\*\*\*\*\*\*\*\*\*\*\*\*\*\*AAPL\*\*\*\*\*\*\*\*\*\*\*\*\*\*

[\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*100%\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*] 1 of 1 completed

Train Data Size: 2236

Test Data Size: 559

(2135, 100)

(2135,)

(458, 100)

(458,)

2023-02-10 00:12:18.903771: I tensorflow/core/platform/cpu\_feature\_guard.cc:193] This TensorFlow binary is optimized with oneAPI Deep Neural Network Library (oneDNN) to use the following CPU instructions in performance-critical operations: AVX AVX2

To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.

Model: "sequential"

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

Layer (type) Output Shape Param #

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

lstm (LSTM) (None, 100, 50) 10400

lstm\_1 (LSTM) (None, 100, 25) 7600

lstm\_2 (LSTM) (None, 12) 1824

dense (Dense) (None, 1) 13

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

Total params: 19,837

Trainable params: 19,837

Non-trainable params: 0

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

Epoch 1/20

134/134 [==============================] - 17s 87ms/step - loss: 0.0033 - val\_loss: 0.0034

Epoch 2/20

134/134 [==============================] - 11s 81ms/step - loss: 2.9786e-04 - val\_loss: 0.0059

Epoch 3/20

134/134 [==============================] - 11s 79ms/step - loss: 3.0594e-04 - val\_loss: 0.0041

Epoch 4/20

134/134 [==============================] - 10s 74ms/step - loss: 3.0255e-04 - val\_loss: 0.0033

Epoch 5/20

134/134 [==============================] - 10s 78ms/step - loss: 2.7425e-04 - val\_loss: 0.0028

Epoch 6/20

134/134 [==============================] - 12s 86ms/step - loss: 2.5954e-04 - val\_loss: 0.0029

Epoch 7/20

134/134 [==============================] - 10s 75ms/step - loss: 2.1974e-04 - val\_loss: 0.0039

Epoch 8/20

134/134 [==============================] - 10s 75ms/step - loss: 1.9927e-04 - val\_loss: 0.0021

Epoch 9/20

134/134 [==============================] - 11s 79ms/step - loss: 1.8671e-04 - val\_loss: 0.0084

Epoch 10/20

134/134 [==============================] - 12s 87ms/step - loss: 1.9492e-04 - val\_loss: 0.0069

Epoch 11/20

134/134 [==============================] - 11s 86ms/step - loss: 1.7156e-04 - val\_loss: 0.0035

Epoch 12/20

134/134 [==============================] - 11s 84ms/step - loss: 1.7807e-04 - val\_loss: 0.0022

Epoch 13/20

134/134 [==============================] - 11s 85ms/step - loss: 1.5781e-04 - val\_loss: 0.0013

Epoch 14/20

134/134 [==============================] - 12s 90ms/step - loss: 1.5818e-04 - val\_loss: 0.0013

Epoch 15/20

134/134 [==============================] - 11s 82ms/step - loss: 1.5690e-04 - val\_loss: 0.0013

Epoch 16/20

134/134 [==============================] - 11s 80ms/step - loss: 1.4270e-04 - val\_loss: 0.0014

Epoch 17/20

134/134 [==============================] - 11s 81ms/step - loss: 1.4704e-04 - val\_loss: 0.0019

Epoch 18/20

134/134 [==============================] - 10s 75ms/step - loss: 1.2121e-04 - val\_loss: 0.0060

Epoch 19/20

134/134 [==============================] - 10s 75ms/step - loss: 1.2102e-04 - val\_loss: 0.0019

Epoch 20/20

134/134 [==============================] - 11s 80ms/step - loss: 1.1903e-04 - val\_loss: 9.9789e-04

