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1 /Users/duruoheng/.conda/envs/lstm_project/bin/
  python /Users/duruoheng/PycharmProjects/
  lstm_project/main.py
2 2023-07-25 19:27:03.809863: 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:
  SSE4.1 SSE4.2 AVX AVX2 AVX512F AVX512_VNNI FMA
3 To enable them in other operations, rebuild
  TensorFlow with the appropriate compiler flags.
4   var1(t-1)  var2(t-1)  var3(t-1) ...  var15(t-1)
  )  var16(t-1)  var1(t)
5 1    0.021692    0.044881    0.004280 ...    0.012965
      0.042439    0.011387
6 2    0.011387    0.010687    0.001163 ...    0.008192
      0.046756    0.018290
7 3    0.018290    0.000000    0.000000 ...    0.006421
      0.047125    0.000000
8 4    0.000000    0.032341    0.001064 ...    0.008293
      0.052667    0.045191
9 5    0.045191    0.058452    0.010233 ...    0.011289
      0.052220    0.054986
10
11 [5 rows x 17 columns]
12 (4213, 1, 16) (4213,) (469, 1, 16) (469,)
13 2023-07-25 19:27:06.318603: 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:
  SSE4.1 SSE4.2 AVX AVX2 AVX512F AVX512_VNNI FMA
14 To enable them in other operations, rebuild
  TensorFlow with the appropriate compiler flags.
15 Epoch 1/400
16 132/132 - 2s - loss: 0.0716 - val_loss: 0.0115 - 2s
  /epoch - 18ms/step
17 Epoch 2/400
18 132/132 - 0s - loss: 0.0349 - val_loss: 0.0120 -
  265ms/epoch - 2ms/step
19 Epoch 3/400
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20 132/132 - 0s - loss: 0.0290 - val_loss: 0.0112 -  
    243ms/epoch - 2ms/step  
21 Epoch 4/400  
22 132/132 - 0s - loss: 0.0221 - val_loss: 0.0113 -  
    261ms/epoch - 2ms/step  
23 Epoch 5/400  
24 132/132 - 0s - loss: 0.0178 - val_loss: 0.0110 -  
    260ms/epoch - 2ms/step  
25 Epoch 6/400  
26 132/132 - 0s - loss: 0.0157 - val_loss: 0.0108 -  
    232ms/epoch - 2ms/step  
27 Epoch 7/400  
28 132/132 - 0s - loss: 0.0154 - val_loss: 0.0109 -  
    263ms/epoch - 2ms/step  
29 Epoch 8/400  
30 132/132 - 0s - loss: 0.0138 - val_loss: 0.0134 -  
    252ms/epoch - 2ms/step  
31 Epoch 9/400  
32 132/132 - 0s - loss: 0.0140 - val_loss: 0.0128 -  
    299ms/epoch - 2ms/step  
33 Epoch 10/400  
34 132/132 - 0s - loss: 0.0134 - val_loss: 0.0118 -  
    283ms/epoch - 2ms/step  
35 Epoch 11/400  
36 132/132 - 0s - loss: 0.0126 - val_loss: 0.0113 -  
    274ms/epoch - 2ms/step  
37 Epoch 12/400  
38 132/132 - 0s - loss: 0.0124 - val_loss: 0.0104 -  
    241ms/epoch - 2ms/step  
39 Epoch 13/400  
40 132/132 - 0s - loss: 0.0121 - val_loss: 0.0104 -  
    255ms/epoch - 2ms/step  
41 Epoch 14/400  
42 132/132 - 0s - loss: 0.0117 - val_loss: 0.0103 -  
    240ms/epoch - 2ms/step  
43 Epoch 15/400  
44 132/132 - 0s - loss: 0.0117 - val_loss: 0.0106 -  
    239ms/epoch - 2ms/step  
45 Epoch 16/400  
46 132/132 - 0s - loss: 0.0116 - val_loss: 0.0106 -  
    234ms/epoch - 2ms/step
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47 Epoch 17/400
48 132/132 - 0s - loss: 0.0120 - val_loss: 0.0101 -
    274ms/epoch - 2ms/step
49 Epoch 18/400
50 132/132 - 0s - loss: 0.0119 - val_loss: 0.0122 -
    236ms/epoch - 2ms/step
51 Epoch 19/400
52 132/132 - 0s - loss: 0.0113 - val_loss: 0.0113 -
    262ms/epoch - 2ms/step
53 Epoch 20/400
54 132/132 - 0s - loss: 0.0130 - val_loss: 0.0109 -
    234ms/epoch - 2ms/step
55 Epoch 21/400
