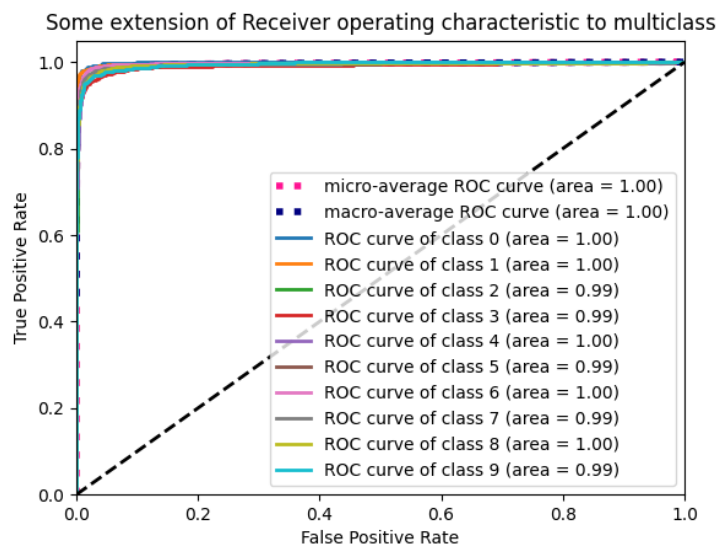


## Part 1

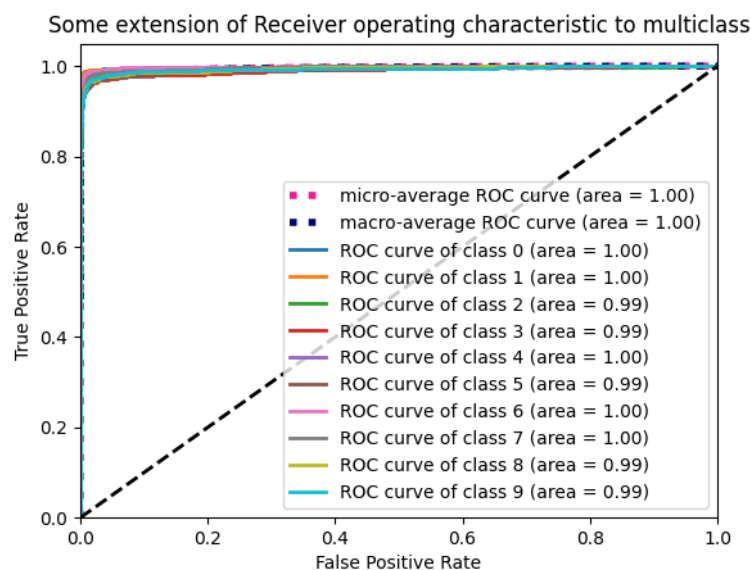
			1v1 ROC AUC scores		1vRest ROC AUC scores	
Model	Test Accuracy	Macro AUC	Macro	Wiegthed by Prevalence	Macro	Wiegthed by Prevalence
Chapter 11 one hidden layer	95.89%	0.995459364	0.995413	0.995459	0.995413	0.995459
Chapter 11 two hidden layers	96.16%	0.996477583	0.996433	0.996478	0.996433	0.996478
Keras two hidden layers	94.07%	0.995177091	0.995154	0.99518	0.995154	0.99518

AUC graphs:

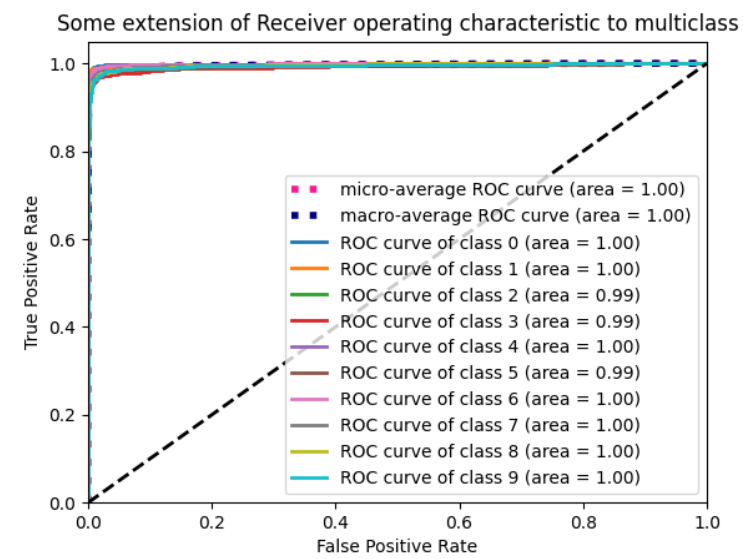
Keras:



