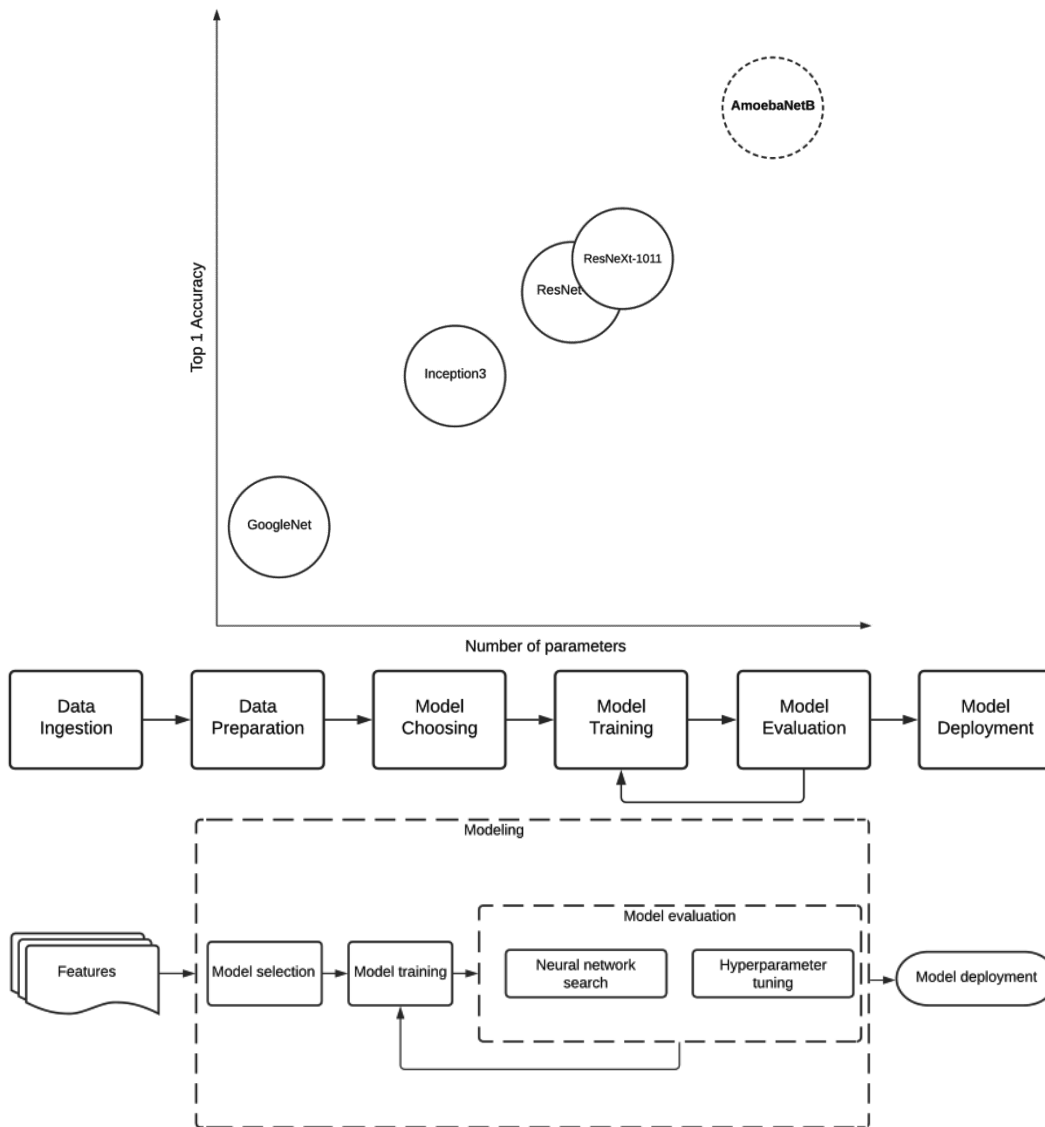
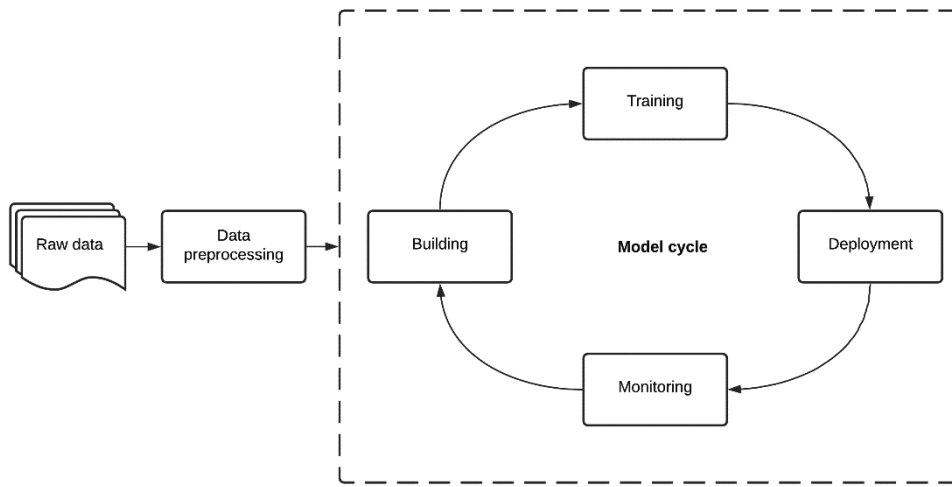
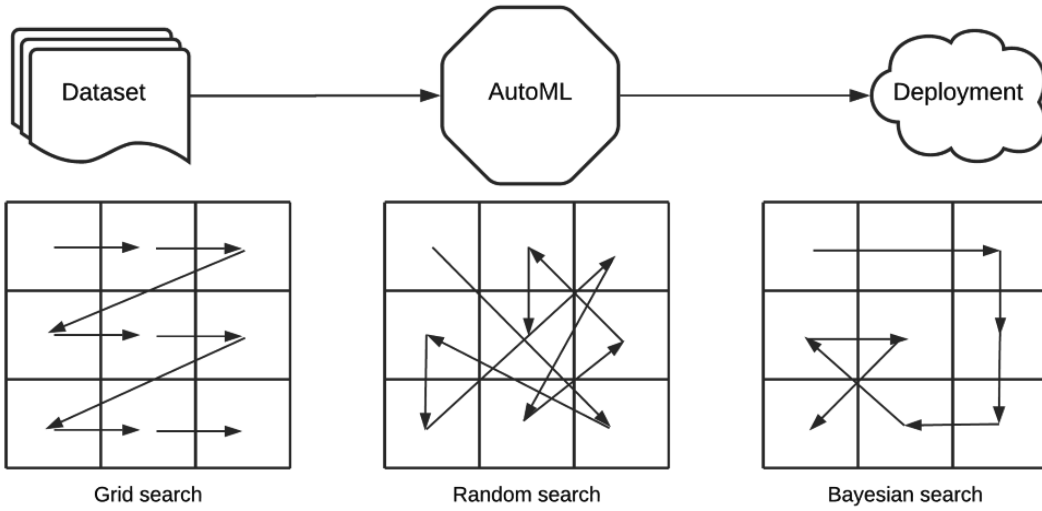


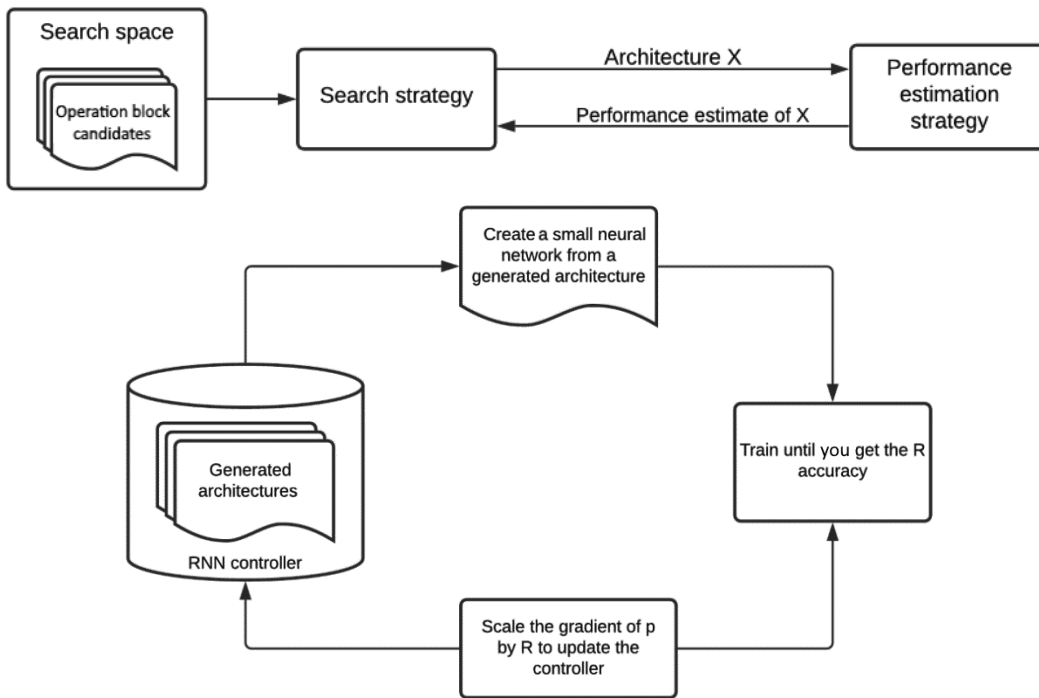
Chapter 1: Introduction to Automated Machine Learning



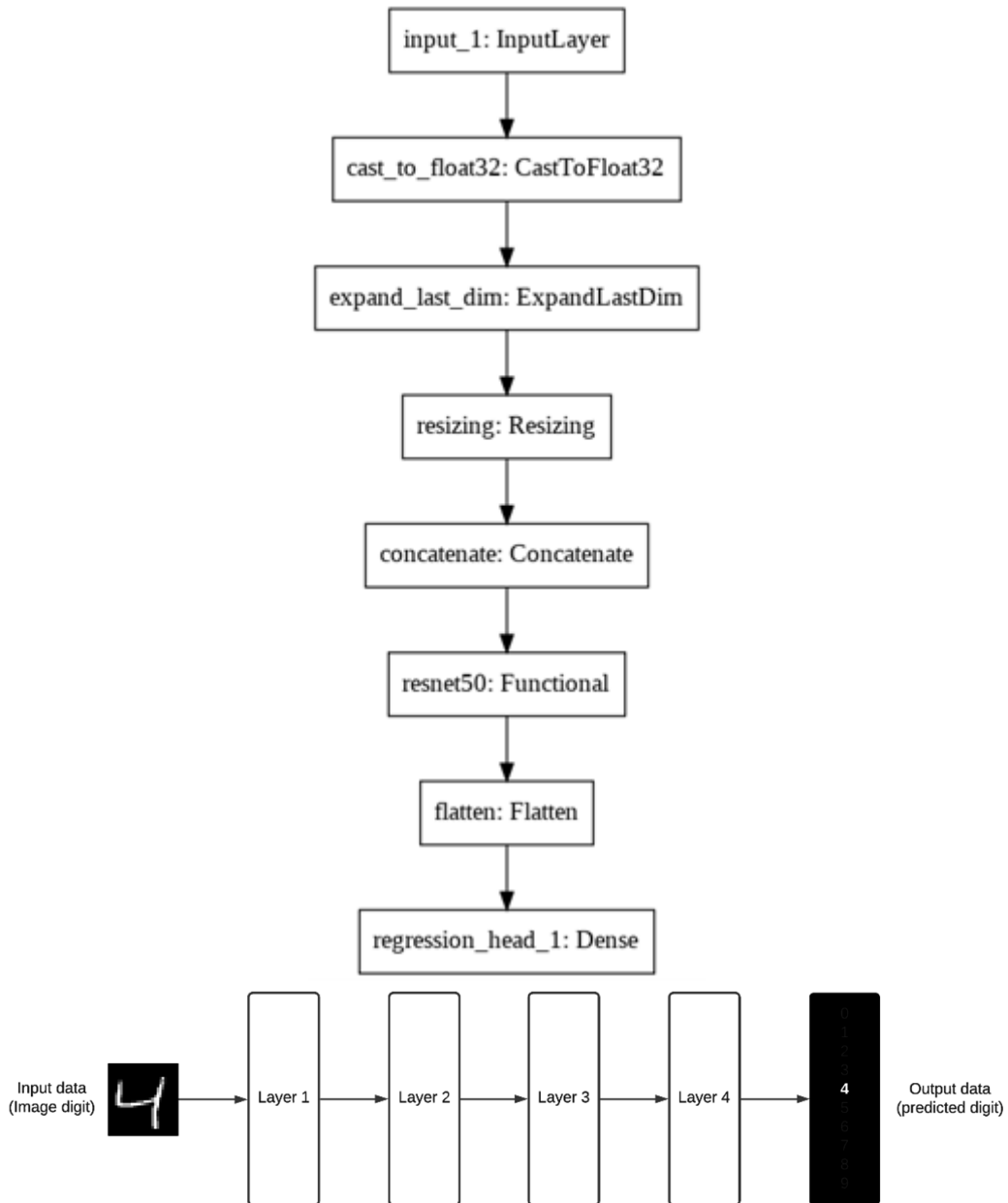


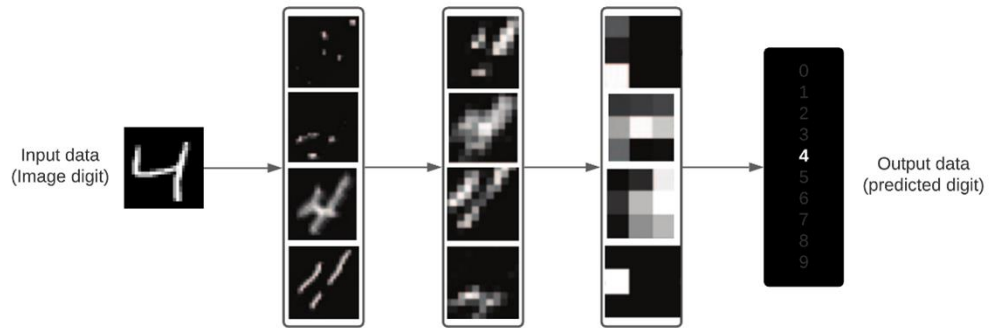
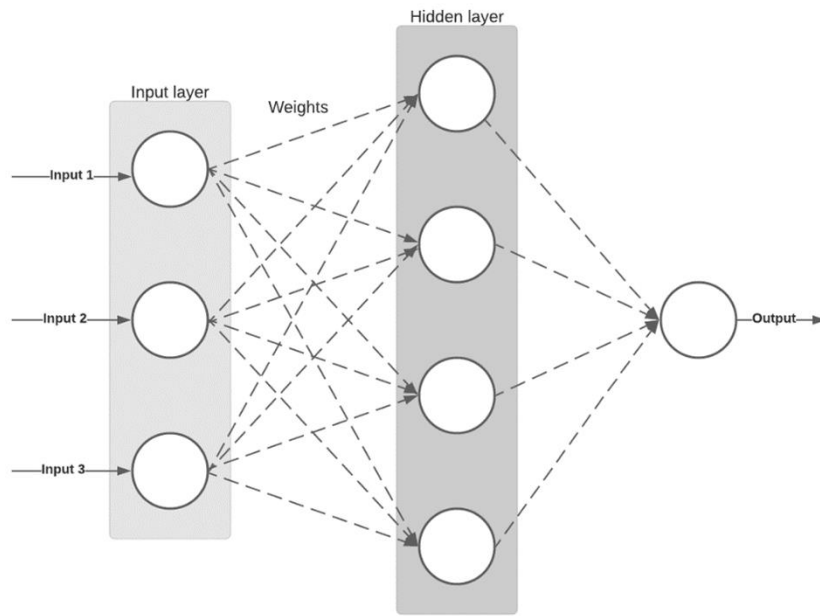
How AutoML works





Chapter 2: Getting Started with AutoKeras







+ Code + Text Copy to Drive

Connect Editing

Creating an image classifier

Now, we will use the AutoKeras ImageClassifier to find the best classification model. Just for this little example, we set `max_trials` (the maximum number of different Keras Models to try) to 1 and the number of epochs to train each model to 20, but for real use it is recommended to set a large number of trials and not to set the epochs parameter to use an adaptive number of epochs automatically.

