Model 1

Model: "sequential"

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

Layer (type) Output Shape Param #

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

embedding (Embedding) (None, None, 200) 6104400

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dropout (Dropout) (None, None, 200) 0

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conv1d (Conv1D) (None, None, 64) 64064

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max\_pooling1d (MaxPooling1D) (None, None, 64) 0

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lstm (LSTM) (None, 64) 33024

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dense (Dense) (None, 1) 65

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Total params: 6,201,553

Trainable params: 97,153

Non-trainable params: 6,104,400

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Train on 144000 samples, validate on 16000 samples

Epoch 1/50

144000/144000 - 16s - loss: 0.5999 - accuracy: 0.6692 - val\_loss: 0.5686 - val\_accuracy: 0.6965

Epoch 2/50

144000/144000 - 13s - loss: 0.5462 - accuracy: 0.7156 - val\_loss: 0.5458 - val\_accuracy: 0.7181

Epoch 3/50

144000/144000 - 13s - loss: 0.5215 - accuracy: 0.7352 - val\_loss: 0.5410 - val\_accuracy: 0.7230

Epoch 4/50

144000/144000 - 12s - loss: 0.5047 - accuracy: 0.7472 - val\_loss: 0.5358 - val\_accuracy: 0.7272

Epoch 5/50

144000/144000 - 12s - loss: 0.4921 - accuracy: 0.7562 - val\_loss: 0.5370 - val\_accuracy: 0.7260

Epoch 6/50

144000/144000 - 13s - loss: 0.4816 - accuracy: 0.7628 - val\_loss: 0.5379 - val\_accuracy: 0.7236

Epoch 7/50

144000/144000 - 13s - loss: 0.4735 - accuracy: 0.7679 - val\_loss: 0.5475 - val\_accuracy: 0.7244

Epoch 8/50

144000/144000 - 12s - loss: 0.4669 - accuracy: 0.7721 - val\_loss: 0.5612 - val\_accuracy: 0.7199

Epoch 9/50

144000/144000 - 13s - loss: 0.4589 - accuracy: 0.7764 - val\_loss: 0.5445 - val\_accuracy: 0.7252

Epoch 10/50

144000/144000 - 12s - loss: 0.4548 - accuracy: 0.7795 - val\_loss: 0.5501 - val\_accuracy: 0.7241

Epoch 11/50

144000/144000 - 13s - loss: 0.4496 - accuracy: 0.7839 - val\_loss: 0.5512 - val\_accuracy: 0.7227

Epoch 12/50

144000/144000 - 12s - loss: 0.4458 - accuracy: 0.7853 - val\_loss: 0.5504 - val\_accuracy: 0.7251

Epoch 13/50

144000/144000 - 13s - loss: 0.4408 - accuracy: 0.7883 - val\_loss: 0.5604 - val\_accuracy: 0.7234

Epoch 14/50

144000/144000 - 13s - loss: 0.4359 - accuracy: 0.7927 - val\_loss: 0.5652 - val\_accuracy: 0.7256

Epoch 15/50

144000/144000 - 13s - loss: 0.4323 - accuracy: 0.7939 - val\_loss: 0.5860 - val\_accuracy: 0.7194

Epoch 16/50

144000/144000 - 13s - loss: 0.4305 - accuracy: 0.7942 - val\_loss: 0.5606 - val\_accuracy: 0.7251

Epoch 17/50

144000/144000 - 13s - loss: 0.4256 - accuracy: 0.7974 - val\_loss: 0.5674 - val\_accuracy: 0.7209

Epoch 18/50

144000/144000 - 13s - loss: 0.4245 - accuracy: 0.7987 - val\_loss: 0.5735 - val\_accuracy: 0.7203

Epoch 19/50

144000/144000 - 13s - loss: 0.4229 - accuracy: 0.7999 - val\_loss: 0.5585 - val\_accuracy: 0.7230

Epoch 20/50

144000/144000 - 13s - loss: 0.4190 - accuracy: 0.8016 - val\_loss: 0.5793 - val\_accuracy: 0.7176

Epoch 21/50

144000/144000 - 13s - loss: 0.4152 - accuracy: 0.8039 - val\_loss: 0.5740 - val\_accuracy: 0.7230

Epoch 22/50

144000/144000 - 12s - loss: 0.4139 - accuracy: 0.8050 - val\_loss: 0.5716 - val\_accuracy: 0.7196

Epoch 23/50

144000/144000 - 13s - loss: 0.4114 - accuracy: 0.8059 - val\_loss: 0.5888 - val\_accuracy: 0.7220

Epoch 24/50

144000/144000 - 12s - loss: 0.4111 - accuracy: 0.8061 - val\_loss: 0.5814 - val\_accuracy: 0.7235

Epoch 25/50

144000/144000 - 12s - loss: 0.4080 - accuracy: 0.8078 - val\_loss: 0.5705 - val\_accuracy: 0.7251

Epoch 26/50

144000/144000 - 12s - loss: 0.4042 - accuracy: 0.8105 - val\_loss: 0.5693 - val\_accuracy: 0.7228

Epoch 27/50

144000/144000 - 12s - loss: 0.4025 - accuracy: 0.8114 - val\_loss: 0.5862 - val\_accuracy: 0.7179

Epoch 28/50

144000/144000 - 12s - loss: 0.3993 - accuracy: 0.8139 - val\_loss: 0.5855 - val\_accuracy: 0.7218

Epoch 29/50

144000/144000 - 12s - loss: 0.3993 - accuracy: 0.8130 - val\_loss: 0.5963 - val\_accuracy: 0.7208

Epoch 30/50

144000/144000 - 12s - loss: 0.3963 - accuracy: 0.8150 - val\_loss: 0.5778 - val\_accuracy: 0.7236

Epoch 31/50

144000/144000 - 12s - loss: 0.3958 - accuracy: 0.8149 - val\_loss: 0.5971 - val\_accuracy: 0.7171