{'loss': [0.003288480220362544, 0.0002978614065796137, 0.0003059435694012791, 0.00030254872399382293, 0.00027425430016592145, 0.00025954056764021516, 0.00021973530238028616, 0.0001992746110772714, 0.0001867088139988482, 0.00019492459250614047, 0.00017155766545329243, 0.0001780745224095881, 0.00015781114052515477, 0.00015817787789274007, 0.00015690323198214173, 0.0001426955423085019, 0.00014703974011354148, 0.00012121319014113396, 0.00012102220352971926, 0.00011902549158548936], 'val\_loss': [0.003374027321115136, 0.005891511682420969, 0.004111827816814184, 0.00327472947537899, 0.0028297186363488436, 0.0028852715622633696, 0.0038517906796187162, 0.002060878789052367, 0.008352081291377544, 0.006923237349838018, 0.003540701698511839, 0.0022340326104313135, 0.0012622942449524999, 0.0012921628076583147, 0.0013496612664312124, 0.0013566833222284913, 0.0018585041398182511, 0.005975554697215557, 0.0019192685140296817, 0.0009978906018659472]}

67/67 [==============================] - 3s 25ms/step

15/15 [==============================] - 0s 25ms/step

Train RMSE: 2.137376510933298

Train MSE: 4.568378349489398

Train MAPE: 3.167380445806701

Train MAE: 1.3050246964573027

Test RMSE: 5.308993780488428

Test MSE: 28.18541496126481

Test MAPE: 2.615300710644276

Test MAE: 3.987953835699756

\*\*\*\*\*\*\*\*\*\*\*\*\*\*MSFT\*\*\*\*\*\*\*\*\*\*\*\*\*\*

[\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*100%\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*] 1 of 1 completed

Train Data Size: 2236

Test Data Size: 559

(2135, 100)

(2135,)

(458, 100)

(458,)

Model: "sequential\_1"

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Layer (type) Output Shape Param #

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

lstm\_3 (LSTM) (None, 100, 50) 10400

lstm\_4 (LSTM) (None, 100, 25) 7600

lstm\_5 (LSTM) (None, 12) 1824

dense\_1 (Dense) (None, 1) 13

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

Total params: 19,837

Trainable params: 19,837

Non-trainable params: 0

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Epoch 1/20

134/134 [==============================] - 20s 102ms/step - loss: 0.0024 - val\_loss: 0.0031

Epoch 2/20

134/134 [==============================] - 11s 84ms/step - loss: 1.9474e-04 - val\_loss: 0.0044

Epoch 3/20

134/134 [==============================] - 11s 78ms/step - loss: 2.3087e-04 - val\_loss: 0.0041

Epoch 4/20

134/134 [==============================] - 10s 77ms/step - loss: 2.0467e-04 - val\_loss: 0.0087

Epoch 5/20

134/134 [==============================] - 11s 83ms/step - loss: 1.9911e-04 - val\_loss: 0.0033

Epoch 6/20

134/134 [==============================] - 11s 79ms/step - loss: 1.7413e-04 - val\_loss: 0.0061

Epoch 7/20

134/134 [==============================] - 10s 77ms/step - loss: 1.7917e-04 - val\_loss: 0.0029

Epoch 8/20

134/134 [==============================] - 10s 76ms/step - loss: 1.6158e-04 - val\_loss: 0.0019

Epoch 9/20

134/134 [==============================] - 11s 82ms/step - loss: 1.5347e-04 - val\_loss: 0.0019

Epoch 10/20

134/134 [==============================] - 11s 85ms/step - loss: 1.4879e-04 - val\_loss: 0.0023

Epoch 11/20

134/134 [==============================] - 10s 76ms/step - loss: 1.3413e-04 - val\_loss: 0.0030

Epoch 12/20

134/134 [==============================] - 11s 82ms/step - loss: 1.3396e-04 - val\_loss: 0.0022

Epoch 13/20

134/134 [==============================] - 11s 84ms/step - loss: 1.4135e-04 - val\_loss: 0.0021

Epoch 14/20

134/134 [==============================] - 13s 96ms/step - loss: 1.3708e-04 - val\_loss: 0.0017

Epoch 15/20

134/134 [==============================] - 12s 91ms/step - loss: 1.2241e-04 - val\_loss: 0.0015