Chapter 11 one hidden layer:



## Chapter 11 two hidden layers:



## Part 2:

Preprocessing:

Crop from center of the image for an image size of (250,250,3)

InceptionV3

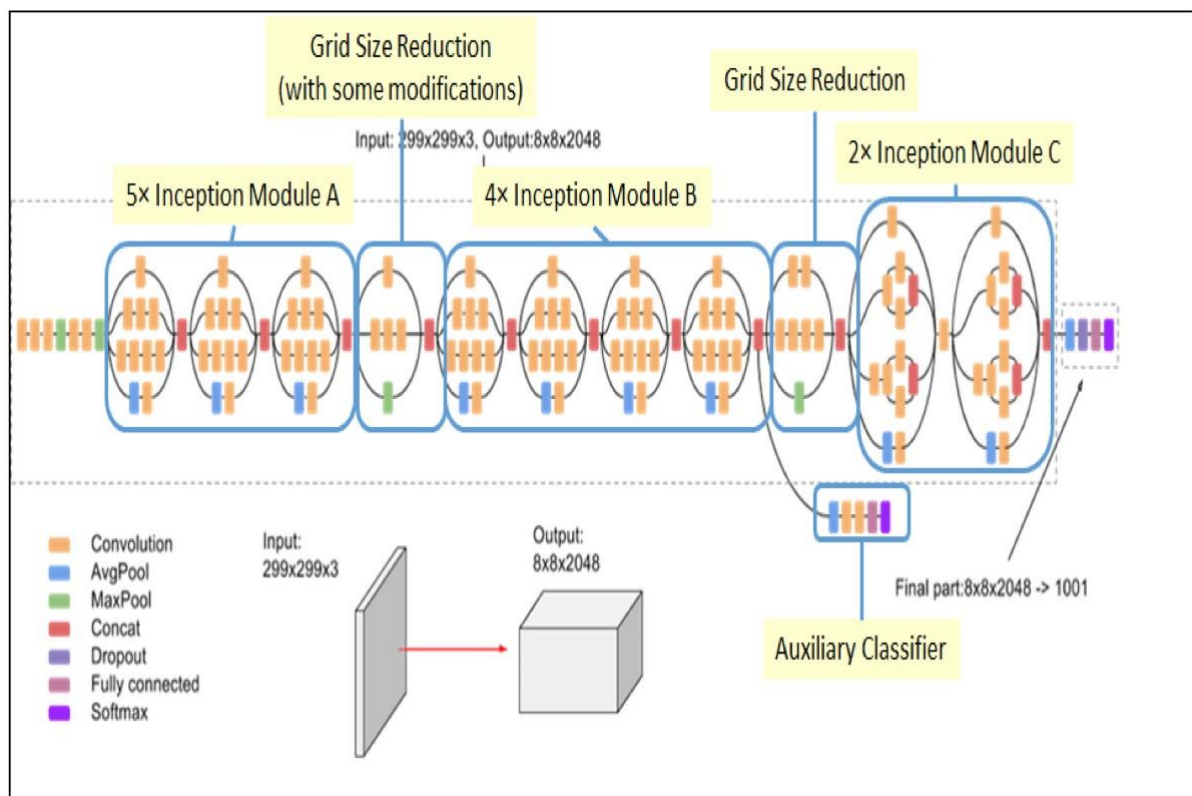
Total params: 22,011,782

Trainable params: 21,977,350


Non-trainable params: 34,432

# of layers: 313

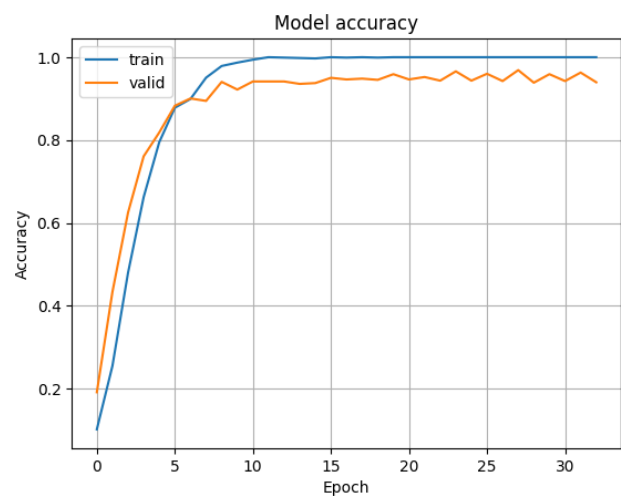
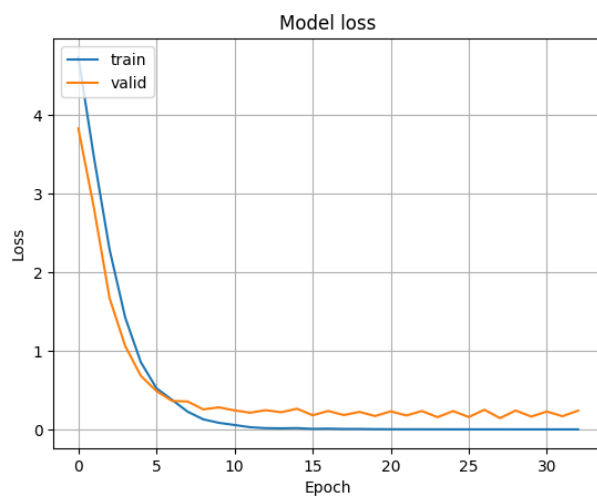
Inception-v3 is a CNN architecture from the Inception family that makes several improvements including using Label Smoothing, Factorized  $7 \times 7$  convolutions, and the use of an auxiliary classifier to propagate label information lower down the network (along with the use of batch normalization for layers in the sidehead).



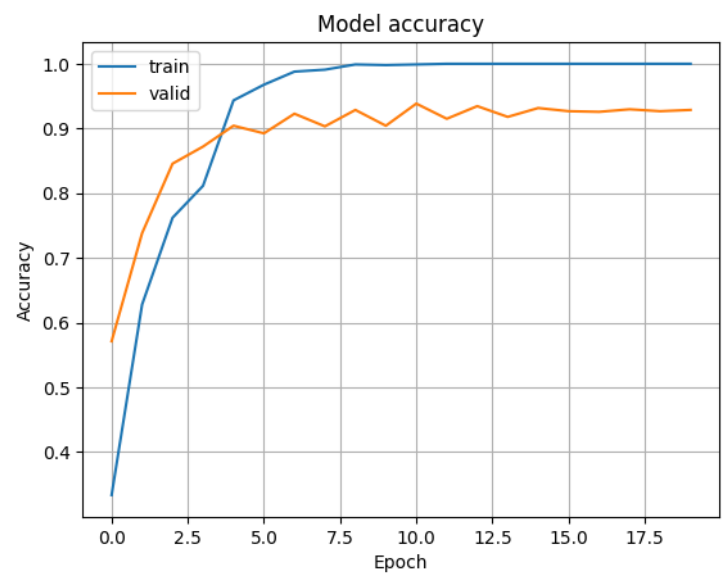
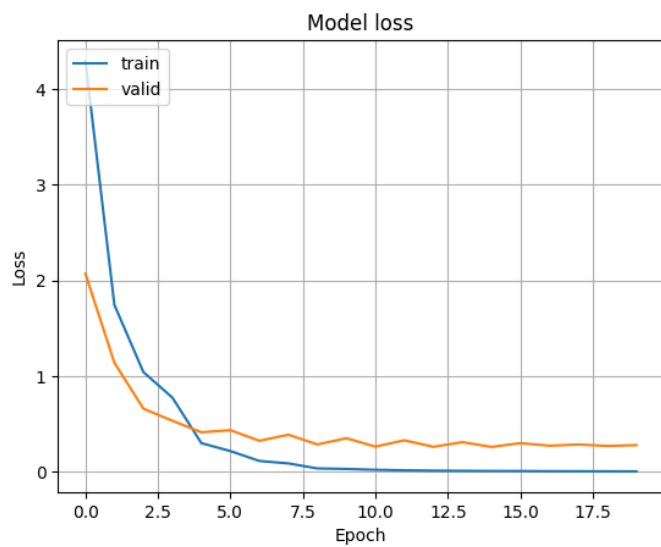
type	patch size/ stride	output size	depth	#1×1	#3×3 reduce	#3×3	#5×5 reduce	#5×5	pool proj	params	ops
convolution	7×7/2	112×112×64	1							2.7K	34M
max pool	3×3/2	56×56×64	0								
convolution	3×3/1	56×56×192	2		64	192				112K	360M
max pool	3×3/2	28×28×192	0								
inception (3a)		28×28×256	2	64	96	128	16	32	32	159K	128M
inception (3b)		28×28×480	2	128	128	192	32	96	64	380K	304M
max pool	3×3/2	14×14×480	0								
inception (4a)		14×14×512	2	192	96	208	16	48	64	364K	73M
inception (4b)		14×14×512	2	160	112	224	24	64	64	437K	88M
inception (4c)		14×14×512	2	128	128	256	24	64	64	463K	100M
inception (4d)		14×14×528	2	112	144	288	32	64	64	580K	119M
inception (4e)		14×14×832	2	256	160	320	32	128	128	840K	170M
max pool	3×3/2	7×7×832	0								
inception (5a)		7×7×832	2	256	160	320	32	128	128	1072K	54M
inception (5b)		7×7×1024	2	384	192	384	48	128	128	1388K	71M
avg pool	7×7/1	1×1×1024	0								
dropout (40%)		1×1×1024	0								
linear		1×1×1000	1							1000K	1M
softmax		1×1×1000	0								