56 132/132 - 0s - loss: 0.0111 - val_loss: 0.0114 -
    259ms/epoch - 2ms/step
57 Epoch 22/400
58 132/132 - 0s - loss: 0.0115 - val_loss: 0.0114 -
    238ms/epoch - 2ms/step
59 Epoch 23/400
60 132/132 - 0s - loss: 0.0113 - val_loss: 0.0124 -
    240ms/epoch - 2ms/step
61 Epoch 24/400
62 132/132 - 0s - loss: 0.0111 - val_loss: 0.0120 -
    288ms/epoch - 2ms/step
63 Epoch 25/400
64 132/132 - 0s - loss: 0.0115 - val_loss: 0.0130 -
    237ms/epoch - 2ms/step
65 Epoch 26/400
66 132/132 - 0s - loss: 0.0108 - val_loss: 0.0112 -
    229ms/epoch - 2ms/step
67 Epoch 27/400
68 132/132 - 0s - loss: 0.0118 - val_loss: 0.0134 -
    247ms/epoch - 2ms/step
69 Epoch 28/400
70 132/132 - 0s - loss: 0.0110 - val_loss: 0.0125 -
    233ms/epoch - 2ms/step
71 Epoch 29/400
72 132/132 - 0s - loss: 0.0113 - val_loss: 0.0123 -
    237ms/epoch - 2ms/step
73 Epoch 30/400
74 132/132 - 0s - loss: 0.0111 - val_loss: 0.0133 -
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74 229ms/epoch - 2ms/step
75 Epoch 31/400
76 132/132 - 0s - loss: 0.0109 - val_loss: 0.0120 -
    234ms/epoch - 2ms/step
77 Epoch 32/400
78 132/132 - 0s - loss: 0.0111 - val_loss: 0.0104 -
    245ms/epoch - 2ms/step
79 Epoch 33/400
80 132/132 - 0s - loss: 0.0108 - val_loss: 0.0130 -
    235ms/epoch - 2ms/step
81 Epoch 34/400
82 132/132 - 0s - loss: 0.0107 - val_loss: 0.0123 -
    237ms/epoch - 2ms/step
83 Epoch 35/400
84 132/132 - 0s - loss: 0.0108 - val_loss: 0.0118 -
    228ms/epoch - 2ms/step
85 Epoch 36/400
86 132/132 - 0s - loss: 0.0109 - val_loss: 0.0130 -
    247ms/epoch - 2ms/step
87 Epoch 37/400
88 132/132 - 0s - loss: 0.0102 - val_loss: 0.0121 -
    226ms/epoch - 2ms/step
89 Epoch 38/400
90 132/132 - 0s - loss: 0.0118 - val_loss: 0.0149 -
    251ms/epoch - 2ms/step
91 Epoch 39/400
92 132/132 - 0s - loss: 0.0106 - val_loss: 0.0138 -
    233ms/epoch - 2ms/step
93 Epoch 40/400
94 132/132 - 0s - loss: 0.0134 - val_loss: 0.0109 -
    250ms/epoch - 2ms/step
95 Epoch 41/400
96 132/132 - 0s - loss: 0.0126 - val_loss: 0.0098 -
    231ms/epoch - 2ms/step
97 Epoch 42/400
98 132/132 - 0s - loss: 0.0127 - val_loss: 0.0095 -
    248ms/epoch - 2ms/step
99 Epoch 43/400
100 132/132 - 0s - loss: 0.0125 - val_loss: 0.0089 -
    225ms/epoch - 2ms/step
101 Epoch 44/400
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102 132/132 - 0s - loss: 0.0127 - val_loss: 0.0092 -
    245ms/epoch - 2ms/step
103 Epoch 45/400
104 132/132 - 0s - loss: 0.0123 - val_loss: 0.0088 -
    258ms/epoch - 2ms/step
105 Epoch 46/400
106 132/132 - 0s - loss: 0.0119 - val_loss: 0.0088 -
    240ms/epoch - 2ms/step
107 Epoch 47/400
108 132/132 - 0s - loss: 0.0118 - val_loss: 0.0088 -
    235ms/epoch - 2ms/step
109 Epoch 48/400
110 132/132 - 0s - loss: 0.0118 - val_loss: 0.0088 -
    244ms/epoch - 2ms/step
111 Epoch 49/400
112 132/132 - 0s - loss: 0.0122 - val_loss: 0.0088 -
    257ms/epoch - 2ms/step
113 Epoch 50/400
114 132/132 - 0s - loss: 0.0111 - val_loss: 0.0089 -
    235ms/epoch - 2ms/step
115 Epoch 51/400
116 132/132 - 0s - loss: 0.0111 - val_loss: 0.0088 -
    265ms/epoch - 2ms/step
117 Epoch 52/400
118 132/132 - 0s - loss: 0.0110 - val_loss: 0.0090 -
    239ms/epoch - 2ms/step
119 Epoch 53/400
120 132/132 - 0s - loss: 0.0110 - val_loss: 0.0091 -
    257ms/epoch - 2ms/step
121 Epoch 54/400
122 132/132 - 0s - loss: 0.0113 - val_loss: 0.0091 -