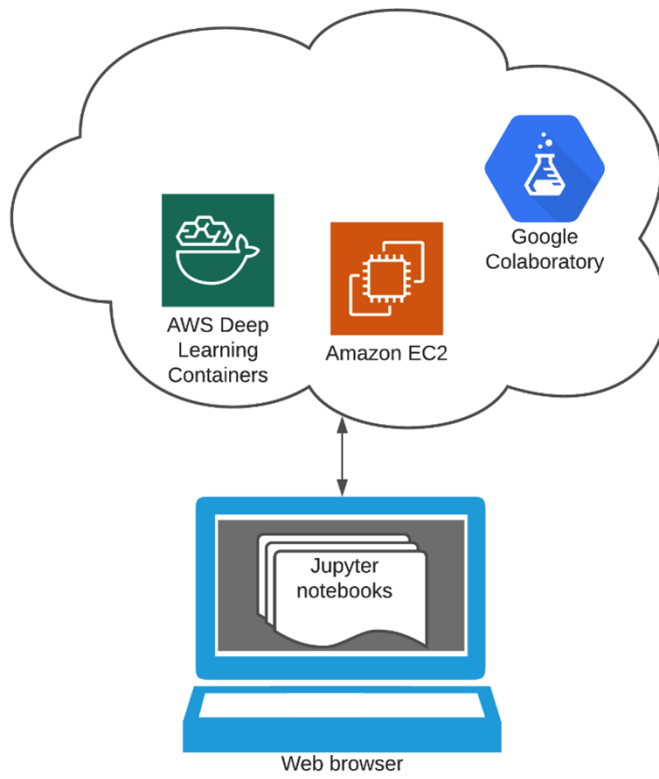
```
[ ] # Create a image classifier object defining
    clf = ak.ImageClassifier(
        overwrite=True,
        max_trials=1)

# Search for the optimal classifier for the MNIST training dataset
clf.fit(x_train, y_train, epochs=20)
```

```
Trial 1 Complete [00h 02m 02s]
val_loss: 0.0394585020840168

Best val_loss So Far: 0.0394585020840168
Total elapsed time: 00h 02m 02s
INFO:tensorflow:Oracle triggered exit
Epoch 1/20
1875/1875 [=====] - 6s 3ms/step - loss: 0.1585 - accuracy: 0.9510
Epoch 2/20
1875/1875 [=====] - 6s 3ms/step - loss: 0.0760 - accuracy: 0.9767
Epoch 3/20
1875/1875 [=====] - 6s 3ms/step - loss: 0.0595 - accuracy: 0.9817
Epoch 4/20
1875/1875 [=====] - 6s 3ms/step - loss: 0.0513 - accuracy: 0.9841
Epoch 5/20
1875/1875 [=====] - 6s 3ms/step - loss: 0.0466 - accuracy: 0.9844
Epoch 6/20
1875/1875 [=====] - 6s 3ms/step - loss: 0.0410 - accuracy: 0.9865
Epoch 7/20
1875/1875 [=====] - 6s 3ms/step - loss: 0.0381 - accuracy: 0.9881
Epoch 8/20
1875/1875 [=====] - 6s 3ms/step - loss: 0.0346 - accuracy: 0.9885
Epoch 9/20
1875/1875 [=====] - 6s 3ms/step - loss: 0.0330 - accuracy: 0.9888
Epoch 10/20
1875/1875 [=====] - 6s 3ms/step - loss: 0.0315 - accuracy: 0.9897
```







Getting the MNIST dataset

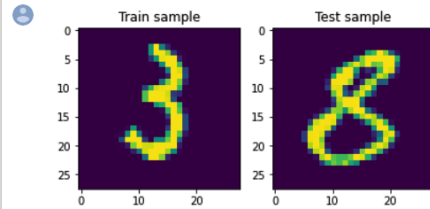
We have first to download the MNIST data and have a quick look to the dataset shape

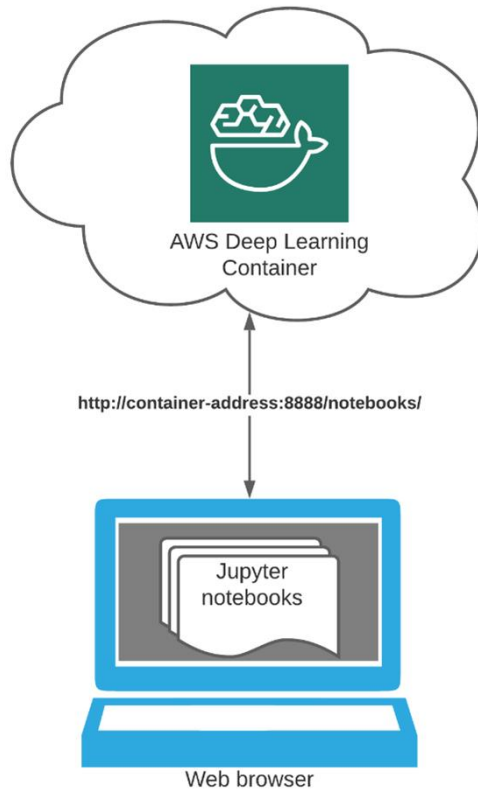
```
[ ] [(x_train, y_train), (x_test, y_test)] = mnist.load_data()
    print(x_train.shape)
    print(x_test.shape)
```

```
(60000, 28, 28)
(10000, 28, 28)
```

We can see from the output above that each dataset contains images of size 28x28 pixels. Now let's see what a digit looks like

```
%matplotlib inline
fig = plt.figure()
ax = fig.add_subplot(1, 2, 1)
plt.imshow(x_train[1234])
ax.set_title('Train sample')
ax = fig.add_subplot(1, 2, 2)
plt.imshow(x_test[1234])
ax.set_title('Test sample')
plt.show()
```







Cloud	VS	On Premise
Short	Setup	Long
Low	Investment	High
Yes	IT costs	No
Predictable	Total costs	Unpredictable
Low	Customization	High
Mediun	Security	High
High	Scalability	Medium

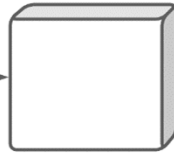
Docker file

Docker image

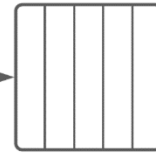
Docker container



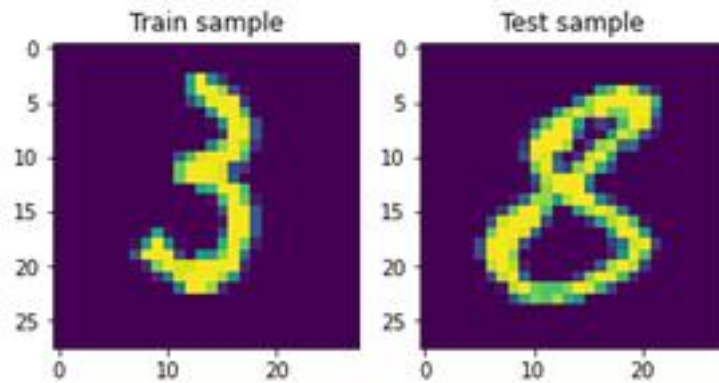
Build

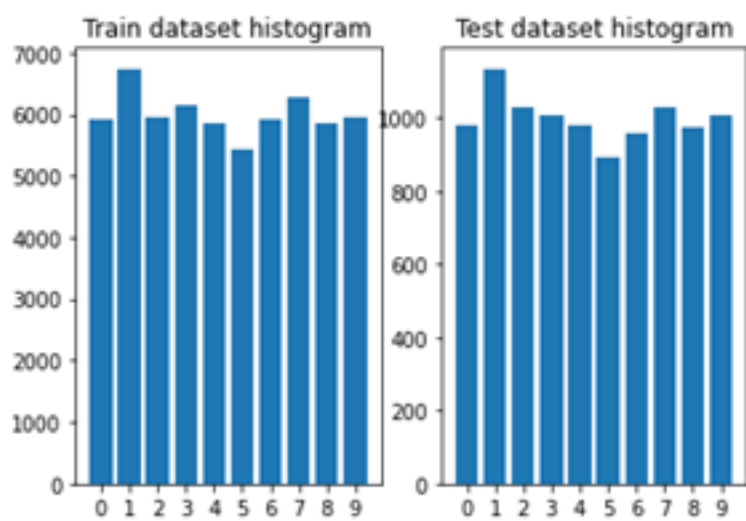


Run



0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
9 9 9 9 9 9 9 9 9 9 9 9 9 9 9





Trial 1 Complete [00h 02m 41s]
val_loss: 0.04122922942042351

Best val_loss So Far: 0.04122922942042351

Total elapsed time: 00h 02m 41s

INFO:tensorflow:Oracle triggered exit

Epoch 1/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.1563 - accuracy: 0.9522

Epoch 2/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0742 - accuracy: 0.9776

Epoch 3/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0593 - accuracy: 0.9813

Epoch 4/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0493 - accuracy: 0.9848

Epoch 5/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0449 - accuracy: 0.9859

Epoch 6/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0400 - accuracy: 0.9873

Epoch 7/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0360 - accuracy: 0.9884

Epoch 8/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0326 - accuracy: 0.9894

Epoch 9/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0317 - accuracy: 0.9897

Epoch 10/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0307 - accuracy: 0.9901

Epoch 11/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0270 - accuracy: 0.9910

Epoch 12/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0266 - accuracy: 0.9911

Epoch 13/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0259 - accuracy: 0.9918

Epoch 14/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0238 - accuracy: 0.9923

Epoch 15/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0244 - accuracy: 0.9919

Epoch 16/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0222 - accuracy: 0.9928

Epoch 17/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0223 - accuracy: 0.9926

Epoch 18/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0212 - accuracy: 0.9932

Epoch 19/20

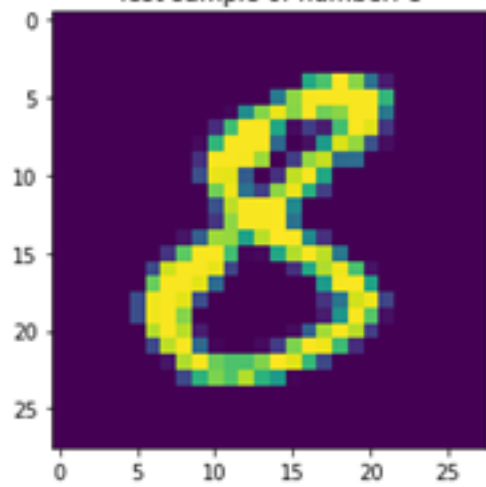
1875/1875 [=====] - 8s 4ms/step - loss: 0.0226 - accuracy: 0.9925

Epoch 20/20

1875/1875 [=====] - 8s 4ms/step - loss: 0.0194 - accuracy: 0.9937

INFO:tensorflow:Assets written to: ./image_classifier/best_model/assets

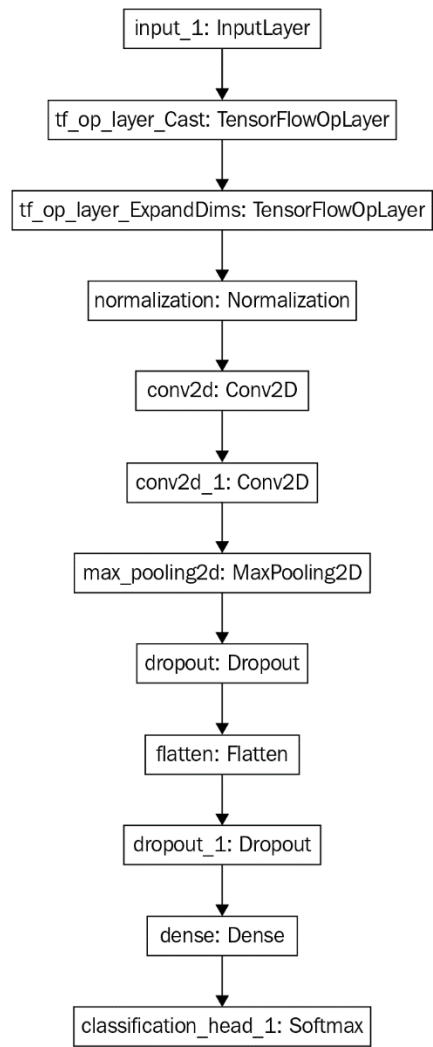
Test sample of number: 8



Model: "functional_1"

