val_Loss	ACC	Val_ACC
21,066,380	2.2750	2.2833	0.4211	0.4208



THANKS FOR YOUR ATTENTION



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