    255ms/epoch - 2ms/step
123 Epoch 55/400
124 132/132 - 0s - loss: 0.0112 - val_loss: 0.0092 -
    249ms/epoch - 2ms/step
125 Epoch 56/400
126 132/132 - 0s - loss: 0.0109 - val_loss: 0.0091 -
    256ms/epoch - 2ms/step
127 Epoch 57/400
128 132/132 - 0s - loss: 0.0117 - val_loss: 0.0089 -
    263ms/epoch - 2ms/step
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129 Epoch 58/400
130 132/132 - 0s - loss: 0.0126 - val_loss: 0.0102 -
    272ms/epoch - 2ms/step
131 Epoch 59/400
132 132/132 - 0s - loss: 0.0130 - val_loss: 0.0153 -
    259ms/epoch - 2ms/step
133 Epoch 60/400
134 132/132 - 0s - loss: 0.0143 - val_loss: 0.0170 -
    266ms/epoch - 2ms/step
135 Epoch 61/400
136 132/132 - 0s - loss: 0.0140 - val_loss: 0.0138 -
    261ms/epoch - 2ms/step
137 Epoch 62/400
138 132/132 - 0s - loss: 0.0138 - val_loss: 0.0144 -
    269ms/epoch - 2ms/step
139 Epoch 63/400
140 132/132 - 0s - loss: 0.0132 - val_loss: 0.0139 -
    238ms/epoch - 2ms/step
141 Epoch 64/400
142 132/132 - 0s - loss: 0.0129 - val_loss: 0.0138 -
    263ms/epoch - 2ms/step
143 Epoch 65/400
144 132/132 - 0s - loss: 0.0130 - val_loss: 0.0144 -
    234ms/epoch - 2ms/step
145 Epoch 66/400
146 132/132 - 0s - loss: 0.0128 - val_loss: 0.0153 -
    250ms/epoch - 2ms/step
147 Epoch 67/400
148 132/132 - 0s - loss: 0.0130 - val_loss: 0.0139 -
    252ms/epoch - 2ms/step
149 Epoch 68/400
150 132/132 - 0s - loss: 0.0129 - val_loss: 0.0147 -
    257ms/epoch - 2ms/step
151 Epoch 69/400
152 132/132 - 0s - loss: 0.0131 - val_loss: 0.0148 -
    270ms/epoch - 2ms/step
153 Epoch 70/400
154 132/132 - 0s - loss: 0.0131 - val_loss: 0.0166 -
    251ms/epoch - 2ms/step
155 Epoch 71/400
156 132/132 - 0s - loss: 0.0132 - val_loss: 0.0157 -
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156 258ms/epoch - 2ms/step
157 Epoch 72/400
158 132/132 - 0s - loss: 0.0131 - val_loss: 0.0165 -
    260ms/epoch - 2ms/step
159 Epoch 73/400
160 132/132 - 0s - loss: 0.0129 - val_loss: 0.0168 -
    247ms/epoch - 2ms/step
161 Epoch 74/400
162 132/132 - 0s - loss: 0.0129 - val_loss: 0.0159 -
    265ms/epoch - 2ms/step
163 Epoch 75/400
164 132/132 - 0s - loss: 0.0127 - val_loss: 0.0163 -
    244ms/epoch - 2ms/step
165 Epoch 76/400
166 132/132 - 0s - loss: 0.0125 - val_loss: 0.0158 -
    276ms/epoch - 2ms/step
167 Epoch 77/400
168 132/132 - 0s - loss: 0.0122 - val_loss: 0.0154 -
    286ms/epoch - 2ms/step
169 Epoch 78/400
170 132/132 - 0s - loss: 0.0125 - val_loss: 0.0152 -
    268ms/epoch - 2ms/step
171 Epoch 79/400
172 132/132 - 0s - loss: 0.0122 - val_loss: 0.0158 -
    234ms/epoch - 2ms/step
173 Epoch 80/400
174 132/132 - 0s - loss: 0.0120 - val_loss: 0.0154 -
    280ms/epoch - 2ms/step
175 Epoch 81/400
176 132/132 - 0s - loss: 0.0121 - val_loss: 0.0146 -
    273ms/epoch - 2ms/step
177 Epoch 82/400
178 132/132 - 0s - loss: 0.0122 - val_loss: 0.0157 -
    223ms/epoch - 2ms/step
179 Epoch 83/400
180 132/132 - 0s - loss: 0.0119 - val_loss: 0.0169 -
    282ms/epoch - 2ms/step
181 Epoch 84/400
182 132/132 - 0s - loss: 0.0124 - val_loss: 0.0156 -
    284ms/epoch - 2ms/step
183 Epoch 85/400
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184 132/132 - 0s - loss: 0.0120 - val_loss: 0.0158 -  
    265ms/epoch - 2ms/step  
185 Epoch 86/400  
186 132/132 - 0s - loss: 0.0118 - val_loss: 0.0161 -  