Epoch 32/50

144000/144000 - 13s - loss: 0.3936 - accuracy: 0.8161 - val\_loss: 0.5892 - val\_accuracy: 0.7219

Epoch 33/50

144000/144000 - 12s - loss: 0.3904 - accuracy: 0.8190 - val\_loss: 0.6092 - val\_accuracy: 0.7196

Epoch 34/50

144000/144000 - 12s - loss: 0.3875 - accuracy: 0.8203 - val\_loss: 0.5976 - val\_accuracy: 0.7175

Epoch 35/50

144000/144000 - 12s - loss: 0.3862 - accuracy: 0.8199 - val\_loss: 0.6070 - val\_accuracy: 0.7147

Epoch 36/50

144000/144000 - 12s - loss: 0.3851 - accuracy: 0.8216 - val\_loss: 0.6035 - val\_accuracy: 0.7156

Epoch 37/50

144000/144000 - 12s - loss: 0.3845 - accuracy: 0.8214 - val\_loss: 0.6018 - val\_accuracy: 0.7115

Epoch 38/50

144000/144000 - 13s - loss: 0.3817 - accuracy: 0.8230 - val\_loss: 0.6038 - val\_accuracy: 0.7190

Epoch 39/50

144000/144000 - 13s - loss: 0.3803 - accuracy: 0.8242 - val\_loss: 0.6189 - val\_accuracy: 0.7136

Epoch 40/50

144000/144000 - 12s - loss: 0.3804 - accuracy: 0.8241 - val\_loss: 0.6096 - val\_accuracy: 0.7161

Epoch 41/50

144000/144000 - 12s - loss: 0.3784 - accuracy: 0.8248 - val\_loss: 0.5924 - val\_accuracy: 0.7199

Epoch 42/50

144000/144000 - 12s - loss: 0.3763 - accuracy: 0.8269 - val\_loss: 0.6053 - val\_accuracy: 0.7137

Epoch 43/50

144000/144000 - 12s - loss: 0.3752 - accuracy: 0.8274 - val\_loss: 0.6062 - val\_accuracy: 0.7172

Epoch 44/50

144000/144000 - 12s - loss: 0.3759 - accuracy: 0.8273 - val\_loss: 0.6092 - val\_accuracy: 0.7191

Epoch 45/50

144000/144000 - 12s - loss: 0.3723 - accuracy: 0.8284 - val\_loss: 0.6103 - val\_accuracy: 0.7231

Epoch 46/50

144000/144000 - 12s - loss: 0.3712 - accuracy: 0.8284 - val\_loss: 0.6173 - val\_accuracy: 0.7173

Epoch 47/50

144000/144000 - 12s - loss: 0.3685 - accuracy: 0.8303 - val\_loss: 0.6214 - val\_accuracy: 0.7109

Epoch 48/50

144000/144000 - 13s - loss: 0.3686 - accuracy: 0.8300 - val\_loss: 0.6249 - val\_accuracy: 0.7165

Epoch 49/50

144000/144000 - 13s - loss: 0.3666 - accuracy: 0.8316 - val\_loss: 0.6067 - val\_accuracy: 0.7140

Epoch 50/50

144000/144000 - 13s - loss: 0.3660 - accuracy: 0.8314 - val\_loss: 0.6200 - val\_accuracy: 0.7128

Training Complete

Model 2

model = tf.keras.Sequential([

tf.keras.layers.Embedding(vocab\_size, embedding\_dim, trainable=False),

tf.keras.layers.Dropout(0.2),

tf.keras.layers.Conv1D(64, 5, activation='relu'),

tf.keras.layers.MaxPooling1D(pool\_size=4),

tf.keras.layers.LSTM(64),

tf.keras.layers.Dense(1, activation='sigmoid')

])

Model: "sequential\_1"

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Layer (type) Output Shape Param #

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embedding\_1 (Embedding) (None, None, 200) 6104400

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dropout\_1 (Dropout) (None, None, 200) 0

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conv1d\_1 (Conv1D) (None, None, 64) 64064

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max\_pooling1d\_1 (MaxPooling1 (None, None, 64) 0

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lstm\_1 (LSTM) (None, 64) 33024

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dense\_1 (Dense) (None, 1) 65

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

Total params: 6,201,553

Trainable params: 97,153

Non-trainable params: 6,104,400

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Train on 144000 samples, validate on 16000 samples

Epoch 1/50

144000/144000 - 22s - loss: 0.6205 - accuracy: 0.6315 - val\_loss: 0.5363 - val\_accuracy: 0.7350

Epoch 2/50

144000/144000 - 21s - loss: 0.5116 - accuracy: 0.7482 - val\_loss: 0.4982 - val\_accuracy: 0.7563

Epoch 3/50

144000/144000 - 21s - loss: 0.4765 - accuracy: 0.7726 - val\_loss: 0.4917 - val\_accuracy: 0.7627

Epoch 4/50

144000/144000 - 21s - loss: 0.4556 - accuracy: 0.7860 - val\_loss: 0.4825 - val\_accuracy: 0.7645

Epoch 5/50

144000/144000 - 21s - loss: 0.4400 - accuracy: 0.7947 - val\_loss: 0.4810 - val\_accuracy: 0.7719

Epoch 6/50

144000/144000 - 20s - loss: 0.4280 - accuracy: 0.8004 - val\_loss: 0.4885 - val\_accuracy: 0.7707

Epoch 7/50

144000/144000 - 21s - loss: 0.4191 - accuracy: 0.8064 - val\_loss: 0.5065 - val\_accuracy: 0.7617

Epoch 8/50

144000/144000 - 21s - loss: 0.4111 - accuracy: 0.8106 - val\_loss: 0.4776 - val\_accuracy: 0.7738

Epoch 9/50

144000/144000 - 20s - loss: 0.4029 - accuracy: 0.8150 - val\_loss: 0.5014 - val\_accuracy: 0.7704

Epoch 10/50

144000/144000 - 20s - loss: 0.3983 - accuracy: 0.8181 - val\_loss: 0.4835 - val\_accuracy: 0.7751