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None, 28, 28)]	0
cast_to_float32 (CastToFloat)	(None, 28, 28)	0
expand_last_dim (ExpandLastD)	(None, 28, 28, 1)	0
normalization (Normalization)	(None, 28, 28, 1)	3
conv2d (Conv2D)	(None, 26, 26, 32)	320
conv2d_1 (Conv2D)	(None, 24, 24, 64)	18496
max_pooling2d (MaxPooling2D)	(None, 12, 12, 64)	0
dropout (Dropout)	(None, 12, 12, 64)	0
flatten (Flatten)	(None, 9216)	0
dropout_1 (Dropout)	(None, 9216)	0
dense (Dense)	(None, 10)	92170
classification_head_1 (Softm)	(None, 10)	0

=====
Total params: 110,989
Trainable params: 110,986
Non-trainable params: 3

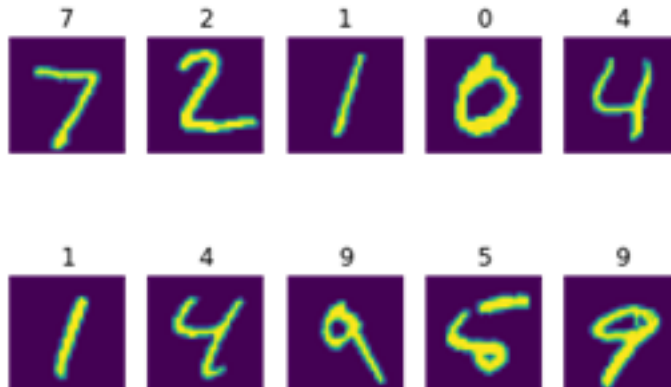


↳ Trial 1 Complete [00h 20m 13s]
val_loss: 0.12817470729351044

Best val_loss So Far: 0.12817470729351044
Total elapsed time: 00h 20m 13s
INFO:tensorflow:Oracle triggered exit

```
Epoch 1/20  
1875/1875 [=====] - 70s 37ms/step - loss: 4.6799 - mean_squared_error: 4.6799  
Epoch 2/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.9664 - mean_squared_error: 0.9664  
Epoch 3/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.5637 - mean_squared_error: 0.5637  
Epoch 4/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.5392 - mean_squared_error: 0.5392  
Epoch 5/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.5031 - mean_squared_error: 0.5031  
Epoch 6/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.4753 - mean_squared_error: 0.4753  
Epoch 7/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.4194 - mean_squared_error: 0.4194  
Epoch 8/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.5813 - mean_squared_error: 0.5813  
Epoch 9/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.3162 - mean_squared_error: 0.3162  
Epoch 10/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.2818 - mean_squared_error: 0.2818  
Epoch 11/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.2313 - mean_squared_error: 0.2313  
Epoch 12/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.2017 - mean_squared_error: 0.2017  
Epoch 13/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.1772 - mean_squared_error: 0.1772  
Epoch 14/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.1219 - mean_squared_error: 0.1219  
Epoch 15/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.1129 - mean_squared_error: 0.1129  
Epoch 16/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.1014 - mean_squared_error: 0.1014  
Epoch 17/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.0687 - mean_squared_error: 0.0687  
Epoch 18/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.0418 - mean_squared_error: 0.0418  
Epoch 19/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.0328 - mean_squared_error: 0.0328  
Epoch 20/20  
1875/1875 [=====] - 70s 37ms/step - loss: 0.0253 - mean_squared_error: 0.0253  
INFO:tensorflow:Assets written to: ./image_regressor/best_model/assets
```

```
313/313 [=====] - 3s 10ms/step - loss: 0.0839 - mean_squared_error: 0.0839  
[0.08389939367771149, 0.08389939367771149]
```

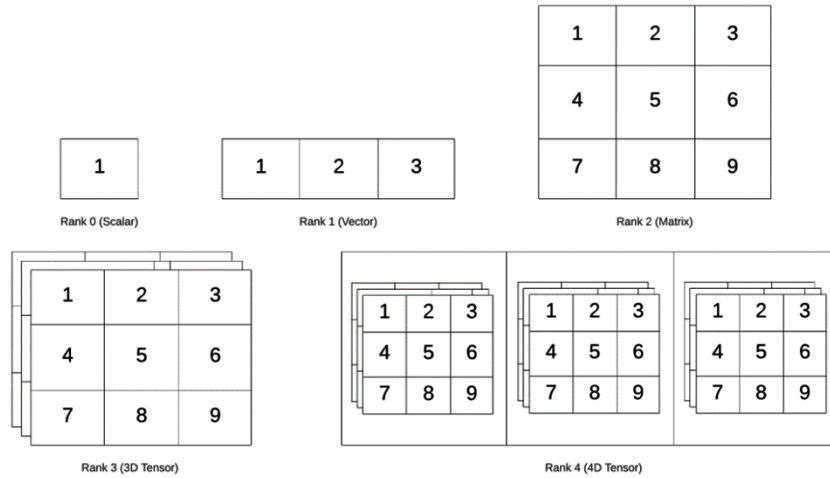
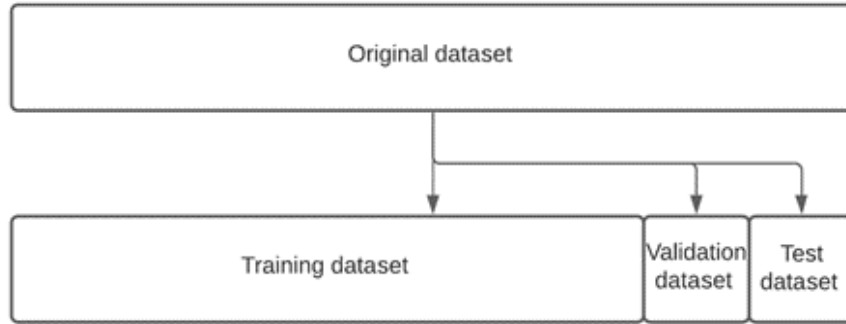


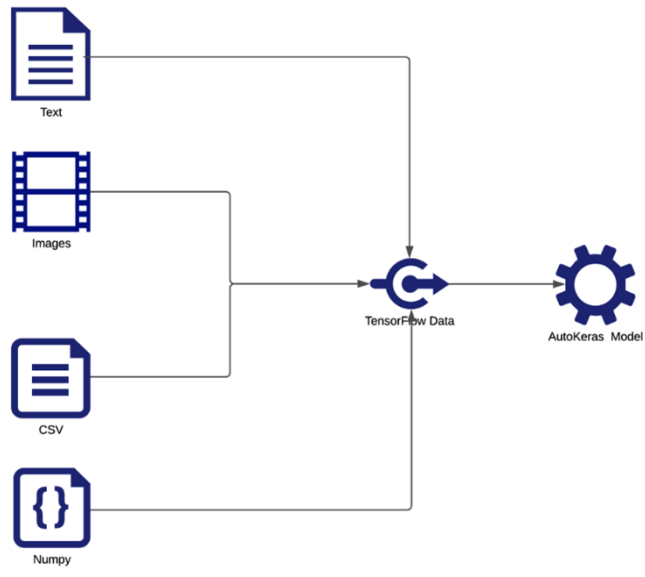
Model: "functional_1"

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[None, 28, 28]	0	
cast_to_float32 (CastToFloat32)	(None, 28, 28)	0	input_1[0][0]
expand_last_dim (ExpandLastDim)	(None, 28, 28, 1)	0	cast_to_float32[0][0]
resizing (Resizing)	(None, 32, 32, 1)	0	expand_last_dim[0][0]
concatenate (Concatenate)	(None, 32, 32, 3)	0	resizing[0][0] resizing[0][0] resizing[0][0]
resnet50 (Functional)	(None, 1, 1, 2048)	23587712	concatenate[0][0]
flatten (Flatten)	(None, 2048)	0	resnet50[0][0]
regression_head_1 (Dense)	(None, 1)	2049	flatten[0][0]

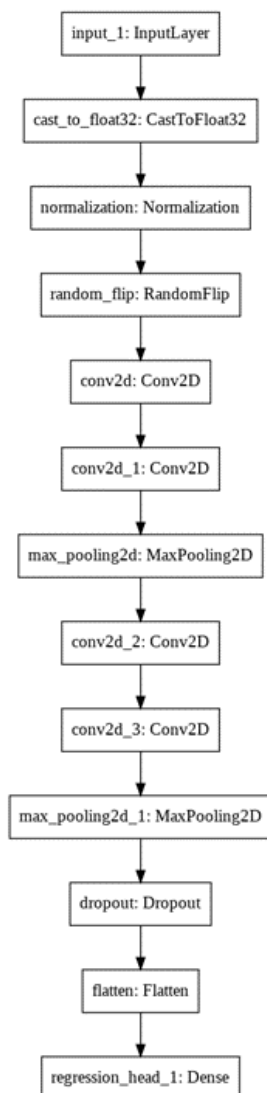
Total params: 23,589,761
Trainable params: 23,536,641
Non-trainable params: 53,120

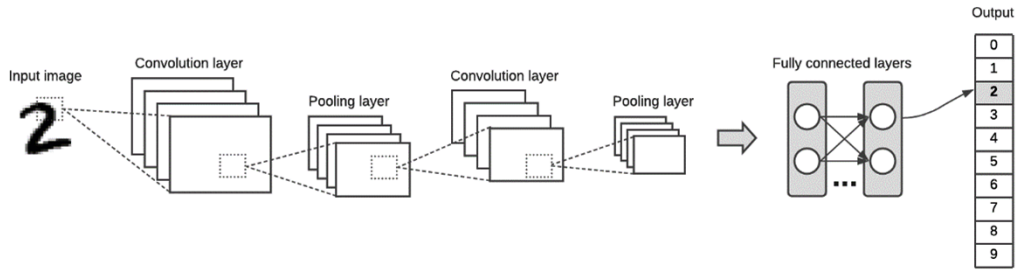
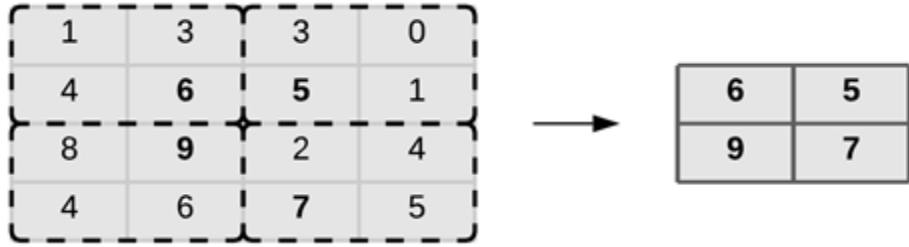
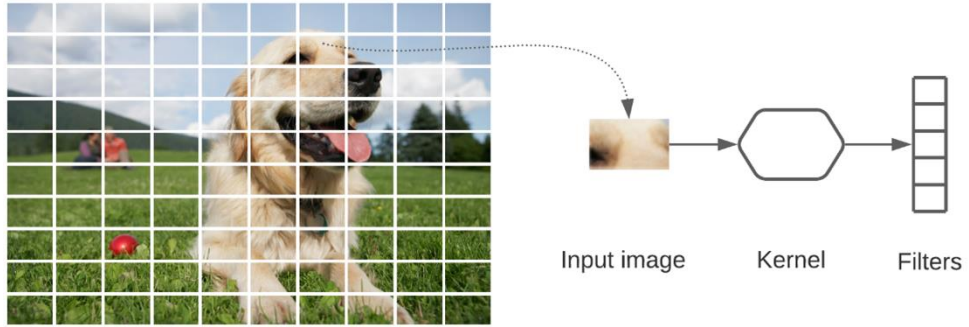
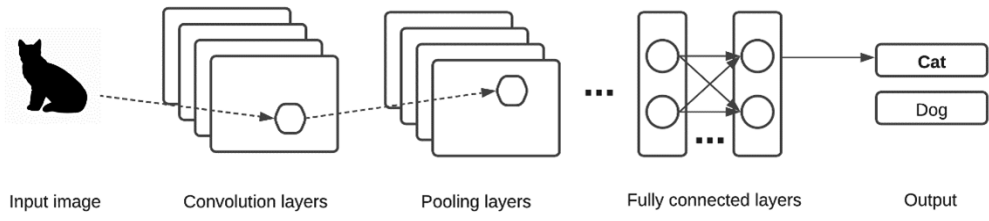
Chapter 3: Automating the Machine Learning Pipeline with AutoKeras

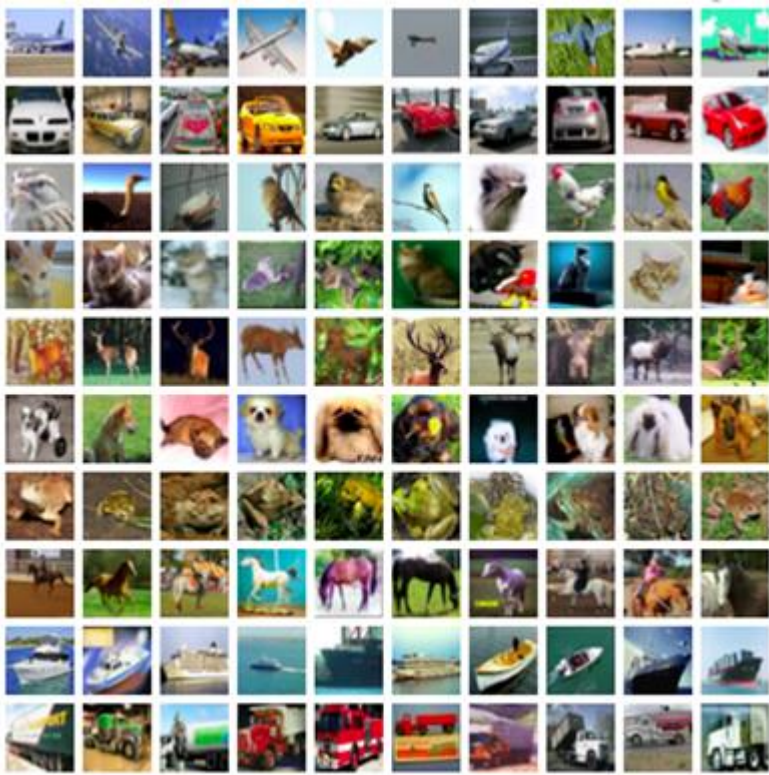
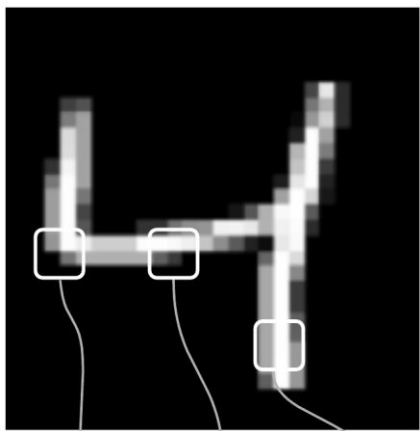