    280ms/epoch - 2ms/step  
187 Epoch 87/400  
188 132/132 - 0s - loss: 0.0118 - val_loss: 0.0159 -  
    267ms/epoch - 2ms/step  
189 Epoch 88/400  
190 132/132 - 0s - loss: 0.0117 - val_loss: 0.0162 -  
    270ms/epoch - 2ms/step  
191 Epoch 89/400  
192 132/132 - 0s - loss: 0.0116 - val_loss: 0.0153 -  
    252ms/epoch - 2ms/step  
193 Epoch 90/400  
194 132/132 - 0s - loss: 0.0115 - val_loss: 0.0147 -  
    242ms/epoch - 2ms/step  
195 Epoch 91/400  
196 132/132 - 0s - loss: 0.0117 - val_loss: 0.0155 -  
    252ms/epoch - 2ms/step  
197 Epoch 92/400  
198 132/132 - 0s - loss: 0.0115 - val_loss: 0.0150 -  
    272ms/epoch - 2ms/step  
199 Epoch 93/400  
200 132/132 - 0s - loss: 0.0115 - val_loss: 0.0150 -  
    244ms/epoch - 2ms/step  
201 Epoch 94/400  
202 132/132 - 0s - loss: 0.0117 - val_loss: 0.0151 -  
    266ms/epoch - 2ms/step  
203 Epoch 95/400  
204 132/132 - 0s - loss: 0.0114 - val_loss: 0.0152 -  
    243ms/epoch - 2ms/step  
205 Epoch 96/400  
206 132/132 - 0s - loss: 0.0111 - val_loss: 0.0137 -  
    277ms/epoch - 2ms/step  
207 Epoch 97/400  
208 132/132 - 0s - loss: 0.0115 - val_loss: 0.0154 -  
    261ms/epoch - 2ms/step  
209 Epoch 98/400  
210 132/132 - 0s - loss: 0.0115 - val_loss: 0.0168 -  
    231ms/epoch - 2ms/step
```

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211 Epoch 99/400
212 132/132 - 0s - loss: 0.0111 - val_loss: 0.0148 -
    252ms/epoch - 2ms/step
213 Epoch 100/400
214 132/132 - 0s - loss: 0.0112 - val_loss: 0.0136 -
    253ms/epoch - 2ms/step
215 Epoch 101/400
216 132/132 - 0s - loss: 0.0116 - val_loss: 0.0156 -
    243ms/epoch - 2ms/step
217 Epoch 102/400
218 132/132 - 0s - loss: 0.0111 - val_loss: 0.0148 -
    269ms/epoch - 2ms/step
219 Epoch 103/400
220 132/132 - 0s - loss: 0.0109 - val_loss: 0.0145 -
    232ms/epoch - 2ms/step
221 Epoch 104/400
222 132/132 - 0s - loss: 0.0112 - val_loss: 0.0156 -
    256ms/epoch - 2ms/step
223 Epoch 105/400
224 132/132 - 0s - loss: 0.0109 - val_loss: 0.0152 -
    230ms/epoch - 2ms/step
225 Epoch 106/400
226 132/132 - 0s - loss: 0.0110 - val_loss: 0.0133 -
    233ms/epoch - 2ms/step
227 Epoch 107/400
228 132/132 - 0s - loss: 0.0115 - val_loss: 0.0152 -
    270ms/epoch - 2ms/step
229 Epoch 108/400
230 132/132 - 0s - loss: 0.0110 - val_loss: 0.0142 -
    252ms/epoch - 2ms/step
231 Epoch 109/400
232 132/132 - 0s - loss: 0.0106 - val_loss: 0.0144 -
    265ms/epoch - 2ms/step
233 Epoch 110/400
234 132/132 - 0s - loss: 0.0109 - val_loss: 0.0151 -
    257ms/epoch - 2ms/step
235 Epoch 111/400
236 132/132 - 0s - loss: 0.0110 - val_loss: 0.0145 -
    315ms/epoch - 2ms/step
237 Epoch 112/400
238 132/132 - 0s - loss: 0.0108 - val_loss: 0.0148 -
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238 268ms/epoch - 2ms/step
239 Epoch 113/400
240 132/132 - 0s - loss: 0.0107 - val_loss: 0.0145 -
    323ms/epoch - 2ms/step
241 Epoch 114/400
242 132/132 - 0s - loss: 0.0110 - val_loss: 0.0137 -
    284ms/epoch - 2ms/step
243 Epoch 115/400
244 132/132 - 0s - loss: 0.0108 - val_loss: 0.0141 -
    447ms/epoch - 3ms/step
245 Epoch 116/400
246 132/132 - 0s - loss: 0.0107 - val_loss: 0.0143 -
    288ms/epoch - 2ms/step
247 Epoch 117/400
248 132/132 - 0s - loss: 0.0108 - val_loss: 0.0127 -
    226ms/epoch - 2ms/step
249 Epoch 118/400
250 132/132 - 0s - loss: 0.0108 - val_loss: 0.0143 -