Epoch 11/50

144000/144000 - 21s - loss: 0.3920 - accuracy: 0.8218 - val\_loss: 0.4849 - val\_accuracy: 0.7744

Epoch 12/50

144000/144000 - 21s - loss: 0.3858 - accuracy: 0.8242 - val\_loss: 0.4863 - val\_accuracy: 0.7721

Epoch 13/50

144000/144000 - 21s - loss: 0.3813 - accuracy: 0.8283 - val\_loss: 0.4714 - val\_accuracy: 0.7803

Epoch 14/50

144000/144000 - 21s - loss: 0.3782 - accuracy: 0.8294 - val\_loss: 0.4720 - val\_accuracy: 0.7830

Epoch 15/50

144000/144000 - 21s - loss: 0.3735 - accuracy: 0.8311 - val\_loss: 0.4769 - val\_accuracy: 0.7784

Epoch 16/50

144000/144000 - 21s - loss: 0.3701 - accuracy: 0.8337 - val\_loss: 0.5104 - val\_accuracy: 0.7794

Epoch 17/50

144000/144000 - 21s - loss: 0.3652 - accuracy: 0.8369 - val\_loss: 0.5088 - val\_accuracy: 0.7761

Epoch 18/50

144000/144000 - 22s - loss: 0.3634 - accuracy: 0.8366 - val\_loss: 0.4863 - val\_accuracy: 0.7821

Epoch 19/50

144000/144000 - 21s - loss: 0.3599 - accuracy: 0.8389 - val\_loss: 0.4913 - val\_accuracy: 0.7797

Epoch 20/50

144000/144000 - 21s - loss: 0.3566 - accuracy: 0.8402 - val\_loss: 0.5019 - val\_accuracy: 0.7779

Epoch 21/50

144000/144000 - 20s - loss: 0.3549 - accuracy: 0.8408 - val\_loss: 0.4863 - val\_accuracy: 0.7777

Epoch 22/50

144000/144000 - 21s - loss: 0.3510 - accuracy: 0.8444 - val\_loss: 0.5007 - val\_accuracy: 0.7746

Epoch 23/50

144000/144000 - 21s - loss: 0.3477 - accuracy: 0.8448 - val\_loss: 0.4876 - val\_accuracy: 0.7803

Epoch 24/50

144000/144000 - 21s - loss: 0.3468 - accuracy: 0.8454 - val\_loss: 0.5439 - val\_accuracy: 0.7803

Epoch 25/50

144000/144000 - 21s - loss: 0.3452 - accuracy: 0.8452 - val\_loss: 0.4999 - val\_accuracy: 0.7768

Epoch 26/50

144000/144000 - 21s - loss: 0.3439 - accuracy: 0.8469 - val\_loss: 0.5095 - val\_accuracy: 0.7794

Epoch 27/50

144000/144000 - 21s - loss: 0.3412 - accuracy: 0.8475 - val\_loss: 0.4998 - val\_accuracy: 0.7794

Epoch 28/50

144000/144000 - 21s - loss: 0.3374 - accuracy: 0.8509 - val\_loss: 0.5163 - val\_accuracy: 0.7755

Epoch 29/50

144000/144000 - 21s - loss: 0.3367 - accuracy: 0.8501 - val\_loss: 0.5087 - val\_accuracy: 0.7786

Epoch 30/50

144000/144000 - 21s - loss: 0.3332 - accuracy: 0.8518 - val\_loss: 0.4954 - val\_accuracy: 0.7766

Epoch 31/50

144000/144000 - 20s - loss: 0.3323 - accuracy: 0.8528 - val\_loss: 0.5208 - val\_accuracy: 0.7733

Epoch 32/50

144000/144000 - 20s - loss: 0.3306 - accuracy: 0.8536 - val\_loss: 0.5193 - val\_accuracy: 0.7770

Epoch 33/50

144000/144000 - 20s - loss: 0.3303 - accuracy: 0.8531 - val\_loss: 0.5147 - val\_accuracy: 0.7744

Epoch 34/50

144000/144000 - 20s - loss: 0.3281 - accuracy: 0.8544 - val\_loss: 0.5201 - val\_accuracy: 0.7763

Epoch 35/50

144000/144000 - 20s - loss: 0.3243 - accuracy: 0.8572 - val\_loss: 0.5221 - val\_accuracy: 0.7748

Epoch 36/50

144000/144000 - 20s - loss: 0.3231 - accuracy: 0.8576 - val\_loss: 0.4987 - val\_accuracy: 0.7788

Epoch 37/50

144000/144000 - 20s - loss: 0.3235 - accuracy: 0.8585 - val\_loss: 0.4946 - val\_accuracy: 0.7780

Epoch 38/50

144000/144000 - 20s - loss: 0.3212 - accuracy: 0.8578 - val\_loss: 0.5184 - val\_accuracy: 0.7804

Epoch 39/50

144000/144000 - 20s - loss: 0.3177 - accuracy: 0.8594 - val\_loss: 0.5216 - val\_accuracy: 0.7782

Epoch 40/50

144000/144000 - 20s - loss: 0.3168 - accuracy: 0.8597 - val\_loss: 0.5173 - val\_accuracy: 0.7759

Epoch 41/50

144000/144000 - 20s - loss: 0.3153 - accuracy: 0.8614 - val\_loss: 0.5050 - val\_accuracy: 0.7757

Epoch 42/50

144000/144000 - 20s - loss: 0.3144 - accuracy: 0.8619 - val\_loss: 0.5350 - val\_accuracy: 0.7765

Epoch 43/50

144000/144000 - 20s - loss: 0.3138 - accuracy: 0.8626 - val\_loss: 0.5255 - val\_accuracy: 0.7741

Epoch 44/50

144000/144000 - 20s - loss: 0.3099 - accuracy: 0.8636 - val\_loss: 0.5240 - val\_accuracy: 0.7756

Epoch 45/50

144000/144000 - 20s - loss: 0.3112 - accuracy: 0.8630 - val\_loss: 0.5155 - val\_accuracy: 0.7765