NetChain		
	Input	image
conv_conv2d	ConvolutionLayer	array (size: 3 × 299 × 299)
conv_batchnorm	BatchNormalizationLayer	array (size: 32 × 149 × 149)
conv_relu	Ramp	array (size: 32 × 149 × 149)
conv_1_conv2d	ConvolutionLayer	array (size: 32 × 147 × 147)
conv_1_batchnorm	BatchNormalizationLayer	array (size: 32 × 147 × 147)
conv_1_relu	Ramp	array (size: 32 × 147 × 147)
conv_2_conv2d	ConvolutionLayer	array (size: 64 × 147 × 147)
conv_2_batchnorm	BatchNormalizationLayer	array (size: 64 × 147 × 147)
conv_2_relu	Ramp	array (size: 64 × 147 × 147)
pool	PoolingLayer	array (size: 64 × 73 × 73)
conv_3_conv2d	ConvolutionLayer	array (size: 80 × 73 × 73)
conv_3_batchnorm	BatchNormalizationLayer	array (size: 80 × 73 × 73)
conv_3_relu	Ramp	array (size: 80 × 73 × 73)
conv_4_conv2d	ConvolutionLayer	array (size: 192 × 71 × 71)
conv_4_batchnorm	BatchNormalizationLayer	array (size: 192 × 71 × 71)
conv_4_relu	Ramp	array (size: 192 × 71 × 71)
pool1	PoolingLayer	array (size: 192 × 35 × 35)
Inception1	NetGraph (23 nodes)	array (size: 256 × 35 × 35)
Inception2	NetGraph (23 nodes)	array (size: 288 × 35 × 35)
Inception3	NetGraph (23 nodes)	array (size: 288 × 35 × 35)
Inception4	NetGraph (14 nodes)	array (size: 768 × 17 × 17)
Inception5	NetGraph (32 nodes)	array (size: 768 × 17 × 17)
Inception6	NetGraph (32 nodes)	array (size: 768 × 17 × 17)
Inception7	NetGraph (32 nodes)	array (size: 768 × 17 × 17)
Inception8	NetGraph (32 nodes)	array (size: 768 × 17 × 17)
Inception9	NetGraph (20 nodes)	array (size: 1280 × 8 × 8)
Inception10	NetGraph (29 nodes)	array (size: 2048 × 8 × 8)
Inception11	NetGraph (29 nodes)	array (size: 2048 × 8 × 8)
global_pool	PoolingLayer	array (size: 2048 × 1 × 1)
flatten	FlattenLayer	vector (size: 2048)
fc1	LinearLayer	vector (size: 1008)
part	PartLayer	vector (size: 1001)
softmax	SoftmaxLayer	vector (size: 1001)
	Output	class