    231ms/epoch - 2ms/step
251 Epoch 119/400
252 132/132 - 0s - loss: 0.0107 - val_loss: 0.0138 -
    258ms/epoch - 2ms/step
253 Epoch 120/400
254 132/132 - 0s - loss: 0.0107 - val_loss: 0.0136 -
    248ms/epoch - 2ms/step
255 Epoch 121/400
256 132/132 - 0s - loss: 0.0109 - val_loss: 0.0141 -
    226ms/epoch - 2ms/step
257 Epoch 122/400
258 132/132 - 0s - loss: 0.0107 - val_loss: 0.0132 -
    270ms/epoch - 2ms/step
259 Epoch 123/400
260 132/132 - 0s - loss: 0.0109 - val_loss: 0.0145 -
    232ms/epoch - 2ms/step
261 Epoch 124/400
262 132/132 - 0s - loss: 0.0104 - val_loss: 0.0137 -
    231ms/epoch - 2ms/step
263 Epoch 125/400
264 132/132 - 0s - loss: 0.0107 - val_loss: 0.0140 -
    263ms/epoch - 2ms/step
265 Epoch 126/400
```

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266 132/132 - 0s - loss: 0.0109 - val_loss: 0.0139 -
    248ms/epoch - 2ms/step
267 Epoch 127/400
268 132/132 - 0s - loss: 0.0104 - val_loss: 0.0136 -
    256ms/epoch - 2ms/step
269 Epoch 128/400
270 132/132 - 0s - loss: 0.0108 - val_loss: 0.0132 -
    225ms/epoch - 2ms/step
271 Epoch 129/400
272 132/132 - 0s - loss: 0.0107 - val_loss: 0.0137 -
    245ms/epoch - 2ms/step
273 Epoch 130/400
274 132/132 - 0s - loss: 0.0107 - val_loss: 0.0130 -
    236ms/epoch - 2ms/step
275 Epoch 131/400
276 132/132 - 0s - loss: 0.0104 - val_loss: 0.0129 -
    253ms/epoch - 2ms/step
277 Epoch 132/400
278 132/132 - 0s - loss: 0.0106 - val_loss: 0.0133 -
    258ms/epoch - 2ms/step
279 Epoch 133/400
280 132/132 - 0s - loss: 0.0104 - val_loss: 0.0132 -
    302ms/epoch - 2ms/step
281 Epoch 134/400
282 132/132 - 0s - loss: 0.0104 - val_loss: 0.0129 -
    261ms/epoch - 2ms/step
283 Epoch 135/400
284 132/132 - 0s - loss: 0.0106 - val_loss: 0.0126 -
    267ms/epoch - 2ms/step
285 Epoch 136/400
286 132/132 - 0s - loss: 0.0103 - val_loss: 0.0129 -
    235ms/epoch - 2ms/step
287 Epoch 137/400
288 132/132 - 0s - loss: 0.0105 - val_loss: 0.0129 -
    246ms/epoch - 2ms/step
289 Epoch 138/400
290 132/132 - 0s - loss: 0.0104 - val_loss: 0.0129 -
    266ms/epoch - 2ms/step
291 Epoch 139/400
292 132/132 - 0s - loss: 0.0103 - val_loss: 0.0129 -
    222ms/epoch - 2ms/step
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293 Epoch 140/400
294 132/132 - 0s - loss: 0.0103 - val_loss: 0.0125 -
    247ms/epoch - 2ms/step
295 Epoch 141/400
296 132/132 - 0s - loss: 0.0102 - val_loss: 0.0130 -
    290ms/epoch - 2ms/step
297 Epoch 142/400
298 132/132 - 0s - loss: 0.0100 - val_loss: 0.0130 -
    263ms/epoch - 2ms/step
299 Epoch 143/400
300 132/132 - 0s - loss: 0.0102 - val_loss: 0.0126 -
    259ms/epoch - 2ms/step
301 Epoch 144/400
302 132/132 - 0s - loss: 0.0103 - val_loss: 0.0125 -
    291ms/epoch - 2ms/step
303 Epoch 145/400
304 132/132 - 0s - loss: 0.0101 - val_loss: 0.0124 -
    300ms/epoch - 2ms/step
305 Epoch 146/400
306 132/132 - 0s - loss: 0.0101 - val_loss: 0.0121 -
    255ms/epoch - 2ms/step
307 Epoch 147/400
308 132/132 - 0s - loss: 0.0101 - val_loss: 0.0122 -
    346ms/epoch - 3ms/step
309 Epoch 148/400
310 132/132 - 0s - loss: 0.0101 - val_loss: 0.0126 -
    268ms/epoch - 2ms/step
311 Epoch 149/400
312 132/132 - 0s - loss: 0.0100 - val_loss: 0.0121 -
    311ms/epoch - 2ms/step
313 Epoch 150/400
314 132/132 - 0s - loss: 0.0099 - val_loss: 0.0118 -
    290ms/epoch - 2ms/step