Epoch 16/20

134/134 [==============================] - 12s 92ms/step - loss: 1.3174e-04 - val\_loss: 0.0019

Epoch 17/20

134/134 [==============================] - 13s 96ms/step - loss: 1.2771e-04 - val\_loss: 0.0034

Epoch 18/20

134/134 [==============================] - 13s 99ms/step - loss: 1.0348e-04 - val\_loss: 0.0032

Epoch 19/20

134/134 [==============================] - 13s 95ms/step - loss: 1.0104e-04 - val\_loss: 0.0017

Epoch 20/20

134/134 [==============================] - 13s 97ms/step - loss: 1.2945e-04 - val\_loss: 0.0021

{'loss': [0.0024191841948777437, 0.00019474260625429451, 0.0002308663388248533, 0.000204674550332129, 0.00019911238632630557, 0.0001741342421155423, 0.00017916748765856028, 0.00016157595382537693, 0.00015346614236477762, 0.00014879002992529422, 0.00013412884436547756, 0.00013396466965787113, 0.00014135408855509013, 0.00013707952166441828, 0.00012241338845342398, 0.00013173656770959496, 0.00012771297770086676, 0.00010347517672926188, 0.00010104457760462537, 0.00012944948684889823], 'val\_loss': [0.003051755018532276, 0.004375157877802849, 0.004083422012627125, 0.008729688823223114, 0.0032967713195830584, 0.0060811955481767654, 0.0029238443821668625, 0.0018935113912448287, 0.0019442320335656404, 0.002282408531755209, 0.002999003743752837, 0.0021601361222565174, 0.0020874657202512026, 0.0016626016004011035, 0.0015064802719280124, 0.0019422168843448162, 0.0033826427534222603, 0.0032391853164881468, 0.0016650898614898324, 0.0020761520136147738]}

67/67 [==============================] - 3s 28ms/step

15/15 [==============================] - 0s 28ms/step

Train RMSE: 3.0633472581748804

Train MSE: 9.384096424167558

Train MAPE: 2.8452081346989577

Train MAE: 2.013230271529258

Test RMSE: 14.43220128785532

Test MSE: 208.28843401317275

Test MAPE: 4.075399205036368

Test MAE: 11.734451793687313

\*\*\*\*\*\*\*\*\*\*\*\*\*\*GOOG\*\*\*\*\*\*\*\*\*\*\*\*\*\*

[\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*100%\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*] 1 of 1 completed

Train Data Size: 2236

Test Data Size: 559

(2135, 100)

(2135,)

(458, 100)

(458,)

Model: "sequential\_2"

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Layer (type) Output Shape Param #

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

lstm\_6 (LSTM) (None, 100, 50) 10400

lstm\_7 (LSTM) (None, 100, 25) 7600

lstm\_8 (LSTM) (None, 12) 1824

dense\_2 (Dense) (None, 1) 13

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

Total params: 19,837

Trainable params: 19,837

Non-trainable params: 0

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Epoch 1/20

134/134 [==============================] - 23s 124ms/step - loss: 0.0031 - val\_loss: 0.0082

Epoch 2/20

134/134 [==============================] - 13s 95ms/step - loss: 2.7827e-04 - val\_loss: 0.0076

Epoch 3/20

134/134 [==============================] - 12s 91ms/step - loss: 2.4974e-04 - val\_loss: 0.0075

Epoch 4/20

134/134 [==============================] - 15s 113ms/step - loss: 2.5421e-04 - val\_loss: 0.0062

Epoch 5/20

134/134 [==============================] - 11s 82ms/step - loss: 2.4067e-04 - val\_loss: 0.0080

Epoch 6/20

134/134 [==============================] - 11s 80ms/step - loss: 2.3078e-04 - val\_loss: 0.0074

Epoch 7/20

134/134 [==============================] - 11s 79ms/step - loss: 2.2138e-04 - val\_loss: 0.0045

Epoch 8/20

134/134 [==============================] - 10s 77ms/step - loss: 1.9683e-04 - val\_loss: 0.0043