Epoch 46/50

144000/144000 - 20s - loss: 0.3105 - accuracy: 0.8640 - val\_loss: 0.5301 - val\_accuracy: 0.7762

Epoch 47/50

144000/144000 - 21s - loss: 0.3104 - accuracy: 0.8644 - val\_loss: 0.5370 - val\_accuracy: 0.7774

Epoch 48/50

144000/144000 - 20s - loss: 0.3070 - accuracy: 0.8651 - val\_loss: 0.5195 - val\_accuracy: 0.7779

Epoch 49/50

144000/144000 - 21s - loss: 0.3075 - accuracy: 0.8650 - val\_loss: 0.5089 - val\_accuracy: 0.7791

Epoch 50/50

144000/144000 - 21s - loss: 0.3051 - accuracy: 0.8664 - val\_loss: 0.5274 - val\_accuracy: 0.7756

Training Complete

Model 3

Model: "sequential"

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Layer (type) Output Shape Param #

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embedding (Embedding) (None, None, 200) 6104400

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dropout (Dropout) (None, None, 200) 0

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conv1d (Conv1D) (None, None, 64) 64064

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dropout\_1 (Dropout) (None, None, 64) 0

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conv1d\_1 (Conv1D) (None, None, 64) 20544

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max\_pooling1d (MaxPooling1D) (None, None, 64) 0

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lstm (LSTM) (None, 64) 33024

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dense (Dense) (None, 1) 65

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Total params: 6,222,097

Trainable params: 117,697

Non-trainable params: 6,104,400

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Train on 144000 samples, validate on 16000 samples

Epoch 1/50

144000/144000 - 23s - loss: 0.6257 - accuracy: 0.6262 - val\_loss: 0.5381 - val\_accuracy: 0.7321

Epoch 2/50

144000/144000 - 19s - loss: 0.5307 - accuracy: 0.7324 - val\_loss: 0.5135 - val\_accuracy: 0.7446

Epoch 3/50

144000/144000 - 19s - loss: 0.4998 - accuracy: 0.7549 - val\_loss: 0.5005 - val\_accuracy: 0.7534

Epoch 4/50

144000/144000 - 19s - loss: 0.6883 - accuracy: 0.5102 - val\_loss: 0.6934 - val\_accuracy: 0.4995

Epoch 5/50

144000/144000 - 19s - loss: 0.5879 - accuracy: 0.6563 - val\_loss: 0.4962 - val\_accuracy: 0.7605

Epoch 6/50

144000/144000 - 20s - loss: 0.5284 - accuracy: 0.7279 - val\_loss: 0.5086 - val\_accuracy: 0.7557

Epoch 7/50

144000/144000 - 19s - loss: 0.4805 - accuracy: 0.7707 - val\_loss: 0.4905 - val\_accuracy: 0.7632

Epoch 8/50

144000/144000 - 19s - loss: 0.4649 - accuracy: 0.7788 - val\_loss: 0.4712 - val\_accuracy: 0.7775

Epoch 9/50

144000/144000 - 20s - loss: 0.4560 - accuracy: 0.7840 - val\_loss: 0.4670 - val\_accuracy: 0.7765

Epoch 10/50

144000/144000 - 20s - loss: 0.4482 - accuracy: 0.7885 - val\_loss: 0.4643 - val\_accuracy: 0.7791

Epoch 11/50

144000/144000 - 19s - loss: 0.4395 - accuracy: 0.7946 - val\_loss: 0.4627 - val\_accuracy: 0.7839

Epoch 12/50

144000/144000 - 19s - loss: 0.4346 - accuracy: 0.7974 - val\_loss: 0.4657 - val\_accuracy: 0.7766

Epoch 13/50

144000/144000 - 19s - loss: 0.4303 - accuracy: 0.7993 - val\_loss: 0.4647 - val\_accuracy: 0.7807

Epoch 14/50

144000/144000 - 19s - loss: 0.4243 - accuracy: 0.8034 - val\_loss: 0.4615 - val\_accuracy: 0.7851

Epoch 15/50

144000/144000 - 19s - loss: 0.4205 - accuracy: 0.8058 - val\_loss: 0.4570 - val\_accuracy: 0.7856

Epoch 16/50

144000/144000 - 19s - loss: 0.4158 - accuracy: 0.8082 - val\_loss: 0.4606 - val\_accuracy: 0.7827

Epoch 17/50

144000/144000 - 19s - loss: 0.4137 - accuracy: 0.8076 - val\_loss: 0.4523 - val\_accuracy: 0.7884

Epoch 18/50

144000/144000 - 19s - loss: 0.4112 - accuracy: 0.8109 - val\_loss: 0.4561 - val\_accuracy: 0.7875

Epoch 19/50

144000/144000 - 19s - loss: 0.4080 - accuracy: 0.8116 - val\_loss: 0.4592 - val\_accuracy: 0.7872

Epoch 20/50

144000/144000 - 19s - loss: 0.4051 - accuracy: 0.8134 - val\_loss: 0.4556 - val\_accuracy: 0.7895

Epoch 21/50

144000/144000 - 19s - loss: 0.4034 - accuracy: 0.8149 - val\_loss: 0.4610 - val\_accuracy: 0.7808

Epoch 22/50

144000/144000 - 19s - loss: 0.3999 - accuracy: 0.8167 - val\_loss: 0.4554 - val\_accuracy: 0.7879

Epoch 23/50

144000/144000 - 19s - loss: 0.3990 - accuracy: 0.8174 - val\_loss: 0.4570 - val\_accuracy: 0.7862

Epoch 24/50

144000/144000 - 20s - loss: 0.3972 - accuracy: 0.8185 - val\_loss: 0.4616 - val\_accuracy: 0.7846

Epoch 25/50

144000/144000 - 20s - loss: 0.3949 - accuracy: 0.8202 - val\_loss: 0.4570 - val\_accuracy: 0.7862