315 Epoch 151/400
316 132/132 - 0s - loss: 0.0101 - val_loss: 0.0121 -
    355ms/epoch - 3ms/step
317 Epoch 152/400
318 132/132 - 0s - loss: 0.0099 - val_loss: 0.0126 -
    405ms/epoch - 3ms/step
319 Epoch 153/400
320 132/132 - 0s - loss: 0.0099 - val_loss: 0.0124 -
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320 322ms/epoch - 2ms/step
321 Epoch 154/400
322 132/132 - 0s - loss: 0.0099 - val_loss: 0.0120 -
    240ms/epoch - 2ms/step
323 Epoch 155/400
324 132/132 - 0s - loss: 0.0100 - val_loss: 0.0118 -
    232ms/epoch - 2ms/step
325 Epoch 156/400
326 132/132 - 0s - loss: 0.0101 - val_loss: 0.0122 -
    258ms/epoch - 2ms/step
327 Epoch 157/400
328 132/132 - 0s - loss: 0.0097 - val_loss: 0.0118 -
    263ms/epoch - 2ms/step
329 Epoch 158/400
330 132/132 - 0s - loss: 0.0098 - val_loss: 0.0120 -
    333ms/epoch - 3ms/step
331 Epoch 159/400
332 132/132 - 0s - loss: 0.0100 - val_loss: 0.0119 -
    294ms/epoch - 2ms/step
333 Epoch 160/400
334 132/132 - 0s - loss: 0.0099 - val_loss: 0.0116 -
    225ms/epoch - 2ms/step
335 Epoch 161/400
336 132/132 - 0s - loss: 0.0097 - val_loss: 0.0113 -
    252ms/epoch - 2ms/step
337 Epoch 162/400
338 132/132 - 0s - loss: 0.0097 - val_loss: 0.0117 -
    258ms/epoch - 2ms/step
339 Epoch 163/400
340 132/132 - 0s - loss: 0.0099 - val_loss: 0.0116 -
    301ms/epoch - 2ms/step
341 Epoch 164/400
342 132/132 - 0s - loss: 0.0097 - val_loss: 0.0120 -
    240ms/epoch - 2ms/step
343 Epoch 165/400
344 132/132 - 0s - loss: 0.0097 - val_loss: 0.0118 -
    273ms/epoch - 2ms/step
345 Epoch 166/400
346 132/132 - 0s - loss: 0.0097 - val_loss: 0.0114 -
    343ms/epoch - 3ms/step
347 Epoch 167/400
```

```
348 132/132 - 0s - loss: 0.0098 - val_loss: 0.0115 -
    386ms/epoch - 3ms/step
349 Epoch 168/400
350 132/132 - 0s - loss: 0.0095 - val_loss: 0.0115 -
    298ms/epoch - 2ms/step
351 Epoch 169/400
352 132/132 - 0s - loss: 0.0099 - val_loss: 0.0117 -
    229ms/epoch - 2ms/step
353 Epoch 170/400
354 132/132 - 0s - loss: 0.0098 - val_loss: 0.0118 -
    253ms/epoch - 2ms/step
355 Epoch 171/400
356 132/132 - 0s - loss: 0.0096 - val_loss: 0.0116 -
    232ms/epoch - 2ms/step
357 Epoch 172/400
358 132/132 - 0s - loss: 0.0096 - val_loss: 0.0116 -
    238ms/epoch - 2ms/step
359 Epoch 173/400
360 132/132 - 0s - loss: 0.0099 - val_loss: 0.0115 -
    258ms/epoch - 2ms/step
361 Epoch 174/400
362 132/132 - 0s - loss: 0.0096 - val_loss: 0.0111 -
    256ms/epoch - 2ms/step
363 Epoch 175/400
364 132/132 - 0s - loss: 0.0099 - val_loss: 0.0113 -
    234ms/epoch - 2ms/step
365 Epoch 176/400
366 132/132 - 0s - loss: 0.0095 - val_loss: 0.0113 -
    246ms/epoch - 2ms/step
367 Epoch 177/400
368 132/132 - 0s - loss: 0.0095 - val_loss: 0.0118 -
    233ms/epoch - 2ms/step
369 Epoch 178/400
370 132/132 - 0s - loss: 0.0098 - val_loss: 0.0116 -
    239ms/epoch - 2ms/step
371 Epoch 179/400
372 132/132 - 0s - loss: 0.0094 - val_loss: 0.0112 -
    261ms/epoch - 2ms/step
373 Epoch 180/400
374 132/132 - 0s - loss: 0.0097 - val_loss: 0.0115 -
    256ms/epoch - 2ms/step
```

```
375 Epoch 181/400
376 132/132 - 0s - loss: 0.0097 - val_loss: 0.0112 -
    276ms/epoch - 2ms/step
377 Epoch 182/400
378 132/132 - 0s - loss: 0.0094 - val_loss: 0.0114 -
    241ms/epoch - 2ms/step
379 Epoch 183/400
380 132/132 - 0s - loss: 0.0096 - val_loss: 0.0112 -