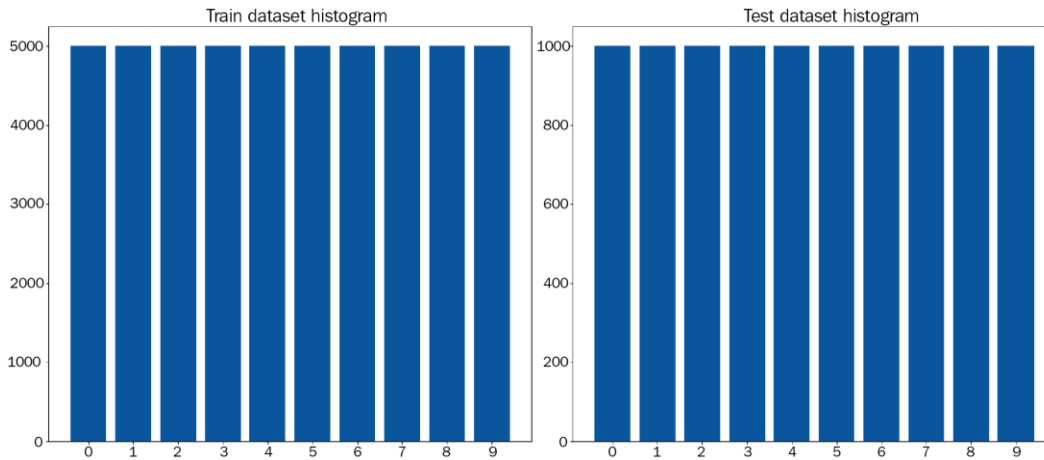


Chapter 4: Image Classification and Regression Using AutoKeras









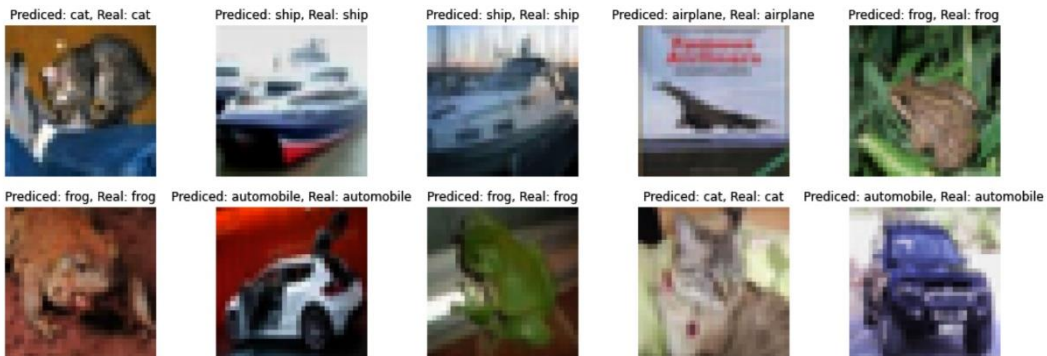
Search: Running Trial #1

Hyperparameter	Value	Best Value So Far
image_block_1/b...	vanilla	?
image_block_1/n...	True	?
image_block_1/a...	False	?
image_block_1/c...	3	?
image_block_1/c...	1	?
image_block_1/c...	2	?
image_block_1/c...	True	?
image_block_1/c...	False	?
image_block_1/c...	0.25	?
image_block_1/c...	32	?
image_block_1/c...	64	?
classification_...	flatten	?
classification_...	0.5	?
optimizer	adam	?
learning_rate	0.001	?

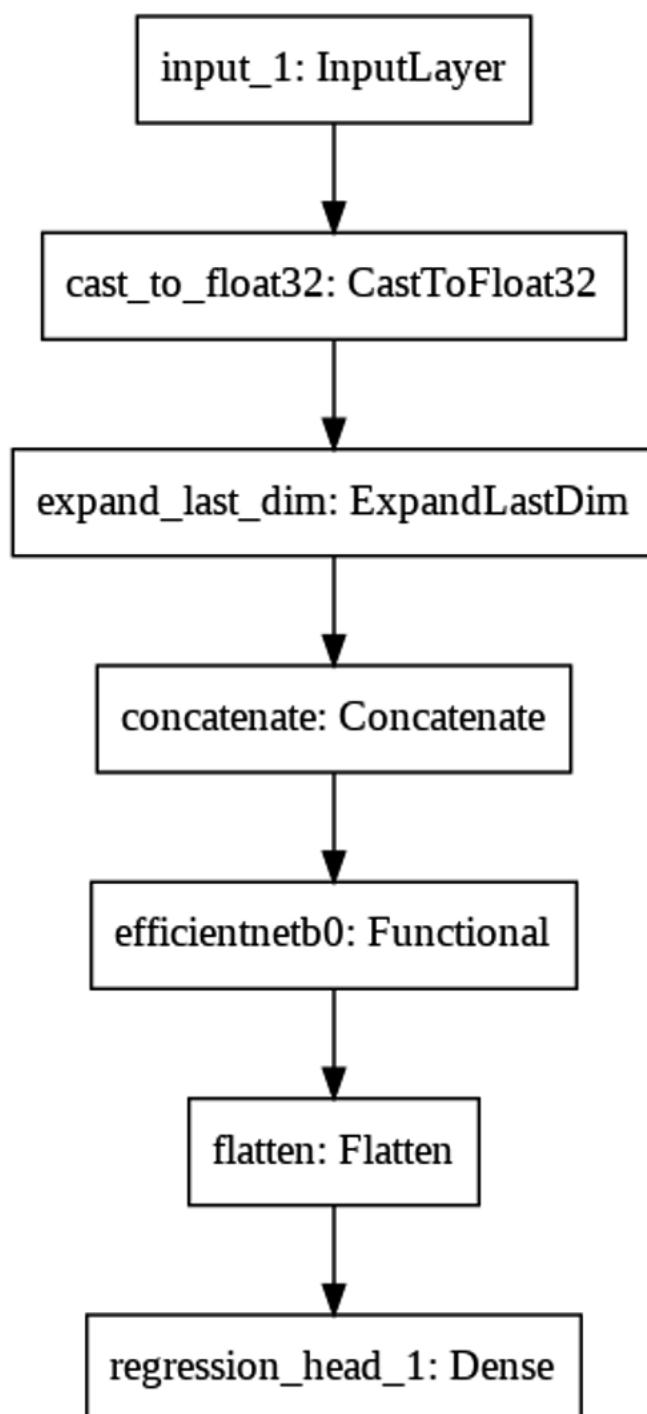
```

Epoch 1/1000
1251/1251 [=====] - 39s 6ms/step - loss: 1.6164 - accuracy: 0.4235 - val_loss: 1.1926 - val_accuracy: 0.5834
Epoch 2/1000
1251/1251 [=====] - 6s 5ms/step - loss: 1.1223 - accuracy: 0.6066 - val_loss: 1.0341 - val_accuracy: 0.6433
Epoch 3/1000
1251/1251 [=====] - 6s 5ms/step - loss: 1.0041 - accuracy: 0.6472 - val_loss: 0.9949 - val_accuracy: 0.6542
Epoch 4/1000
1251/1251 [=====] - 6s 5ms/step - loss: 0.9318 - accuracy: 0.6757 - val_loss: 0.9222 - val_accuracy: 0.6810
Epoch 5/1000
1251/1251 [=====] - 6s 5ms/step - loss: 0.8880 - accuracy: 0.6893 - val_loss: 0.9156 - val_accuracy: 0.6850
Epoch 6/1000
1251/1251 [=====] - 6s 5ms/step - loss: 0.8350 - accuracy: 0.7073 - val_loss: 0.8844 - val_accuracy: 0.6982
Epoch 7/1000
1251/1251 [=====] - 6s 5ms/step - loss: 0.8072 - accuracy: 0.7150 - val_loss: 0.8769 - val_accuracy: 0.6987
Epoch 8/1000
1251/1251 [=====] - 6s 5ms/step - loss: 0.7830 - accuracy: 0.7216 - val_loss: 0.8849 - val_accuracy: 0.6961
Epoch 9/1000
1251/1251 [=====] - 6s 5ms/step - loss: 0.7590 - accuracy: 0.7340 - val_loss: 0.8696 - val_accuracy: 0.7005
Epoch 10/1000
1251/1251 [=====] - 6s 5ms/step - loss: 0.7502 - accuracy: 0.7379 - val_loss: 0.8860 - val_accuracy: 0.7050
Epoch 11/1000
1251/1251 [=====] - 6s 5ms/step - loss: 0.7183 - accuracy: 0.7447 - val_loss: 0.8559 - val_accuracy: 0.7102
Epoch 12/1000
703/1251 [=====>.....] - ETA: 2s - loss: 0.7063 - accuracy: 0.7513

```

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None, 32, 32, 3)]	0
cast_to_float32 (CastToFloat)	(None, 32, 32, 3)	0
normalization (Normalization)	(None, 32, 32, 3)	7
random_translacion (RandomTr)	(None, 32, 32, 3)	0
random_flip (RandomFlip)	(None, 32, 32, 3)	0
resizing (Resizing)	(None, 224, 224, 3)	0
efficientnetb7 (Functional)	(None, None, None, 2560)	64097687
global_average_pooling2d (Gl)	(None, 2560)	0
dense (Dense)	(None, 10)	25610
classification_head_1 (Softm)	(None, 10)	0
Total params: 64,123,304		
Trainable params: 63,812,570		
Non-trainable params: 310,734		





Search: Running Trial #1

Hyperparameter	Value	Best Value So Far
image_block_1/n...	False	?
image_block_1/a...	False	?
image_block_1/b...	resnet	?
image_block_1/r...	False	?
image_block_1/r...	resnet50	?
image_block_1/r...	False	?
regression_head...	0	?
optimizer	adam	?
learning_rate	0.1	?

```

Epoch 1/10
500/500 [=====] - 110s 143ms/step - loss: 182548.5468 - mean_squared_error: 182548.5468 - val_loss: 1072.9189 - val_mean_squared_error: 1072.9189
Epoch 2/10
500/500 [=====] - 69s 138ms/step - loss: 180.0426 - mean_squared_error: 180.0426 - val_loss: 330.8058 - val_mean_squared_error: 330.8058
Epoch 3/10
500/500 [=====] - 70s 140ms/step - loss: 177.8204 - mean_squared_error: 177.8204 - val_loss: 263.8164 - val_mean_squared_error: 263.8164
Epoch 4/10
500/500 [=====] - 70s 140ms/step - loss: 176.9654 - mean_squared_error: 176.9654 - val_loss: 251.0037 - val_mean_squared_error: 251.0037
Epoch 5/10
500/500 [=====] - 70s 140ms/step - loss: 175.8862 - mean_squared_error: 175.8862 - val_loss: 191.7437 - val_mean_squared_error: 191.7437
Epoch 6/10
500/500 [=====] - 70s 140ms/step - loss: 176.4239 - mean_squared_error: 176.4239 - val_loss: 182.2056 - val_mean_squared_error: 182.2056
Epoch 7/10
286/500 [=====>.....] - ETA: 37s - loss: 176.8564 - mean_squared_error: 176.8564

```



Model: "functional_1"

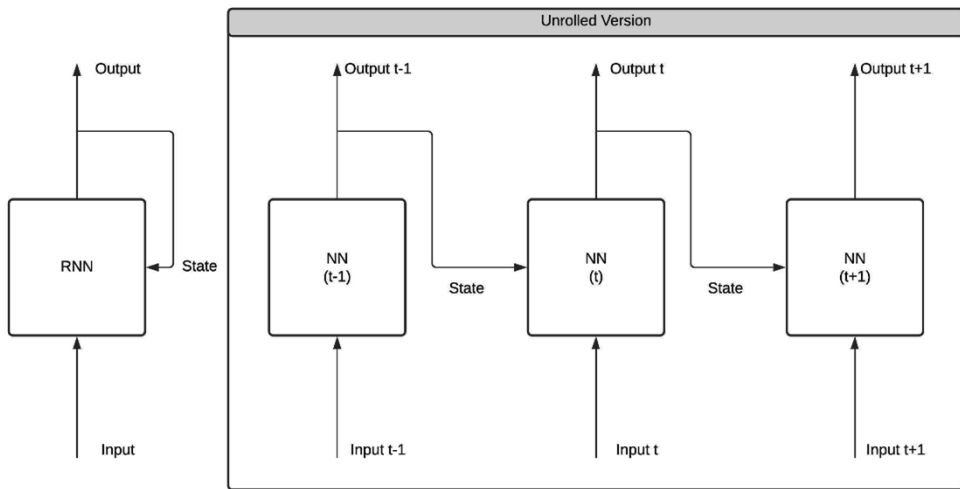
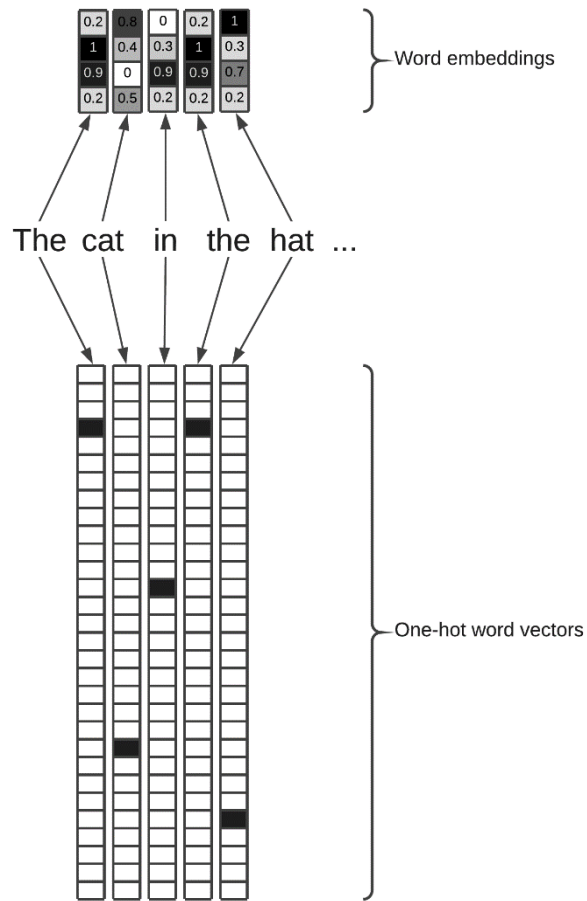
Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None, 128, 128, 1)]	0
cast_to_float32 (CastToFloat)	(None, 128, 128, 1)	0
normalization (Normalization)	(None, 128, 128, 1)	3
random_flip (RandomFlip)	(None, 128, 128, 1)	0
conv2d (Conv2D)	(None, 126, 126, 32)	320
conv2d_1 (Conv2D)	(None, 124, 124, 64)	18496
max_pooling2d (MaxPooling2D)	(None, 62, 62, 64)	0
conv2d_2 (Conv2D)	(None, 60, 60, 32)	18464
conv2d_3 (Conv2D)	(None, 58, 58, 32)	9248
max_pooling2d_1 (MaxPooling2D)	(None, 29, 29, 32)	0
dropout (Dropout)	(None, 29, 29, 32)	0
flatten (Flatten)	(None, 26912)	0
regression_head_1 (Dense)	(None, 1)	26913