Epoch 26/50

144000/144000 - 20s - loss: 0.3931 - accuracy: 0.8201 - val\_loss: 0.4574 - val\_accuracy: 0.7878

Epoch 27/50

144000/144000 - 20s - loss: 0.3899 - accuracy: 0.8223 - val\_loss: 0.4549 - val\_accuracy: 0.7877

Epoch 28/50

144000/144000 - 19s - loss: 0.3902 - accuracy: 0.8212 - val\_loss: 0.4578 - val\_accuracy: 0.7876

Epoch 29/50

144000/144000 - 19s - loss: 0.3897 - accuracy: 0.8215 - val\_loss: 0.4588 - val\_accuracy: 0.7853

Epoch 30/50

144000/144000 - 20s - loss: 0.3866 - accuracy: 0.8230 - val\_loss: 0.4566 - val\_accuracy: 0.7886

Epoch 31/50

144000/144000 - 19s - loss: 0.3858 - accuracy: 0.8245 - val\_loss: 0.4584 - val\_accuracy: 0.7871

Epoch 32/50

144000/144000 - 19s - loss: 0.3851 - accuracy: 0.8236 - val\_loss: 0.4615 - val\_accuracy: 0.7847

Epoch 33/50

144000/144000 - 19s - loss: 0.3843 - accuracy: 0.8242 - val\_loss: 0.4580 - val\_accuracy: 0.7880

Epoch 34/50

144000/144000 - 19s - loss: 0.3822 - accuracy: 0.8250 - val\_loss: 0.4723 - val\_accuracy: 0.7834

Epoch 35/50

144000/144000 - 19s - loss: 0.3804 - accuracy: 0.8267 - val\_loss: 0.4643 - val\_accuracy: 0.7865

Epoch 36/50

144000/144000 - 20s - loss: 0.3799 - accuracy: 0.8270 - val\_loss: 0.4625 - val\_accuracy: 0.7830

Epoch 37/50

144000/144000 - 19s - loss: 0.3792 - accuracy: 0.8281 - val\_loss: 0.4698 - val\_accuracy: 0.7869

Epoch 38/50

144000/144000 - 19s - loss: 0.3768 - accuracy: 0.8285 - val\_loss: 0.4598 - val\_accuracy: 0.7868

Epoch 39/50

144000/144000 - 19s - loss: 0.3793 - accuracy: 0.8270 - val\_loss: 0.4570 - val\_accuracy: 0.7926

Epoch 40/50

144000/144000 - 20s - loss: 0.3754 - accuracy: 0.8303 - val\_loss: 0.4576 - val\_accuracy: 0.7848

Epoch 41/50

144000/144000 - 20s - loss: 0.3752 - accuracy: 0.8294 - val\_loss: 0.4584 - val\_accuracy: 0.7900

Epoch 42/50

144000/144000 - 19s - loss: 0.3752 - accuracy: 0.8293 - val\_loss: 0.4653 - val\_accuracy: 0.7864

Epoch 43/50

144000/144000 - 21s - loss: 0.3743 - accuracy: 0.8306 - val\_loss: 0.4679 - val\_accuracy: 0.7878

Epoch 44/50

144000/144000 - 20s - loss: 0.3729 - accuracy: 0.8309 - val\_loss: 0.4577 - val\_accuracy: 0.7917

Epoch 45/50

144000/144000 - 20s - loss: 0.3727 - accuracy: 0.8313 - val\_loss: 0.4544 - val\_accuracy: 0.7918

Epoch 46/50

144000/144000 - 20s - loss: 0.3708 - accuracy: 0.8322 - val\_loss: 0.4606 - val\_accuracy: 0.7893

Epoch 47/50

144000/144000 - 19s - loss: 0.3713 - accuracy: 0.8317 - val\_loss: 0.4626 - val\_accuracy: 0.7883

Epoch 48/50

144000/144000 - 19s - loss: 0.3694 - accuracy: 0.8335 - val\_loss: 0.4589 - val\_accuracy: 0.7897

Epoch 49/50

144000/144000 - 20s - loss: 0.3700 - accuracy: 0.8331 - val\_loss: 0.4586 - val\_accuracy: 0.7901

Epoch 50/50

144000/144000 - 20s - loss: 0.3680 - accuracy: 0.8337 - val\_loss: 0.4655 - val\_accuracy: 0.7904

Training Complete

Model 4

model = tf.keras.Sequential([

tf.keras.layers.Embedding(vocab\_size, embedding\_dim, trainable=False),

tf.keras.layers.Dropout(0.4),

tf.keras.layers.Conv1D(128, 5, activation='relu'),

tf.keras.layers.Dropout(0.2),

tf.keras.layers.Conv1D(64, 5, activation='relu'),

tf.keras.layers.MaxPooling1D(pool\_size=4),

tf.keras.layers.LSTM(64),

tf.keras.layers.Dense(1, activation='sigmoid')

])

Model: "sequential\_1"

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Layer (type) Output Shape Param #

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embedding\_1 (Embedding) (None, None, 200) 6104400

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dropout\_2 (Dropout) (None, None, 200) 0

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conv1d\_2 (Conv1D) (None, None, 128) 128128

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dropout\_3 (Dropout) (None, None, 128) 0

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conv1d\_3 (Conv1D) (None, None, 64) 41024

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max\_pooling1d\_1 (MaxPooling1 (None, None, 64) 0

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lstm\_1 (LSTM) (None, 64) 33024

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dense\_1 (Dense) (None, 1) 65

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Total params: 6,306,641

Trainable params: 202,241

Non-trainable params: 6,104,400

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Train on 144000 samples, validate on 16000 samples

Epoch 1/50

144000/144000 - 22s - loss: 0.6932 - accuracy: 0.4995 - val\_loss: 0.6932 - val\_accuracy: 0.4995

Epoch 2/50

144000/144000 - 21s - loss: 0.6933 - accuracy: 0.5027 - val\_loss: 0.6933 - val\_accuracy: 0.4995