    231ms/epoch - 2ms/step
381 Epoch 184/400
382 132/132 - 0s - loss: 0.0095 - val_loss: 0.0113 -
    250ms/epoch - 2ms/step
383 Epoch 185/400
384 132/132 - 0s - loss: 0.0095 - val_loss: 0.0111 -
    246ms/epoch - 2ms/step
385 Epoch 186/400
386 132/132 - 0s - loss: 0.0094 - val_loss: 0.0112 -
    255ms/epoch - 2ms/step
387 Epoch 187/400
388 132/132 - 0s - loss: 0.0095 - val_loss: 0.0111 -
    248ms/epoch - 2ms/step
389 Epoch 188/400
390 132/132 - 0s - loss: 0.0093 - val_loss: 0.0118 -
    260ms/epoch - 2ms/step
391 Epoch 189/400
392 132/132 - 0s - loss: 0.0095 - val_loss: 0.0129 -
    255ms/epoch - 2ms/step
393 Epoch 190/400
394 132/132 - 0s - loss: 0.0093 - val_loss: 0.0111 -
    300ms/epoch - 2ms/step
395 Epoch 191/400
396 132/132 - 0s - loss: 0.0095 - val_loss: 0.0113 -
    299ms/epoch - 2ms/step
397 Epoch 192/400
398 132/132 - 0s - loss: 0.0097 - val_loss: 0.0114 -
    276ms/epoch - 2ms/step
399 Epoch 193/400
400 132/132 - 0s - loss: 0.0093 - val_loss: 0.0117 -
    278ms/epoch - 2ms/step
401 Epoch 194/400
402 132/132 - 0s - loss: 0.0094 - val_loss: 0.0112 -
```

```
402 346ms/epoch - 3ms/step
403 Epoch 195/400
404 132/132 - 0s - loss: 0.0094 - val_loss: 0.0111 -
    298ms/epoch - 2ms/step
405 Epoch 196/400
406 132/132 - 0s - loss: 0.0093 - val_loss: 0.0112 -
    271ms/epoch - 2ms/step
407 Epoch 197/400
408 132/132 - 0s - loss: 0.0092 - val_loss: 0.0113 -
    261ms/epoch - 2ms/step
409 Epoch 198/400
410 132/132 - 0s - loss: 0.0094 - val_loss: 0.0113 -
    386ms/epoch - 3ms/step
411 Epoch 199/400
412 132/132 - 0s - loss: 0.0092 - val_loss: 0.0109 -
    287ms/epoch - 2ms/step
413 Epoch 200/400
414 132/132 - 0s - loss: 0.0093 - val_loss: 0.0113 -
    324ms/epoch - 2ms/step
415 Epoch 201/400
416 132/132 - 0s - loss: 0.0095 - val_loss: 0.0114 -
    365ms/epoch - 3ms/step
417 Epoch 202/400
418 132/132 - 0s - loss: 0.0092 - val_loss: 0.0106 -
    333ms/epoch - 3ms/step
419 Epoch 203/400
420 132/132 - 0s - loss: 0.0094 - val_loss: 0.0109 -
    321ms/epoch - 2ms/step
421 Epoch 204/400
422 132/132 - 0s - loss: 0.0095 - val_loss: 0.0112 -
    358ms/epoch - 3ms/step
423 Epoch 205/400
424 132/132 - 0s - loss: 0.0091 - val_loss: 0.0112 -
    451ms/epoch - 3ms/step
425 Epoch 206/400
426 132/132 - 0s - loss: 0.0093 - val_loss: 0.0117 -
    418ms/epoch - 3ms/step
427 Epoch 207/400
428 132/132 - 0s - loss: 0.0093 - val_loss: 0.0109 -
    421ms/epoch - 3ms/step
429 Epoch 208/400
```

```
430 132/132 - 0s - loss: 0.0091 - val_loss: 0.0111 -  
    295ms/epoch - 2ms/step  
431 Epoch 209/400  
432 132/132 - 0s - loss: 0.0099 - val_loss: 0.0110 -  
    341ms/epoch - 3ms/step  
433 Epoch 210/400  
434 132/132 - 0s - loss: 0.0091 - val_loss: 0.0118 -  
    394ms/epoch - 3ms/step  
435 Epoch 211/400  
436 132/132 - 0s - loss: 0.0093 - val_loss: 0.0112 -  
    277ms/epoch - 2ms/step  
437 Epoch 212/400  
438 132/132 - 0s - loss: 0.0097 - val_loss: 0.0109 -  
    260ms/epoch - 2ms/step  
439 Epoch 213/400  
440 132/132 - 0s - loss: 0.0094 - val_loss: 0.0113 -  
    272ms/epoch - 2ms/step  
441 Epoch 214/400  
442 132/132 - 0s - loss: 0.0095 - val_loss: 0.0105 -  
    268ms/epoch - 2ms/step  
443 Epoch 215/400  
444 132/132 - 0s - loss: 0.0098 - val_loss: 0.0101 -  
    248ms/epoch - 2ms/step  
445 Epoch 216/400  
446 132/132 - 0s - loss: 0.0094 - val_loss: 0.0099 -  