Epoch 9/20

134/134 [==============================] - 10s 77ms/step - loss: 1.8672e-04 - val\_loss: 0.0058

Epoch 10/20

134/134 [==============================] - 11s 83ms/step - loss: 1.9844e-04 - val\_loss: 0.0043

Epoch 11/20

134/134 [==============================] - 11s 83ms/step - loss: 1.9291e-04 - val\_loss: 0.0078

Epoch 12/20

134/134 [==============================] - 11s 80ms/step - loss: 1.6927e-04 - val\_loss: 0.0066

Epoch 13/20

134/134 [==============================] - 11s 83ms/step - loss: 1.6970e-04 - val\_loss: 0.0065

Epoch 14/20

134/134 [==============================] - 10s 78ms/step - loss: 1.4579e-04 - val\_loss: 0.0048

Epoch 15/20

134/134 [==============================] - 10s 78ms/step - loss: 1.4871e-04 - val\_loss: 0.0031

Epoch 16/20

134/134 [==============================] - 11s 79ms/step - loss: 1.4783e-04 - val\_loss: 0.0073

Epoch 17/20

134/134 [==============================] - 11s 79ms/step - loss: 1.6927e-04 - val\_loss: 0.0047

Epoch 18/20

134/134 [==============================] - 11s 80ms/step - loss: 1.4369e-04 - val\_loss: 0.0042

Epoch 19/20

134/134 [==============================] - 10s 78ms/step - loss: 1.2837e-04 - val\_loss: 0.0060

Epoch 20/20

134/134 [==============================] - 11s 79ms/step - loss: 1.3111e-04 - val\_loss: 0.0048

{'loss': [0.003138089319691062, 0.00027827100711874664, 0.0002497414534445852, 0.00025421028840355575, 0.000240673529333435, 0.00023078486265148968, 0.00022138006170280278, 0.0001968319556908682, 0.0001867243117885664, 0.00019844132475554943, 0.00019290944328531623, 0.00016926962416619062, 0.0001696990366326645, 0.00014578796981368214, 0.00014870852464810014, 0.00014783201913814992, 0.00016926572425290942, 0.00014368677511811256, 0.00012837360554840416, 0.00013110667350701988], 'val\_loss': [0.008183985948562622, 0.007640771102160215, 0.007458894979208708, 0.006163439713418484, 0.008046213537454605, 0.007376541383564472, 0.004542762413620949, 0.004323031287640333, 0.005839109420776367, 0.004338794853538275, 0.007805895991623402, 0.0065894885919988155, 0.006471924018114805, 0.004814114421606064, 0.003146330825984478, 0.007314896676689386, 0.00465486291795969, 0.004227799363434315, 0.005968042649328709, 0.004756335634738207]}

67/67 [==============================] - 3s 24ms/step

15/15 [==============================] - 0s 21ms/step

Train RMSE: 1.584822579058301

Train MSE: 2.5116626070930046

Train MAPE: 2.4672057488050707

Train MAE: 1.0422683197664713

Test RMSE: 9.433536489595625

Test MSE: 88.99161070053215

Test MAPE: 6.046034941642548

Test MAE: 7.837239344567714

\*\*\*\*\*\*\*\*\*\*\*\*\*\*AMZN\*\*\*\*\*\*\*\*\*\*\*\*\*\*

[\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*100%\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*] 1 of 1 completed

Train Data Size: 2236

Test Data Size: 559

(2135, 100)

(2135,)

(458, 100)

(458,)

Model: "sequential\_3"

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Layer (type) Output Shape Param #

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

lstm\_9 (LSTM) (None, 100, 50) 10400

lstm\_10 (LSTM) (None, 100, 25) 7600

lstm\_11 (LSTM) (None, 12) 1824

dense\_3 (Dense) (None, 1) 13

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

Total params: 19,837

Trainable params: 19,837

Non-trainable params: 0

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Epoch 1/20

134/134 [==============================] - 17s 86ms/step - loss: 0.0084 - val\_loss: 0.0049

Epoch 2/20

134/134 [==============================] - 10s 78ms/step - loss: 5.2233e-04 - val\_loss: 0.0038