Epoch 3/50

144000/144000 - 21s - loss: 0.6932 - accuracy: 0.5015 - val\_loss: 0.6932 - val\_accuracy: 0.4995

Epoch 4/50

144000/144000 - 21s - loss: 0.6525 - accuracy: 0.6005 - val\_loss: 0.5864 - val\_accuracy: 0.6872

Epoch 5/50

144000/144000 - 21s - loss: 0.5703 - accuracy: 0.7015 - val\_loss: 0.5422 - val\_accuracy: 0.7226

Epoch 6/50

144000/144000 - 21s - loss: 0.5318 - accuracy: 0.7303 - val\_loss: 0.5145 - val\_accuracy: 0.7444

Epoch 7/50

144000/144000 - 21s - loss: 0.5115 - accuracy: 0.7453 - val\_loss: 0.5207 - val\_accuracy: 0.7371

Epoch 8/50

144000/144000 - 21s - loss: 0.4977 - accuracy: 0.7559 - val\_loss: 0.4951 - val\_accuracy: 0.7560

Epoch 9/50

144000/144000 - 21s - loss: 0.4877 - accuracy: 0.7617 - val\_loss: 0.4878 - val\_accuracy: 0.7611

Epoch 10/50

144000/144000 - 21s - loss: 0.4793 - accuracy: 0.7677 - val\_loss: 0.4865 - val\_accuracy: 0.7633

Epoch 11/50

144000/144000 - 21s - loss: 0.4729 - accuracy: 0.7711 - val\_loss: 0.4777 - val\_accuracy: 0.7694

Epoch 12/50

144000/144000 - 21s - loss: 0.4662 - accuracy: 0.7761 - val\_loss: 0.4820 - val\_accuracy: 0.7629

Epoch 13/50

144000/144000 - 21s - loss: 0.4609 - accuracy: 0.7779 - val\_loss: 0.4684 - val\_accuracy: 0.7757

Epoch 14/50

144000/144000 - 21s - loss: 0.4549 - accuracy: 0.7831 - val\_loss: 0.4728 - val\_accuracy: 0.7743

Epoch 15/50

144000/144000 - 21s - loss: 0.4517 - accuracy: 0.7845 - val\_loss: 0.4727 - val\_accuracy: 0.7768

Epoch 16/50

144000/144000 - 21s - loss: 0.4481 - accuracy: 0.7874 - val\_loss: 0.4664 - val\_accuracy: 0.7761

Epoch 17/50

144000/144000 - 21s - loss: 0.4445 - accuracy: 0.7890 - val\_loss: 0.4687 - val\_accuracy: 0.7728

Epoch 18/50

144000/144000 - 21s - loss: 0.4408 - accuracy: 0.7913 - val\_loss: 0.4638 - val\_accuracy: 0.7788

Epoch 19/50

144000/144000 - 21s - loss: 0.4387 - accuracy: 0.7923 - val\_loss: 0.4734 - val\_accuracy: 0.7793

Epoch 20/50

144000/144000 - 21s - loss: 0.4359 - accuracy: 0.7940 - val\_loss: 0.4613 - val\_accuracy: 0.7798

Epoch 21/50

144000/144000 - 21s - loss: 0.4311 - accuracy: 0.7969 - val\_loss: 0.4681 - val\_accuracy: 0.7809

Epoch 22/50

144000/144000 - 21s - loss: 0.4309 - accuracy: 0.7971 - val\_loss: 0.4689 - val\_accuracy: 0.7774

Epoch 23/50

144000/144000 - 21s - loss: 0.4287 - accuracy: 0.7978 - val\_loss: 0.4695 - val\_accuracy: 0.7757

Epoch 24/50

144000/144000 - 21s - loss: 0.4278 - accuracy: 0.7988 - val\_loss: 0.4669 - val\_accuracy: 0.7789

Epoch 25/50

144000/144000 - 21s - loss: 0.4256 - accuracy: 0.7998 - val\_loss: 0.4665 - val\_accuracy: 0.7809

Epoch 26/50

144000/144000 - 21s - loss: 0.4231 - accuracy: 0.8013 - val\_loss: 0.4861 - val\_accuracy: 0.7728

Epoch 27/50

144000/144000 - 21s - loss: 0.4227 - accuracy: 0.8018 - val\_loss: 0.4586 - val\_accuracy: 0.7833

Epoch 28/50

144000/144000 - 21s - loss: 0.4180 - accuracy: 0.8029 - val\_loss: 0.4625 - val\_accuracy: 0.7821

Epoch 29/50

144000/144000 - 21s - loss: 0.4175 - accuracy: 0.8054 - val\_loss: 0.4664 - val\_accuracy: 0.7782

Epoch 30/50

144000/144000 - 21s - loss: 0.4164 - accuracy: 0.8056 - val\_loss: 0.4596 - val\_accuracy: 0.7828

Epoch 31/50

144000/144000 - 21s - loss: 0.4157 - accuracy: 0.8048 - val\_loss: 0.4738 - val\_accuracy: 0.7797

Epoch 32/50

144000/144000 - 21s - loss: 0.4138 - accuracy: 0.8066 - val\_loss: 0.4673 - val\_accuracy: 0.7841

Epoch 33/50

144000/144000 - 21s - loss: 0.4108 - accuracy: 0.8091 - val\_loss: 0.4627 - val\_accuracy: 0.7859

Epoch 34/50

144000/144000 - 21s - loss: 0.4135 - accuracy: 0.8073 - val\_loss: 0.4634 - val\_accuracy: 0.7826

Epoch 35/50

144000/144000 - 21s - loss: 0.4092 - accuracy: 0.8091 - val\_loss: 0.4648 - val\_accuracy: 0.7849

Epoch 36/50

144000/144000 - 21s - loss: 0.4091 - accuracy: 0.8105 - val\_loss: 0.4628 - val\_accuracy: 0.7806

Epoch 37/50

144000/144000 - 21s - loss: 0.4093 - accuracy: 0.8085 - val\_loss: 0.4584 - val\_accuracy: 0.7822