InceptionV3 seed 3856 Test accuracy: 0.9643380641937256



InceptionV3 seed 42 Test accuracy: 0.9736199378967285



## Xception

Total params: 21,070,478

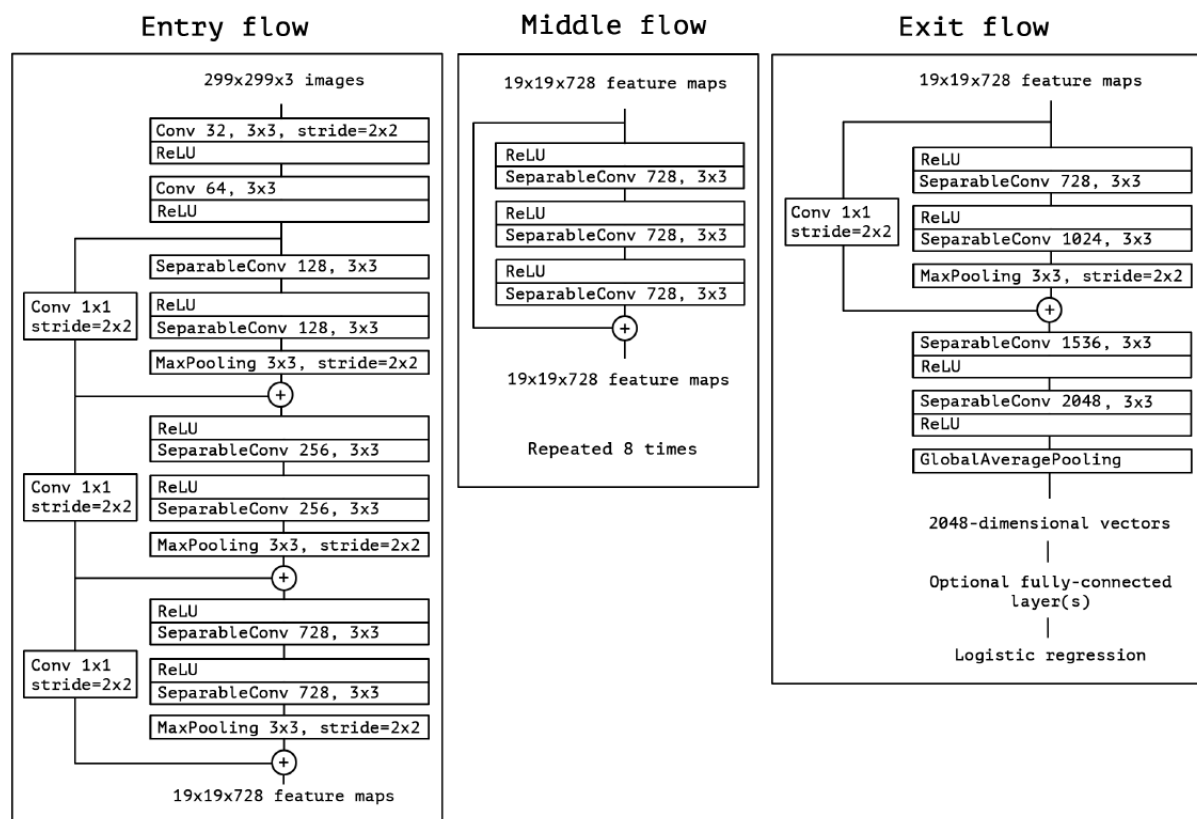
Trainable params: 21,015,950

Non-trainable params: 54,528

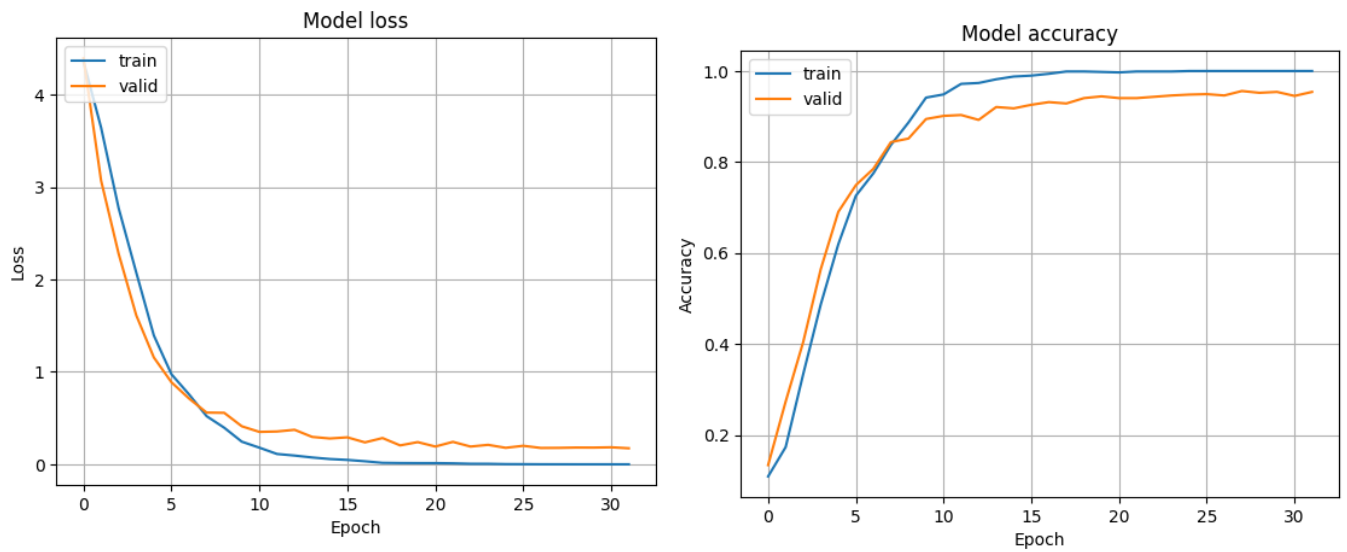
# of layers: 134

Xception (which stands for “Extreme Inception”) architecture has 36 convolutional layers forming the feature extraction base of the network.

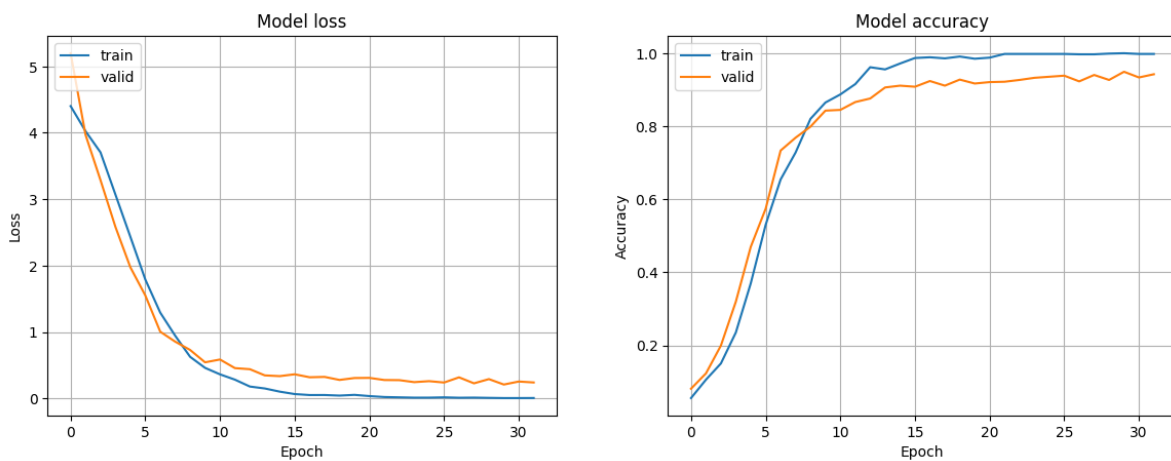
The data first goes through the entry flow, then through the middle flow which is repeated eight times, and finally through the exit flow. Note that all Convolution and Separable Convolution layers are followed by batch normalization (not included in the diagram). All Separable Convolution layers use a depth multiplier of 1 (no depth expansion).



Xception seed 17 Test accuracy: 0.9638495445251465



Xception seed 567485 Test accuracy: 0.9682462215423584



	Parameter count	Steps/second
<b>Inception V3</b>	23,626,728	31
<b>Xception</b>	22,855,952	28

Model	Seed	Test ACC
InceptionV3	3856	0.964338064
InceptionV3	42	<b>0.973619938</b>
Xception	17	0.963849545
Xception	567485	0.968246222