Epoch 3/20

134/134 [==============================] - 11s 83ms/step - loss: 4.7021e-04 - val\_loss: 0.0038

Epoch 4/20

134/134 [==============================] - 10s 78ms/step - loss: 4.5954e-04 - val\_loss: 0.0033

Epoch 5/20

134/134 [==============================] - 10s 78ms/step - loss: 4.1774e-04 - val\_loss: 0.0033

Epoch 6/20

134/134 [==============================] - 10s 78ms/step - loss: 4.4298e-04 - val\_loss: 0.0045

Epoch 7/20

134/134 [==============================] - 10s 78ms/step - loss: 4.1256e-04 - val\_loss: 0.0033

Epoch 8/20

134/134 [==============================] - 11s 83ms/step - loss: 4.1621e-04 - val\_loss: 0.0029

Epoch 9/20

134/134 [==============================] - 10s 78ms/step - loss: 3.6528e-04 - val\_loss: 0.0027

Epoch 10/20

134/134 [==============================] - 10s 78ms/step - loss: 3.4785e-04 - val\_loss: 0.0025

Epoch 11/20

134/134 [==============================] - 10s 77ms/step - loss: 3.6675e-04 - val\_loss: 0.0030

Epoch 12/20

134/134 [==============================] - 10s 78ms/step - loss: 4.0804e-04 - val\_loss: 0.0024

Epoch 13/20

134/134 [==============================] - 11s 80ms/step - loss: 3.8842e-04 - val\_loss: 0.0052

Epoch 14/20

134/134 [==============================] - 11s 83ms/step - loss: 3.2530e-04 - val\_loss: 0.0023

Epoch 15/20

134/134 [==============================] - 11s 81ms/step - loss: 3.5098e-04 - val\_loss: 0.0021

Epoch 16/20

134/134 [==============================] - 11s 79ms/step - loss: 2.9915e-04 - val\_loss: 0.0021

Epoch 17/20

134/134 [==============================] - 11s 79ms/step - loss: 3.9018e-04 - val\_loss: 0.0021

Epoch 18/20

134/134 [==============================] - 11s 80ms/step - loss: 3.6550e-04 - val\_loss: 0.0019

Epoch 19/20

134/134 [==============================] - 11s 83ms/step - loss: 2.8072e-04 - val\_loss: 0.0018

Epoch 20/20

134/134 [==============================] - 10s 78ms/step - loss: 3.1025e-04 - val\_loss: 0.0020

{'loss': [0.008407761342823505, 0.0005223267362453043, 0.00047020515194162726, 0.00045954310917295516, 0.00041774020064622164, 0.0004429781110957265, 0.0004125636478420347, 0.00041621134732849896, 0.0003652820596471429, 0.0003478471771813929, 0.0003667516284622252, 0.00040803951560519636, 0.0003884168399963528, 0.000325304688885808, 0.00035097930231131613, 0.00029915355844423175, 0.0003901757881976664, 0.000365503947250545, 0.0002807165728881955, 0.0003102491027675569], 'val\_loss': [0.004919480066746473, 0.003775079734623432, 0.003809034125879407, 0.0032826093956828117, 0.0033466932363808155, 0.004483007360249758, 0.003268210683017969, 0.0029393178410828114, 0.0027081554289907217, 0.0024771050084382296, 0.0030064003076404333, 0.00235316576436162, 0.005223776679486036, 0.0022631154861301184, 0.0020920189563184977, 0.0021165835205465555, 0.0021166852675378323, 0.0019424752099439502, 0.0018012631917372346, 0.0020461813546717167]}

67/67 [==============================] - 2s 22ms/step

15/15 [==============================] - 0s 22ms/step

Train RMSE: 2.878744610583087

Train MSE: 8.287170532961168

Train MAPE: 3.4537644549918465

Train MAE: 1.7137890527622481

Test RMSE: 8.04156073358881

Test MSE: 64.66669903199738

Test MAPE: 4.738112158226868

Test MAE: 6.17118090833639