Epoch 38/50

144000/144000 - 21s - loss: 0.4077 - accuracy: 0.8105 - val\_loss: 0.4598 - val\_accuracy: 0.7831

Epoch 39/50

144000/144000 - 21s - loss: 0.4060 - accuracy: 0.8117 - val\_loss: 0.4578 - val\_accuracy: 0.7851

Epoch 40/50

144000/144000 - 21s - loss: 0.4050 - accuracy: 0.8124 - val\_loss: 0.4636 - val\_accuracy: 0.7829

Epoch 41/50

144000/144000 - 21s - loss: 0.4039 - accuracy: 0.8124 - val\_loss: 0.4597 - val\_accuracy: 0.7839

Epoch 42/50

144000/144000 - 21s - loss: 0.4011 - accuracy: 0.8140 - val\_loss: 0.4547 - val\_accuracy: 0.7860

Epoch 43/50

144000/144000 - 21s - loss: 0.4002 - accuracy: 0.8140 - val\_loss: 0.4545 - val\_accuracy: 0.7874

Epoch 44/50

144000/144000 - 22s - loss: 0.4016 - accuracy: 0.8140 - val\_loss: 0.4566 - val\_accuracy: 0.7871

Epoch 45/50

144000/144000 - 22s - loss: 0.3998 - accuracy: 0.8152 - val\_loss: 0.4587 - val\_accuracy: 0.7872

Epoch 46/50

144000/144000 - 21s - loss: 0.3990 - accuracy: 0.8147 - val\_loss: 0.4590 - val\_accuracy: 0.7868

Epoch 47/50

144000/144000 - 21s - loss: 0.3970 - accuracy: 0.8175 - val\_loss: 0.4632 - val\_accuracy: 0.7862

Epoch 48/50

144000/144000 - 22s - loss: 0.3973 - accuracy: 0.8166 - val\_loss: 0.4553 - val\_accuracy: 0.7875

Epoch 49/50

144000/144000 - 21s - loss: 0.3945 - accuracy: 0.8180 - val\_loss: 0.4576 - val\_accuracy: 0.7887

Epoch 50/50

144000/144000 - 21s - loss: 0.3944 - accuracy: 0.8183 - val\_loss: 0.4566 - val\_accuracy: 0.7876

Training Complete

Model 6

model = tf.keras.Sequential([

tf.keras.layers.Embedding(vocab\_size, embedding\_dim, trainable=False),

tf.keras.layers.Dropout(0.4),

tf.keras.layers.Conv1D(64, 5, activation='relu'),

tf.keras.layers.MaxPooling1D(pool\_size=4),

tf.keras.layers.LSTM(64),

tf.keras.layers.Dense(1, activation='sigmoid')

])

Model: "sequential\_2"

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Layer (type) Output Shape Param #

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embedding\_2 (Embedding) (None, None, 200) 6104400

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dropout\_4 (Dropout) (None, None, 200) 0

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conv1d\_4 (Conv1D) (None, None, 64) 64064

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max\_pooling1d\_2 (MaxPooling1 (None, None, 64) 0

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lstm\_2 (LSTM) (None, 64) 33024

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dense\_2 (Dense) (None, 1) 65

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Total params: 6,201,553

Trainable params: 97,153

Non-trainable params: 6,104,400

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Train on 144000 samples, validate on 16000 samples

Epoch 1/50

144000/144000 - 19s - loss: 0.6632 - accuracy: 0.5733 - val\_loss: 0.5817 - val\_accuracy: 0.6912

Epoch 2/50

144000/144000 - 18s - loss: 0.5640 - accuracy: 0.7069 - val\_loss: 0.5242 - val\_accuracy: 0.7372

Epoch 3/50

144000/144000 - 18s - loss: 0.5271 - accuracy: 0.7359 - val\_loss: 0.5039 - val\_accuracy: 0.7491

Epoch 4/50

144000/144000 - 18s - loss: 0.5097 - accuracy: 0.7469 - val\_loss: 0.5265 - val\_accuracy: 0.7425

Epoch 5/50

144000/144000 - 18s - loss: 0.4958 - accuracy: 0.7575 - val\_loss: 0.4978 - val\_accuracy: 0.7530

Epoch 6/50

144000/144000 - 18s - loss: 0.4880 - accuracy: 0.7631 - val\_loss: 0.4920 - val\_accuracy: 0.7621

Epoch 7/50

144000/144000 - 18s - loss: 0.4808 - accuracy: 0.7661 - val\_loss: 0.4839 - val\_accuracy: 0.7665

Epoch 8/50

144000/144000 - 18s - loss: 0.4743 - accuracy: 0.7709 - val\_loss: 0.4977 - val\_accuracy: 0.7566

Epoch 9/50

144000/144000 - 18s - loss: 0.4693 - accuracy: 0.7743 - val\_loss: 0.4936 - val\_accuracy: 0.7632

Epoch 10/50

144000/144000 - 18s - loss: 0.4645 - accuracy: 0.7772 - val\_loss: 0.4838 - val\_accuracy: 0.7649

Epoch 11/50

144000/144000 - 18s - loss: 0.4605 - accuracy: 0.7786 - val\_loss: 0.4924 - val\_accuracy: 0.7638

Epoch 12/50

144000/144000 - 18s - loss: 0.4583 - accuracy: 0.7809 - val\_loss: 0.4751 - val\_accuracy: 0.7724

Epoch 13/50

144000/144000 - 18s - loss: 0.4539 - accuracy: 0.7833 - val\_loss: 0.5002 - val\_accuracy: 0.7642

Epoch 14/50

144000/144000 - 18s - loss: 0.4524 - accuracy: 0.7844 - val\_loss: 0.4880 - val\_accuracy: 0.7603

Epoch 15/50

144000/144000 - 20s - loss: 0.4479 - accuracy: 0.7869 - val\_loss: 0.5106 - val\_accuracy: 0.7450