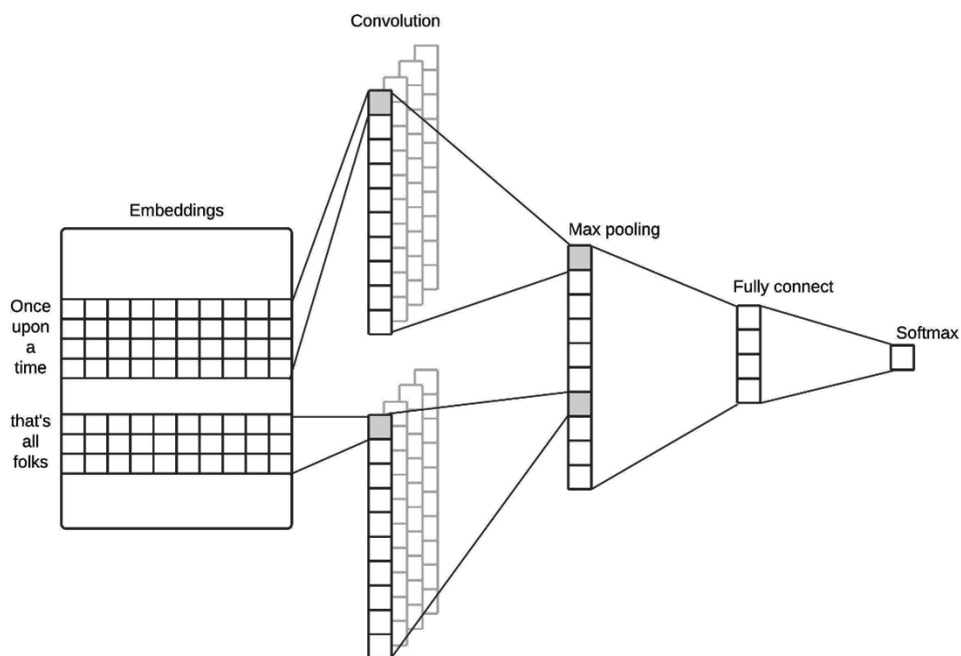
Total params: 73,444
Trainable params: 73,441
Non-trainable params: 3

Chapter 5: Text Classification and Regression Using AutoKeras

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None,)]	0
expand_last_dim (ExpandLastD	(None, 1)	0
text_vectorization (TextVect	(None, 64)	0
embedding (Embedding)	(None, 64, 32)	160032
dropout (Dropout)	(None, 64, 32)	0
conv1d (Conv1D)	(None, 62, 32)	3104
conv1d_1 (Conv1D)	(None, 60, 32)	3104
max_pooling1d (MaxPooling1D)	(None, 30, 32)	0
conv1d_2 (Conv1D)	(None, 28, 32)	3104
conv1d_3 (Conv1D)	(None, 26, 32)	3104
max_pooling1d_1 (MaxPooling1	(None, 13, 32)	0
flatten (Flatten)	(None, 416)	0
dense (Dense)	(None, 32)	13344
re_lu (ReLU)	(None, 32)	0
dense_1 (Dense)	(None, 32)	1056
re_lu_1 (ReLU)	(None, 32)	0
regression_head_1 (Dense)	(None, 1)	33

=====
Total params: 186,881
Trainable params: 186,881
Non-trainable params: 0





	spam	message
0	0	Go until jurong point, crazy.. Available only ...
1	0	Ok lar... Joking wif u oni...
2	1	Free entry in 2 a wkly comp to win FA Cup fina...
3	0	U dun say so early hor... U c already then say...
4	0	Nah I don't think he goes to usf, he lives aro...

Trial 2 Complete [00h 00m 13s]
 val_loss: 0.11438851803541183

Best val_loss So Far: 0.08033576607704163

Total elapsed time: 00h 00m 21s

INFO:tensorflow:Oracle triggered exit

Epoch 1/3

131/131 [=====] - 2s 11ms/step - loss: 0.4098 - accuracy: 0.8703

Epoch 2/3

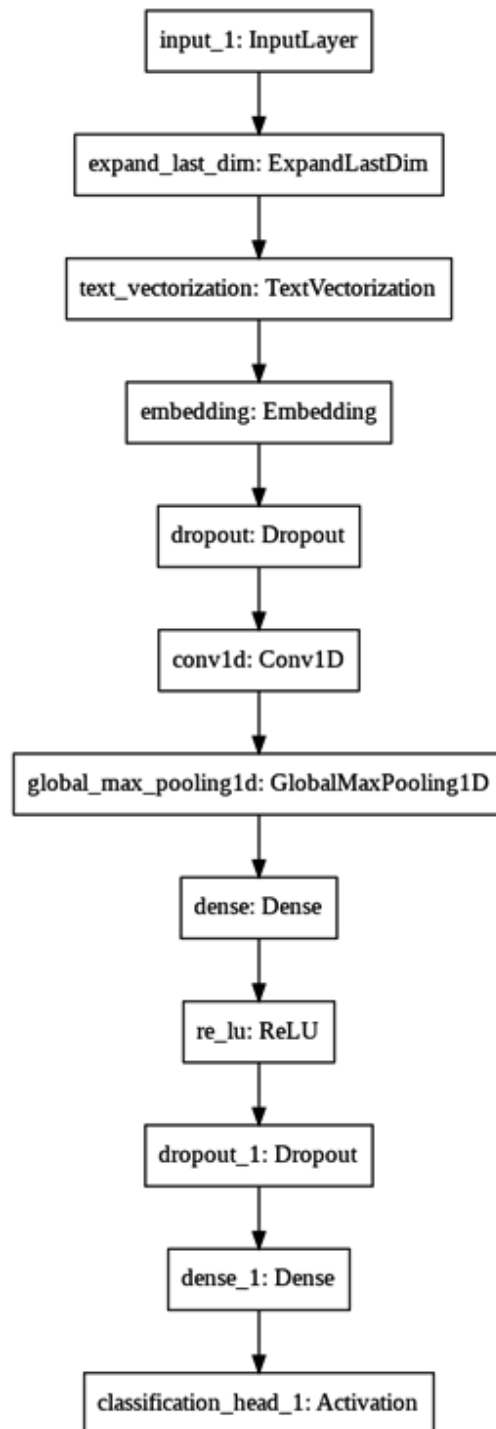
131/131 [=====] - 1s 10ms/step - loss: 0.0701 - accuracy: 0.9779

Epoch 3/3

131/131 [=====] - 1s 10ms/step - loss: 0.0230 - accuracy: 0.9958

INFO:tensorflow:Assets written to: ./text_classifier/best_model/assets

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None,)]	0
expand_last_dim (ExpandLastD	(None, 1)	0
text_vectorization (TextVect	(None, 512)	0
embedding (Embedding)	(None, 512, 64)	320064
dropout (Dropout)	(None, 512, 64)	0
conv1d (Conv1D)	(None, 508, 256)	82176
global_max_pooling1d (Global	(None, 256)	0
dense (Dense)	(None, 256)	65792
re_lu (ReLU)	(None, 256)	0
dropout_1 (Dropout)	(None, 256)	0
dense_1 (Dense)	(None, 1)	257
classification_head_1 (Activ	(None, 1)	0
Total params: 468,289		
Trainable params: 468,289		
Non-trainable params: 0		



IDLink	Title	HeadLine	Source	Topic	PublishDate	SentimentTitle	SentimentHeadline	Facebook	GooglePlus	LinkedIn	
732	299.0	Microsoft's OneDrive debacle shows its cloud c...	When Microsoft announced earlier this week tha...	Digital Trends via Yahoo! News	microsoft	2015-11-08 12:15:00	-0.166139	-0.259052	6	0	1
734	294.0	'Economy to improve in next 2 quarters'	In the coming six months, there seems to be gr...	The Hindu	economy	2015-11-08 12:54:00	0.114820	0.256116	2	0	3
736	292.0	Get ready for a ton of FedSpeak (DJA, SPY, SP...	The US economy had a blockbuster October. US c...	Business Insider	economy	2015-11-08 13:07:00	-0.055902	-0.378927	27	2	22
738	328.0	Microsoft to play a big part in Digital India	Bhaskar Pramanik, Chairman, Microsoft India, s...	DNA India	microsoft	2015-11-08 16:47:00	-0.018326	0.062500	11	1	1
741	201.0	Dollar Goes From Savior to Scapegoat as Zimbab...	Zimbabwe freed its economy from the nightmare ...	Bloomberg	economy	2015-11-08 20:41:00	-0.079057	0.000000	61	0	32
...
93222	61866.0	Microsoft operating chief Kevin Turner is leav...	Kevin Turner, the former Walmart executive who...	Recode	microsoft	2016-07-07 14:20:11	0.037689	-0.052129	-1	4	16
93224	61839.0	Microsoft set a new record by storing an OK Go...	Microsoft announced on Thursday that it has se...	Business Insider	microsoft	2016-07-07 14:27:11	-0.122161	0.118732	-1	3	27
93229	61849.0	Read Microsoft's Cringeworthy Millennial-Bait ...	For any corporate recruiter thinking about add...	Fortune	microsoft	2016-07-07 15:06:11	0.051031	0.178885	-1	0	6
93234	61851.0	Stocks rise as investors key in on US economy ...	The June employment report is viewed as a cruc...	MarketWatch	economy	2016-07-07 15:31:05	0.104284	0.044943	-1	3	5
93235	61865.0	Russian PM proposes to use conservative and to...	In addition, establish stimulating economic po...	TASS	economy	2016-07-07 15:31:10	0.072194	0.000000	-1	0	1

37640 rows x 11 columns

Trial 2 Complete [00h 03m 44s]
val_loss: 14726.8974609375

Best val_loss So Far: 14726.8974609375

Total elapsed time: 00h 07m 11s

INFO:tensorflow:Oracle triggered exit

Epoch 1/9

2331/2331 [=====] - 23s 10ms/step - loss: 25841.2314 - mean_squared_error: 25841.2314

Epoch 2/9

2331/2331 [=====] - 22s 9ms/step - loss: 25266.0573 - mean_squared_error: 25266.0573

Epoch 3/9

2331/2331 [=====] - 22s 9ms/step - loss: 25201.4815 - mean_squared_error: 25201.4815

Epoch 4/9

2331/2331 [=====] - 22s 9ms/step - loss: 24630.7472 - mean_squared_error: 24630.7472

Epoch 5/9

2331/2331 [=====] - 22s 10ms/step - loss: 22843.2585 - mean_squared_error: 22843.2585

Epoch 6/9

2331/2331 [=====] - 22s 10ms/step - loss: 20687.3622 - mean_squared_error: 20687.3622

Epoch 7/9

2331/2331 [=====] - 22s 10ms/step - loss: 17115.8473 - mean_squared_error: 17115.8473

Epoch 8/9

2331/2331 [=====] - 23s 10ms/step - loss: 10369.0446 - mean_squared_error: 10369.0446

Epoch 9/9

2331/2331 [=====] - 23s 10ms/step - loss: 19128.3602 - mean_squared_error: 19128.3602

INFO:tensorflow:Assets written to: ./text_regressor/best_model/assets

Chapter 6: Working with Structured Data Using AutoKeras

	survived	sex	age	n_siblings_spouses	parch	fare	class	deck	embark_town	alone
0	0	male	35.0	0	0	8.0500	Third	unknown	Southampton	y
1	0	male	54.0	0	0	51.8625	First	E	Southampton	y
2	1	female	58.0	0	0	26.5500	First	C	Southampton	y
3	1	female	55.0	0	0	16.0000	Second	unknown	Southampton	y
4	1	male	34.0	0	0	13.0000	Second	D	Southampton	y
...
259	1	female	25.0	0	1	26.0000	Second	unknown	Southampton	n
260	0	male	33.0	0	0	7.8958	Third	unknown	Southampton	y
261	0	female	39.0	0	5	29.1250	Third	unknown	Queenstown	n
262	0	male	27.0	0	0	13.0000	Second	unknown	Southampton	y
263	1	male	26.0	0	0	30.0000	First	C	Cherbourg	y