Epoch 16/50

144000/144000 - 18s - loss: 0.4451 - accuracy: 0.7890 - val\_loss: 0.5363 - val\_accuracy: 0.7398

Epoch 17/50

144000/144000 - 18s - loss: 0.4440 - accuracy: 0.7893 - val\_loss: 0.4990 - val\_accuracy: 0.7585

Epoch 18/50

144000/144000 - 18s - loss: 0.4431 - accuracy: 0.7897 - val\_loss: 0.5061 - val\_accuracy: 0.7574

Epoch 19/50

144000/144000 - 18s - loss: 0.4402 - accuracy: 0.7916 - val\_loss: 0.5107 - val\_accuracy: 0.7574

Epoch 20/50

144000/144000 - 18s - loss: 0.4371 - accuracy: 0.7925 - val\_loss: 0.5370 - val\_accuracy: 0.7443

Epoch 21/50

144000/144000 - 18s - loss: 0.4369 - accuracy: 0.7933 - val\_loss: 0.5142 - val\_accuracy: 0.7599

Epoch 22/50

144000/144000 - 18s - loss: 0.4345 - accuracy: 0.7948 - val\_loss: 0.4962 - val\_accuracy: 0.7609

Epoch 23/50

144000/144000 - 18s - loss: 0.4335 - accuracy: 0.7955 - val\_loss: 0.5040 - val\_accuracy: 0.7523

Epoch 24/50

144000/144000 - 18s - loss: 0.4316 - accuracy: 0.7967 - val\_loss: 0.4772 - val\_accuracy: 0.7751

Epoch 25/50

144000/144000 - 18s - loss: 0.4291 - accuracy: 0.7976 - val\_loss: 0.4901 - val\_accuracy: 0.7662

Epoch 26/50

144000/144000 - 18s - loss: 0.4286 - accuracy: 0.7985 - val\_loss: 0.4950 - val\_accuracy: 0.7574

Epoch 27/50

144000/144000 - 18s - loss: 0.4274 - accuracy: 0.7996 - val\_loss: 0.4950 - val\_accuracy: 0.7551

Epoch 28/50

144000/144000 - 18s - loss: 0.4244 - accuracy: 0.8007 - val\_loss: 0.4926 - val\_accuracy: 0.7692

Epoch 29/50

144000/144000 - 18s - loss: 0.4227 - accuracy: 0.8023 - val\_loss: 0.5170 - val\_accuracy: 0.7585

Epoch 30/50

144000/144000 - 18s - loss: 0.4231 - accuracy: 0.8013 - val\_loss: 0.4901 - val\_accuracy: 0.7679

Epoch 31/50

144000/144000 - 18s - loss: 0.4224 - accuracy: 0.8017 - val\_loss: 0.5050 - val\_accuracy: 0.7655

Epoch 32/50

144000/144000 - 18s - loss: 0.4200 - accuracy: 0.8023 - val\_loss: 0.5007 - val\_accuracy: 0.7634

Epoch 33/50

144000/144000 - 18s - loss: 0.4192 - accuracy: 0.8029 - val\_loss: 0.4876 - val\_accuracy: 0.7666

Epoch 34/50

144000/144000 - 18s - loss: 0.4175 - accuracy: 0.8042 - val\_loss: 0.4979 - val\_accuracy: 0.7612

Epoch 35/50

144000/144000 - 18s - loss: 0.4161 - accuracy: 0.8048 - val\_loss: 0.5156 - val\_accuracy: 0.7544

Epoch 36/50

144000/144000 - 18s - loss: 0.4166 - accuracy: 0.8061 - val\_loss: 0.5248 - val\_accuracy: 0.7501

Epoch 37/50

144000/144000 - 18s - loss: 0.4150 - accuracy: 0.8068 - val\_loss: 0.5278 - val\_accuracy: 0.7563

Epoch 38/50

144000/144000 - 18s - loss: 0.4135 - accuracy: 0.8058 - val\_loss: 0.5175 - val\_accuracy: 0.7638

Epoch 39/50

144000/144000 - 18s - loss: 0.4121 - accuracy: 0.8072 - val\_loss: 0.5208 - val\_accuracy: 0.7554

Epoch 40/50

144000/144000 - 18s - loss: 0.4124 - accuracy: 0.8081 - val\_loss: 0.4909 - val\_accuracy: 0.7665

Epoch 41/50

144000/144000 - 18s - loss: 0.4105 - accuracy: 0.8089 - val\_loss: 0.5209 - val\_accuracy: 0.7562

Epoch 42/50

144000/144000 - 18s - loss: 0.4107 - accuracy: 0.8091 - val\_loss: 0.5221 - val\_accuracy: 0.7602

Epoch 43/50

144000/144000 - 18s - loss: 0.4080 - accuracy: 0.8106 - val\_loss: 0.5226 - val\_accuracy: 0.7512

Epoch 44/50

144000/144000 - 18s - loss: 0.4091 - accuracy: 0.8094 - val\_loss: 0.5031 - val\_accuracy: 0.7649

Epoch 45/50

144000/144000 - 19s - loss: 0.4094 - accuracy: 0.8092 - val\_loss: 0.5146 - val\_accuracy: 0.7522

Epoch 46/50

144000/144000 - 18s - loss: 0.4064 - accuracy: 0.8107 - val\_loss: 0.5015 - val\_accuracy: 0.7659

Epoch 47/50

144000/144000 - 19s - loss: 0.4073 - accuracy: 0.8106 - val\_loss: 0.4974 - val\_accuracy: 0.7637

Epoch 48/50

144000/144000 - 19s - loss: 0.4053 - accuracy: 0.8111 - val\_loss: 0.5101 - val\_accuracy: 0.7573

Epoch 49/50

144000/144000 - 19s - loss: 0.4054 - accuracy: 0.8111 - val\_loss: 0.5306 - val\_accuracy: 0.7615

Epoch 50/50

144000/144000 - 19s - loss: 0.4043 - accuracy: 0.8114 - val\_loss: 0.4952 - val\_accuracy: 0.7619

Training Complete