264 rows × 10 columns

```
Trial 2 Complete [00h 00m 03s]
val_accuracy: 0.8260869383811951
```

```
Best val_accuracy So Far: 0.843478262424469
```

```
Total elapsed time: 00h 00m 06s
```

```
INFO:tensorflow:Oracle triggered exit
```

```
Epoch 1/10
```

```
20/20 [=====] - 1s 2ms/step - loss: 0.6486 - accuracy: 0.6435
```

```
Epoch 2/10
```

```
20/20 [=====] - 0s 2ms/step - loss: 0.5742 - accuracy: 0.7467
```

```
Epoch 3/10
```

```
20/20 [=====] - 0s 2ms/step - loss: 0.5263 - accuracy: 0.7971
```

```
Epoch 4/10
```

```
20/20 [=====] - 0s 2ms/step - loss: 0.4917 - accuracy: 0.8126
```

```
Epoch 5/10
```

```
20/20 [=====] - 0s 2ms/step - loss: 0.4674 - accuracy: 0.8116
```

```
Epoch 6/10
```

```
20/20 [=====] - 0s 2ms/step - loss: 0.4504 - accuracy: 0.8115
```

```
Epoch 7/10
```

```
20/20 [=====] - 0s 2ms/step - loss: 0.4390 - accuracy: 0.8142
```

```
Epoch 8/10
```

```
20/20 [=====] - 0s 2ms/step - loss: 0.4314 - accuracy: 0.8125
```

```
Epoch 9/10
```

```
20/20 [=====] - 0s 3ms/step - loss: 0.4259 - accuracy: 0.8166
```

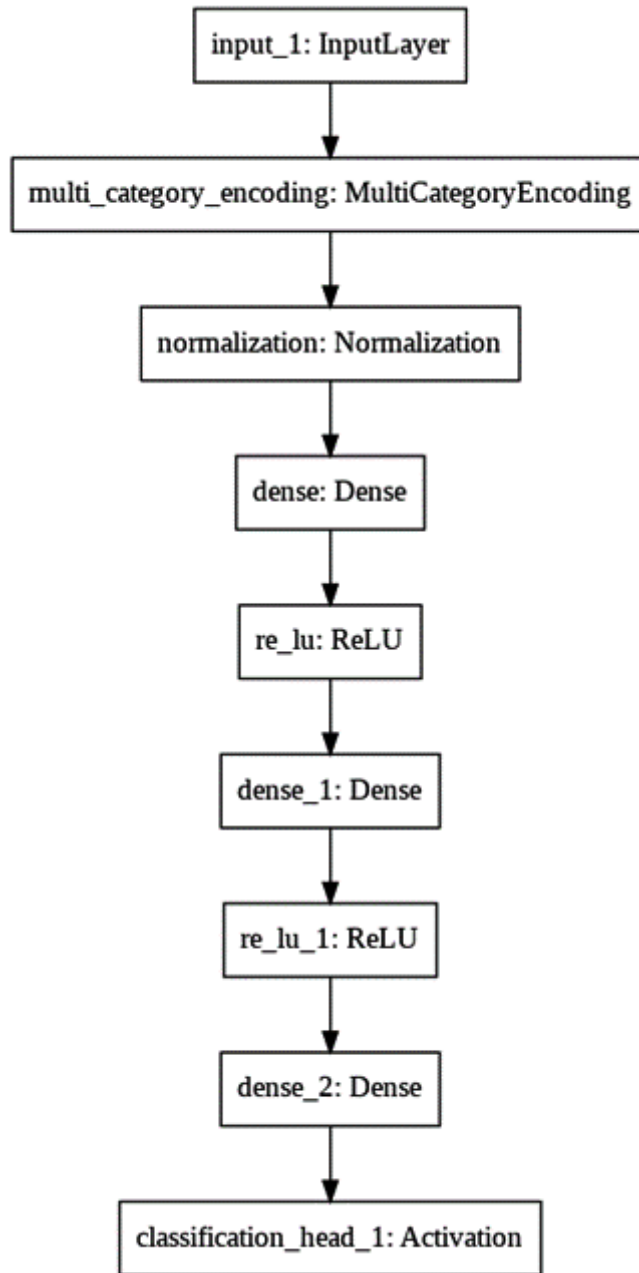
```
Epoch 10/10
```

```
20/20 [=====] - 0s 2ms/step - loss: 0.4216 - accuracy: 0.8193
```

```
INFO:tensorflow:Assets written to: ./structured_data_classifier/best_model/assets
```

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None, 9)]	0
multi_category_encoding (Mul	(None, 9)	0
normalization (Normalization	(None, 9)	19
dense (Dense)	(None, 128)	1280
re_lu (ReLU)	(None, 128)	0
dense_1 (Dense)	(None, 32)	4128
re_lu_1 (ReLU)	(None, 32)	0
dense_2 (Dense)	(None, 1)	33
classification_head_1 (Activ	(None, 1)	0

Total params: 5,460
 Trainable params: 5,441
 Non-trainable params: 19



	CRIM	ZN	INDUS	CHAS	NOX	RM	AGE	DIS	RAD	TAX	PTRATIO	LSTAT
0	0.00632	18.0	2.31	0	0.538	6.575	65.2	4.0900	1	296	15.3	4.98
1	0.02731	0.0	7.07	0	0.469	6.421	78.9	4.9671	2	242	17.8	9.14
2	0.02729	0.0	7.07	0	0.469	7.185	61.1	4.9671	2	242	17.8	4.03
3	0.03237	0.0	2.18	0	0.458	6.998	45.8	6.0622	3	222	18.7	2.94
4	0.06905	0.0	2.18	0	0.458	7.147	54.2	6.0622	3	222	18.7	5.33
...
501	0.06263	0.0	11.93	0	0.573	6.593	69.1	2.4786	1	273	21.0	9.67
502	0.04527	0.0	11.93	0	0.573	6.120	76.7	2.2875	1	273	21.0	9.08
503	0.06076	0.0	11.93	0	0.573	6.976	91.0	2.1675	1	273	21.0	5.64
504	0.10959	0.0	11.93	0	0.573	6.794	89.3	2.3889	1	273	21.0	6.48
505	0.04741	0.0	11.93	0	0.573	6.030	80.8	2.5050	1	273	21.0	7.88

506 rows × 12 columns

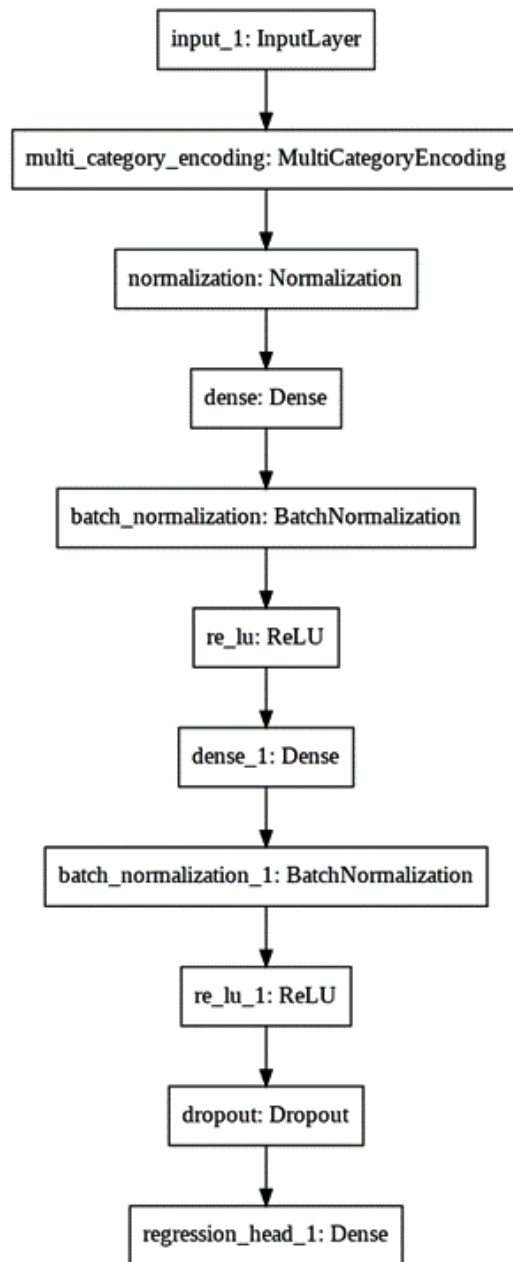
Trial 20 Complete [00h 00m 20s]
val_loss: 5.636470317840576

Best val_loss So Far: 5.055739402770996
Total elapsed time: 00h 04m 12s
INFO:tensorflow:Oracle triggered exit

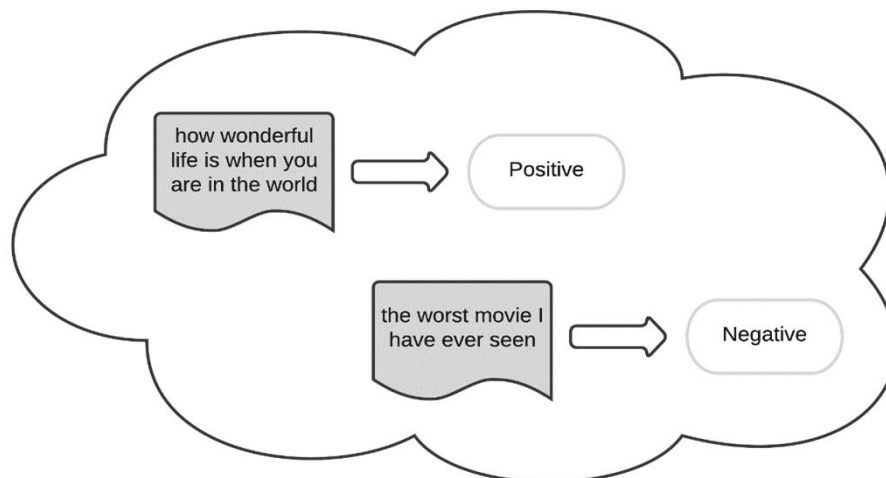
Epoch 1/50
13/13 [=====] - 1s 21ms/step - loss: 491.6132 - mae: 21.0906
Epoch 2/50
13/13 [=====] - 0s 20ms/step - loss: 240.6108 - mae: 14.7851
Epoch 3/50
13/13 [=====] - 0s 20ms/step - loss: 108.5177 - mae: 9.4593
Epoch 4/50
13/13 [=====] - 0s 27ms/step - loss: 41.2898 - mae: 5.3755
Epoch 5/50
13/13 [=====] - 0s 20ms/step - loss: 16.2192 - mae: 3.0941
Epoch 6/50
13/13 [=====] - 0s 21ms/step - loss: 11.1949 - mae: 2.5318
Epoch 7/50
13/13 [=====] - 0s 21ms/step - loss: 8.6533 - mae: 2.2224
Epoch 8/50
13/13 [=====] - 0s 20ms/step - loss: 7.6766 - mae: 2.1011
Epoch 9/50
13/13 [=====] - 0s 19ms/step - loss: 6.6962 - mae: 1.9767
Epoch 10/50
13/13 [=====] - 0s 20ms/step - loss: 7.2498 - mae: 2.0408
Epoch 11/50
13/13 [=====] - 0s 20ms/step - loss: 6.1006 - mae: 1.9432
Epoch 12/50
13/13 [=====] - 0s 19ms/step - loss: 5.7730 - mae: 1.8258
Epoch 13/50
13/13 [=====] - 0s 19ms/step - loss: 5.9468 - mae: 1.8431
Epoch 14/50
13/13 [=====] - 0s 20ms/step - loss: 5.3944 - mae: 1.7894
Epoch 15/50
13/13 [=====] - 0s 20ms/step - loss: 6.5695 - mae: 1.9628
Epoch 16/50
13/13 [=====] - 0s 20ms/step - loss: 6.0071 - mae: 1.8236
Epoch 17/50
13/13 [=====] - 0s 19ms/step - loss: 6.0132 - mae: 1.9093
Epoch 18/50
13/13 [=====] - 0s 19ms/step - loss: 7.1281 - mae: 1.9973
Epoch 19/50
13/13 [=====] - 0s 19ms/step - loss: 5.5487 - mae: 1.8468

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None, 13)]	0
multi_category_encoding (Mul	(None, 13)	0
normalization (Normalization	(None, 13)	27
dense (Dense)	(None, 128)	1792
batch_normalization (BatchNo	(None, 128)	512
re_lu (ReLU)	(None, 128)	0
dense_1 (Dense)	(None, 1024)	132096
batch_normalization_1 (Batch	(None, 1024)	4096
re_lu_1 (ReLU)	(None, 1024)	0
regression_head_1 (Dense)	(None, 1)	1025

=====
 Total params: 139,548
 Trainable params: 137,217
 Non-trainable params: 2,331



Chapter 7: Sentiment Analysis Using AutoKeras



Trial 2 Complete [00h 02m 49s]
val_loss: 0.32017290592193604

Best val_loss So Far: 0.27246472239494324

Total elapsed time: 00h 09m 27s

INFO:tensorflow:Oracle triggered exit

Epoch 1/2

782/782 [=====] - 117s 149ms/step - loss: 0.5567 - accuracy: 0.6677

Epoch 2/2

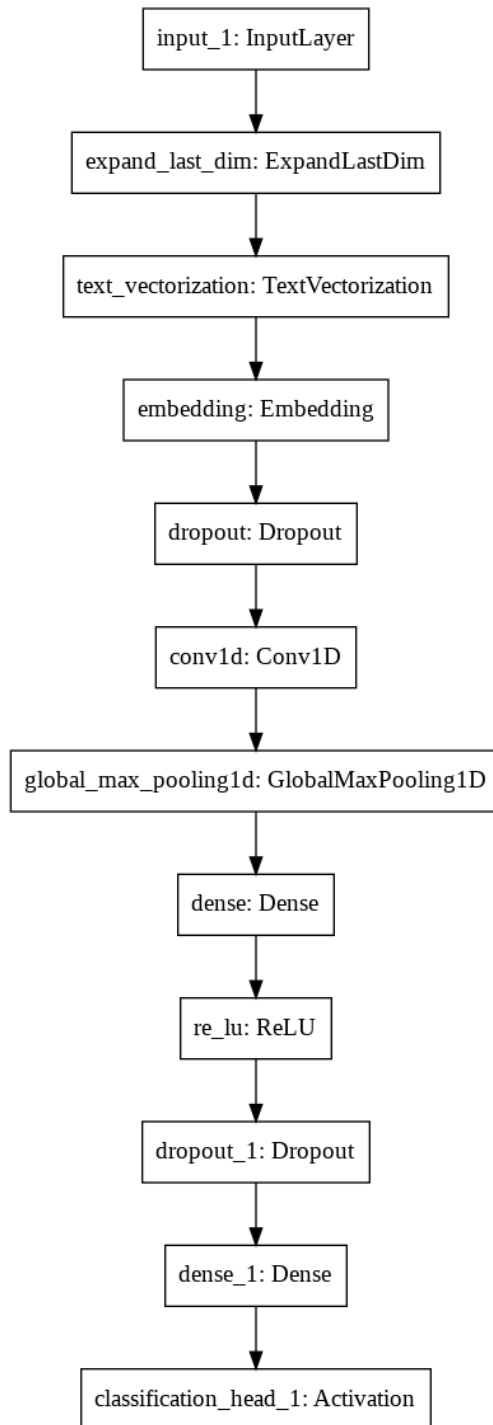
782/782 [=====] - 117s 150ms/step - loss: 0.2624 - accuracy: 0.8939

INFO:tensorflow:Assets written to: ./text_classifier/best_model/assets

Model: "model"

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None,)]	0
expand_last_dim (ExpandLastD	(None, 1)	0
text_vectorization (TextVect	(None, 512)	0
embedding (Embedding)	(None, 512, 64)	320064
dropout (Dropout)	(None, 512, 64)	0
conv1d (Conv1D)	(None, 508, 256)	82176
global_max_pooling1d (Global	(None, 256)	0
dense (Dense)	(None, 256)	65792
re_lu (ReLU)	(None, 256)	0
dropout_1 (Dropout)	(None, 256)	0
dense_1 (Dense)	(None, 1)	257
classification_head_1 (Activ	(None, 1)	0

Total params: 468,289
Trainable params: 468,289
Non-trainable params: 0



<START> please give this one a miss br br kristy swanson and the rest of the cast rendered terrible performances the show is flat flat flat br br i don't know how michael madison could have allowed this one on his plate he almost seemed to know t his wasn't going to work out and his performance was quite lacklustre so all you madison fans give this a miss

Label: Negative, prediction: Negative

<START> this film requires a lot of patience because it focuses on mood and character development the plot is very simple a nd many of the scenes take place on the same set in frances austen's the sandy dennis character apartment but the film buil ds to a disturbing climax br br the characters create an atmosphere rife with sexual tension and psychological trickery it' s very interesting that robert altman directed this considering the style and structure of his other films still the tradem ark altman audio style is evident here and there i think what really makes this film work is the brilliant performance by s andy dennis it's definitely one of her darker characters but she plays it so perfectly and convincingly that it's scary mic hael burns does a good job as the mute young man regular altman player michael murphy has a small part the <UNK> moody set fits the content of the story very well in short this movie is a powerful study of loneliness sexual repression and despera tion be patient <UNK> up the atmosphere and pay attention to the wonderfully written script br br i praise robert altman th is is one of his many films that deals with unconventional fascinating subject matter this film is disturbing but it's sinc ere and it's sure to elicit a strong emotional response from the viewer if you want to see an unusual film some might even say bizarre this is worth the time br br unfortunately it's very difficult to find in video stores you may have to buy it o ff the internet

Label: Positive, prediction: Positive

<START> many animation buffs consider <UNK> <UNK> the great forgotten genius of one special branch of the art puppet animat ion which he invented almost single handedly and as it happened almost accidentally as a young man <UNK> was more intereste d in <UNK> than the cinema but his unsuccessful attempt to film two <UNK> beetles fighting led to an unexpected breakthrough h in film making when he realized he could simulate movement by manipulating beetle <UNK> and photographing them one frame at a time this discovery led to the production of amazingly elaborate classic short the <UNK> revenge which he made in russ ia in 1912 at a time when motion picture animation of all sorts was in its infancy br br the political <UNK> of the russian revolution caused <UNK> to move to paris where one of his first productions coincidentally was a dark political satire <UNK > known as <UNK> or the frogs who wanted a king a strain of black comedy can be found in almost all of films but here it is very dark indeed aimed more at grown ups who can appreciate the satirical aspects than children who would most likely find the climax upsetting i'm middle aged and found it pretty upsetting myself and indeed prints of the film intended for englis h speaking viewers of the 1920s were given title cards filled with puns and quips in order to help soften the sharp sting o f the finale br br our tale is set in a swamp the <UNK> <UNK> where the citizens are unhappy with their government and have called a special session to see what they can do to improve matters they decide to <UNK> <UNK> for a king the crowds are im pressively animated in this opening sequence it couldn't have been easy to make so many frog puppets look alive simultaneou sly while <UNK> for his part is depicted as a droll white bearded guy in the clouds who looks like he'd rather be taking a nap when <UNK> sends them a tree like god who regards them the frogs decide that this is no improvement and demand a differ ent king irritated <UNK> sends them a <UNK> br br delighted with this formidable looking new king who towers above them the frogs welcome him with a <UNK> of <UNK> dressed <UNK> the mayor steps forward to hand him the key to the <UNK> as newsreel cameras record the event to everyone's horror the <UNK> promptly eats the mayor and then goes on a merry rampage <UNK> citi zens at random a title card <UNK> reads news of the king's appetite throughout the kingdom when the now terrified frogs onc e more <UNK> <UNK> for help he loses his temper and showers their community with lightning bolts the moral of our story del ivered by a hapless frog just before he is eaten is let well enough alone br br considering the time period when this start ling little film was made and considering the fact that it was made by a russian <UNK> at the height of that beleaguered co untry's civil war it would be easy to see this as a parable about those events <UNK> may or may not have had <UNK> turmoil in mind when he made <UNK> but whatever prompted his choice of material the film stands as a cautionary tale of universal a pplication <UNK> could be the soviet union italy germany or japan in the 1930s or any country of any era that lets its guar d down and is overwhelmed by tyranny it's a fascinating film even a charming one in its macabre way but its message is no j oke

Label: Positive, prediction: Positive

Trial 2 Complete [00h 00m 41s]
val_loss: 1.1574714183807373

Best val_loss So Far: 0.9651017189025879
Total elapsed time: 00h 01m 20s

INFO:tensorflow:Oracle triggered exit

Epoch 1/6

281/281 [=====] - 5s 16ms/step - loss: 2.4081 - accuracy: 0.4190

Epoch 2/6

281/281 [=====] - 4s 15ms/step - loss: 1.4365 - accuracy: 0.6616

Epoch 3/6

281/281 [=====] - 4s 15ms/step - loss: 1.1436 - accuracy: 0.7245

Epoch 4/6

281/281 [=====] - 4s 15ms/step - loss: 0.9179 - accuracy: 0.7780

Epoch 5/6

281/281 [=====] - 4s 15ms/step - loss: 0.7517 - accuracy: 0.8181

Epoch 6/6

281/281 [=====] - 4s 15ms/step - loss: 0.6245 - accuracy: 0.8425

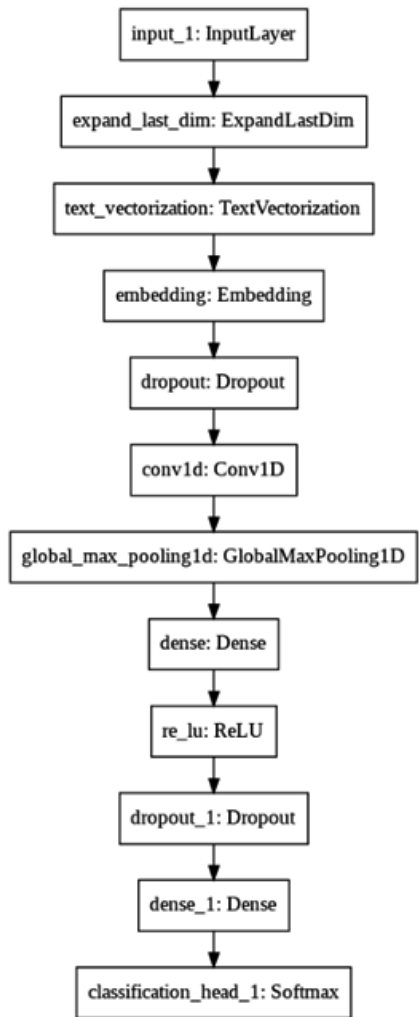
INFO:tensorflow:Assets written to: ./text_classifier/best_model/assets

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None,)]	0
expand_last_dim (ExpandLastD (None, 1)		0
text_vectorization (TextVect (None, 512)		0
embedding (Embedding)	(None, 512, 64)	320064
dropout (Dropout)	(None, 512, 64)	0
conv1d (Conv1D)	(None, 508, 256)	82176
global_max_pooling1d (Global (None, 256)		0
dense (Dense)	(None, 256)	65792
re_lu (ReLU)	(None, 256)	0
dropout_1 (Dropout)	(None, 256)	0
dense_1 (Dense)	(None, 46)	11822
classification_head_1 (Softm (None, 46)		0

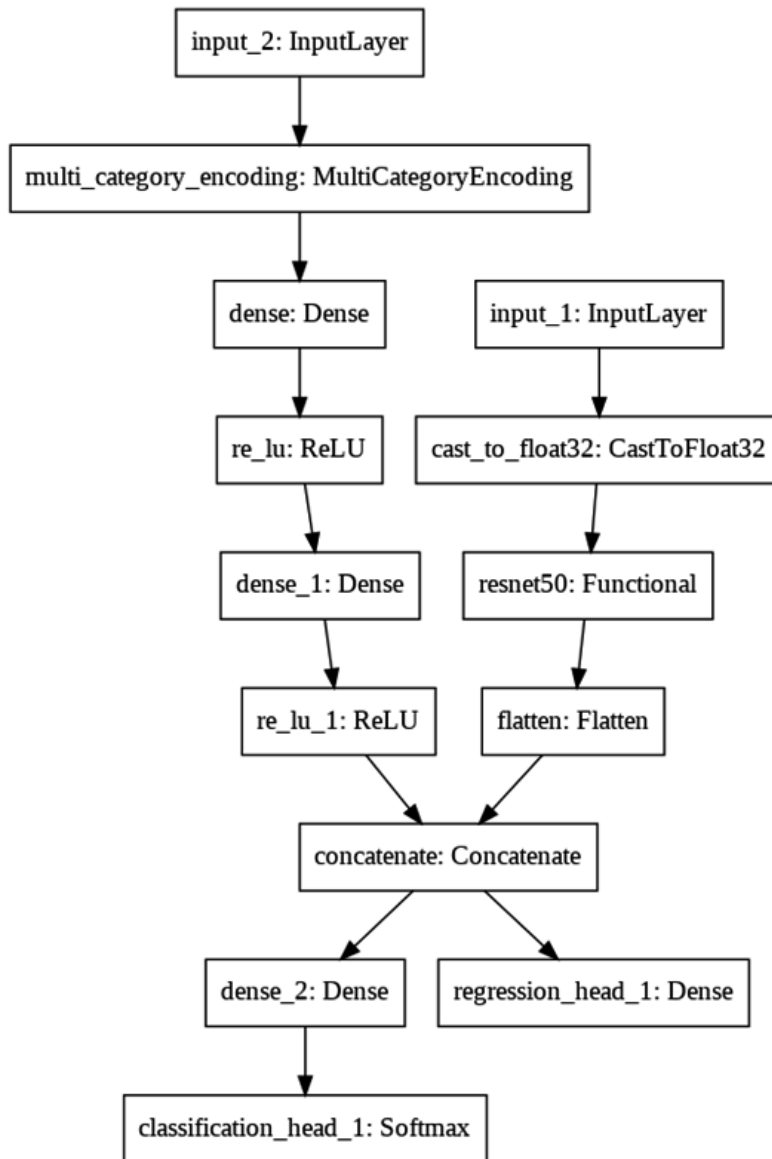
Total params: 479,854

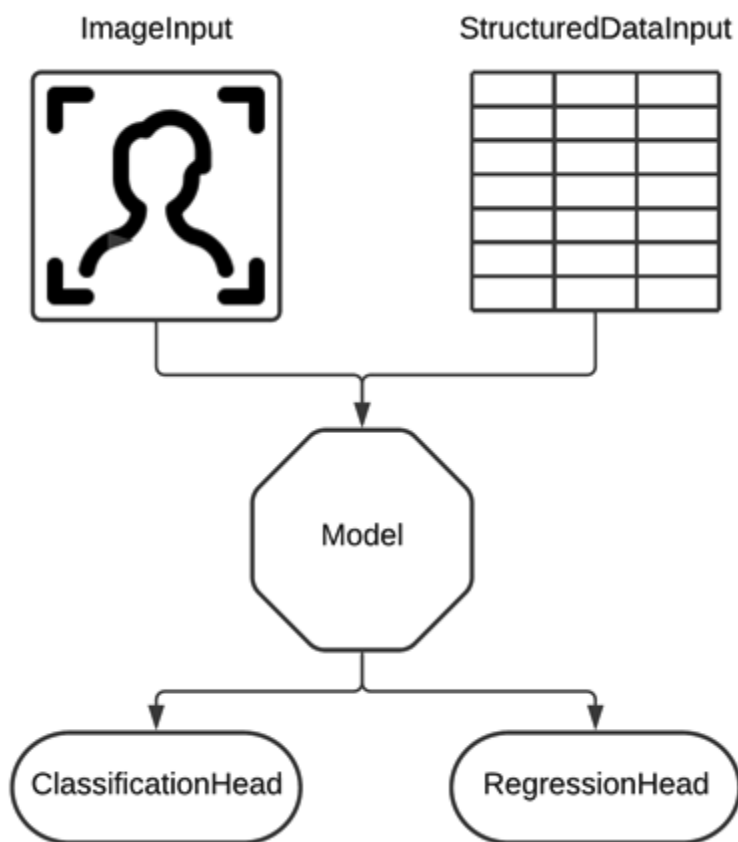
Trainable params: 479,854

Non-trainable params: 0



Chapter 9: Working with Multi-Modal Data and Multi-Task





Trial 2 Complete [00h 00m 33s]
 val_loss: 64.71123504638672

Best val_loss So Far: 1.745060920715332

Total elapsed time: 00h 01m 13s

INFO:tensorflow:Oracle triggered exit

Epoch 1/3

4/4 [=====] - 14s 2s/step - loss: 7.9336 - regression_head_1_loss: 5.0938 - classification_head_1_loss: 2.8398 - regression_head_1_mae: 1.7439 - classification_head_1_accuracy: 0.2182

Epoch 2/3

4/4 [=====] - 7s 2s/step - loss: 21.9110 - regression_head_1_loss: 18.8206 - classification_head_1_loss: 3.0904 - regression_head_1_mae: 3.5696 - classification_head_1_accuracy: 0.3035

Epoch 3/3

4/4 [=====] - 7s 2s/step - loss: 31.7302 - regression_head_1_loss: 28.6634 - classification_head_1_loss: 3.0668 - regression_head_1_mae: 4.1861 - classification_head_1_accuracy: 0.2071

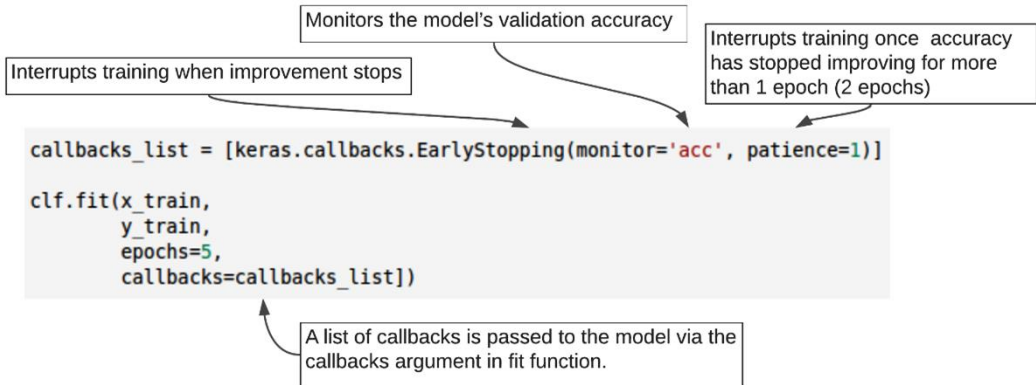
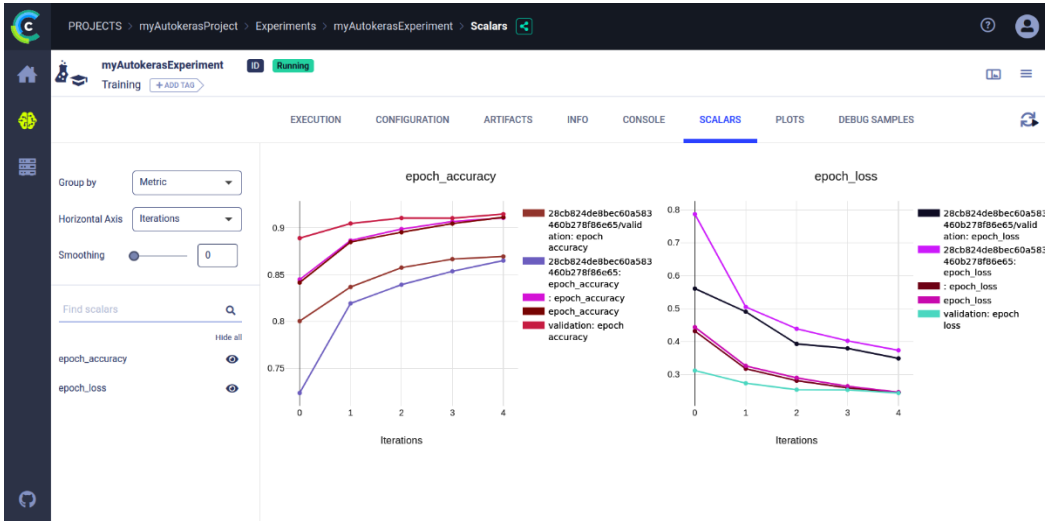
INFO:tensorflow:Assets written to: ./auto_model/best_model/assets

Model: "model"

Layer (type)	Output Shape	Param #	Connected to
input_2 (InputLayer)	[(None, 20)]	0	
multi_category_encoding (MultiC	(None, 20)	0	input_2[0][0]
input_1 (InputLayer)	[(None, 32, 32, 3)]	0	
dense (Dense)	(None, 32)	672	multi_category_encoding[0][0]
cast_to_float32 (CastToFloat32)	(None, 32, 32, 3)	0	input_1[0][0]
re_lu (ReLU)	(None, 32)	0	dense[0][0]
resnet50 (Functional)	(None, 1, 1, 2048)	23587712	cast_to_float32[0][0]
dense_1 (Dense)	(None, 16)	528	re_lu[0][0]
flatten (Flatten)	(None, 2048)	0	resnet50[0][0]
re_lu_1 (ReLU)	(None, 16)	0	dense_1[0][0]
concatenate (Concatenate)	(None, 2064)	0	flatten[0][0] re_lu_1[0][0]
dense_2 (Dense)	(None, 5)	10325	concatenate[0][0]
regression_head_1 (Dense)	(None, 1)	2065	concatenate[0][0]
classification_head_1 (Softmax)	(None, 5)	0	dense_2[0][0]

Total params: 23,601,302
Trainable params: 23,548,182
Non-trainable params: 53,120

Chapter 10: Exporting and Visualizing the Models



- Show data download links
- Ignore outliers in chart scaling
- Tooltip sorting method: **default** ▾



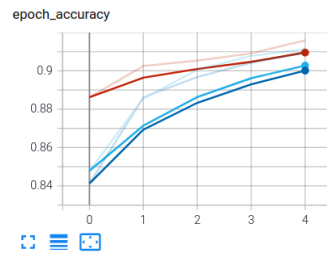
- Horizontal Axis
- STEP** RELATIVE WALL

- Runs
- Write a regex to filter runs
- 20210321-080631/2dc291ba4dfbc5d1fb1f55b1af0bf25a
 - 20210321-080631/2dc291ba4dfbc5d1fb1f55b1af0bf25a/train
 - 20210321-080631/2dc291ba4dfbc5d1fb1f55b1af0bf25a/validation
 - 20210321-080631/train
- TOGGLE ALL RUNS

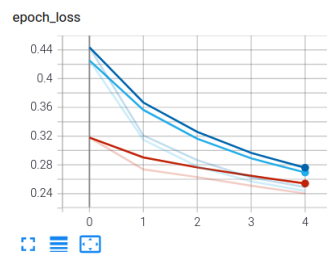
logs

Filter tags (regular expressions supported)

epoch_accuracy



epoch_loss



Search nodes. Regexes supported.

Fit to Screen

Download PNG

Run (3) 20210415-092931/1a43d8c7d5-

Tag (3) Default

Upload Choose File

Graph

Conceptual Graph

Profile

Trace inputs

Color Structure

Device

XLA Cluster

Close legend.

Graph (* = expandable)

Namespace ?

OpNode ?

Unconnected series* ?

Connected series* ?

Constant ?

Summary ?

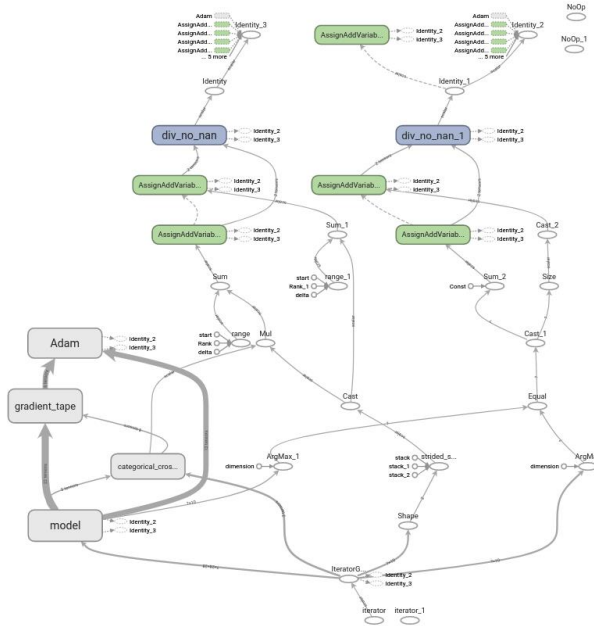
Dataflow edge ?

Control dependency edge ?

Reference edge ?

Main Graph

Auxiliary Nodes



Horizontal axis

STEP RELATIVE WALL

Runs

Write a regex to filter runs

20210415-092931/1a43d8c7d9f0d61462e829b7c848ccb7

20210415-092931/1a43d8c7d9f0d61462e829b7c848ccb7/train

20210415-092931/1a43d8c7d9f0d61462e829b7c848ccb7/validation

20210415-092931/507ae8e97d456ad03af7f693cdfa223

20210415-092931/507ae8e97d456ad03af7f693cdfa223/train

20210415-092931/507ae8e97d456ad03af7f693cdfa223/validation

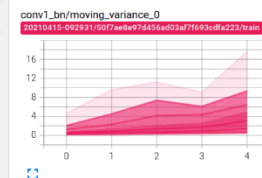
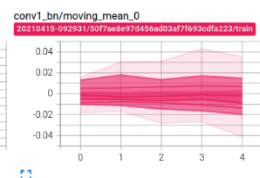
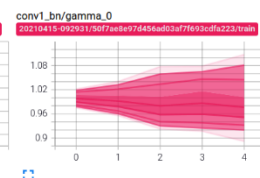
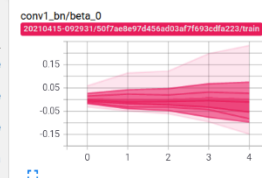
20210415-092931/train

logs

TOGGLE ALL RUNS

Filter tags (regular expressions supported)

conv1_bn

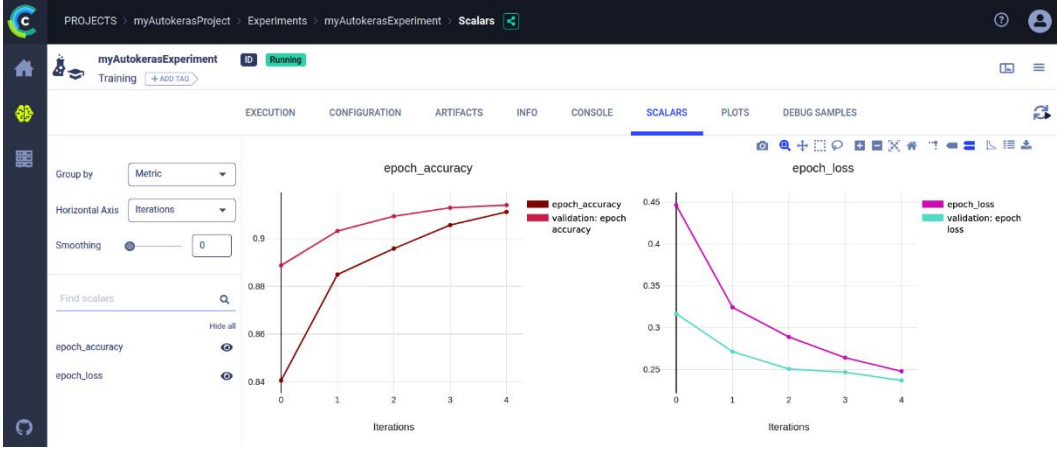
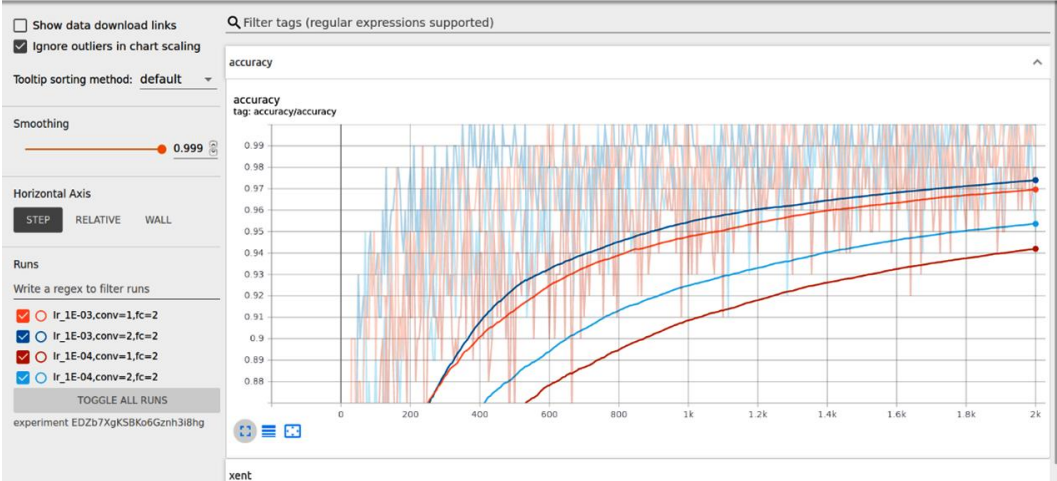


conv1_conv

conv1_conv/bias_0

conv1_conv/kernel_0

My latest experiment Created on Aug 13, 2020, 8:29:38 PM
 Simple comparison of several hyperparameters



PROJECTS > myAutokerasProject > Experiments > myAutokerasExperiment > Plots

myAutokerasExperiment ID Running

Training + ADD TAG

EXECUTION CONFIGURATION ARTIFACTS INFO CONSOLE SCALARS **PLOTS** DEBUG SAMPLES

Find plots

Hide all

- conv2d
- conv2d_1
- dense
- normalization

conv2d

conv2d/bias_0

conv2d/kernel_0

conv2d_1

conv2d_1/bias_0

conv2d_1/kernel_0

Detailed description: The image shows a web interface for monitoring a machine learning experiment. The top navigation bar shows the path 'PROJECTS > myAutokerasProject > Experiments > myAutokerasExperiment > Plots'. Below this, the experiment name 'myAutokerasExperiment' is displayed with a status 'Running' and a 'Training' button. A horizontal menu contains tabs for 'EXECUTION', 'CONFIGURATION', 'ARTIFACTS', 'INFO', 'CONSOLE', 'SCALARS', 'PLOTS' (which is active), and 'DEBUG SAMPLES'. On the left, a sidebar has a search box 'Find plots' and a list of layers: 'conv2d', 'conv2d_1', 'dense', and 'normalization', each with a toggle icon. The main content area displays a grid of 3D surface plots. The top row is under the 'conv2d' layer header and contains two plots: 'conv2d/bias_0' and 'conv2d/kernel_0'. The bottom row is under the 'conv2d_1' layer header and contains two plots: 'conv2d_1/bias_0' and 'conv2d_1/kernel_0'. The 'conv2d/bias_0' plot shows a surface with values ranging from approximately -10 to 10 over 3 iterations and 3 layers. The 'conv2d/kernel_0' plot shows a surface with values ranging from -20 to 20 over 4 iterations and 20 layers. The 'conv2d_1/bias_0' and 'conv2d_1/kernel_0' plots are currently empty.