    266ms/epoch - 2ms/step  
447 Epoch 217/400  
448 132/132 - 0s - loss: 0.0095 - val_loss: 0.0101 -  
    272ms/epoch - 2ms/step  
449 Epoch 218/400  
450 132/132 - 0s - loss: 0.0094 - val_loss: 0.0100 -  
    248ms/epoch - 2ms/step  
451 Epoch 219/400  
452 132/132 - 0s - loss: 0.0092 - val_loss: 0.0098 -  
    263ms/epoch - 2ms/step  
453 Epoch 220/400  
454 132/132 - 0s - loss: 0.0094 - val_loss: 0.0096 -  
    228ms/epoch - 2ms/step  
455 Epoch 221/400  
456 132/132 - 0s - loss: 0.0093 - val_loss: 0.0096 -  
    262ms/epoch - 2ms/step
```

```
457 Epoch 222/400
458 132/132 - 0s - loss: 0.0093 - val_loss: 0.0098 -
    277ms/epoch - 2ms/step
459 Epoch 223/400
460 132/132 - 0s - loss: 0.0092 - val_loss: 0.0098 -
    227ms/epoch - 2ms/step
461 Epoch 224/400
462 132/132 - 0s - loss: 0.0091 - val_loss: 0.0097 -
    237ms/epoch - 2ms/step
463 Epoch 225/400
464 132/132 - 0s - loss: 0.0093 - val_loss: 0.0098 -
    264ms/epoch - 2ms/step
465 Epoch 226/400
466 132/132 - 0s - loss: 0.0092 - val_loss: 0.0093 -
    231ms/epoch - 2ms/step
467 Epoch 227/400
468 132/132 - 0s - loss: 0.0093 - val_loss: 0.0094 -
    281ms/epoch - 2ms/step
469 Epoch 228/400
470 132/132 - 0s - loss: 0.0092 - val_loss: 0.0093 -
    291ms/epoch - 2ms/step
471 Epoch 229/400
472 132/132 - 0s - loss: 0.0091 - val_loss: 0.0098 -
    249ms/epoch - 2ms/step
473 Epoch 230/400
474 132/132 - 0s - loss: 0.0092 - val_loss: 0.0097 -
    259ms/epoch - 2ms/step
475 Epoch 231/400
476 132/132 - 0s - loss: 0.0090 - val_loss: 0.0098 -
    238ms/epoch - 2ms/step
477 Epoch 232/400
478 132/132 - 0s - loss: 0.0091 - val_loss: 0.0093 -
    251ms/epoch - 2ms/step
479 Epoch 233/400
480 132/132 - 0s - loss: 0.0095 - val_loss: 0.0098 -
    245ms/epoch - 2ms/step
481 Epoch 234/400
482 132/132 - 0s - loss: 0.0091 - val_loss: 0.0097 -
    243ms/epoch - 2ms/step
483 Epoch 235/400
484 132/132 - 0s - loss: 0.0093 - val_loss: 0.0090 -
```

```
484 251ms/epoch - 2ms/step
485 Epoch 236/400
486 132/132 - 0s - loss: 0.0093 - val_loss: 0.0093 -
    249ms/epoch - 2ms/step
487 Epoch 237/400
488 132/132 - 0s - loss: 0.0091 - val_loss: 0.0090 -
    255ms/epoch - 2ms/step
489 Epoch 238/400
490 132/132 - 0s - loss: 0.0090 - val_loss: 0.0092 -
    264ms/epoch - 2ms/step
491 Epoch 239/400
492 132/132 - 0s - loss: 0.0093 - val_loss: 0.0093 -
    271ms/epoch - 2ms/step
493 Epoch 240/400
494 132/132 - 0s - loss: 0.0090 - val_loss: 0.0093 -
    244ms/epoch - 2ms/step
495 Epoch 241/400
496 132/132 - 0s - loss: 0.0091 - val_loss: 0.0094 -
    260ms/epoch - 2ms/step
497 Epoch 242/400
498 132/132 - 0s - loss: 0.0092 - val_loss: 0.0090 -
    265ms/epoch - 2ms/step
499 Epoch 243/400
500 132/132 - 0s - loss: 0.0090 - val_loss: 0.0093 -
    226ms/epoch - 2ms/step
501 Epoch 244/400
502 132/132 - 0s - loss: 0.0091 - val_loss: 0.0088 -
    253ms/epoch - 2ms/step
503 Epoch 245/400
504 132/132 - 0s - loss: 0.0092 - val_loss: 0.0087 -
    283ms/epoch - 2ms/step
505 Epoch 246/400
506 132/132 - 0s - loss: 0.0089 - val_loss: 0.0095 -
    245ms/epoch - 2ms/step
507 Epoch 247/400
508 132/132 - 0s - loss: 0.0090 - val_loss: 0.0091 -
    280ms/epoch - 2ms/step
509 Epoch 248/400
510 132/132 - 0s - loss: 0.0090 - val_loss: 0.0092 -
    274ms/epoch - 2ms/step
511 Epoch 249/400
```

```
512 132/132 - 0s - loss: 0.0092 - val_loss: 0.0090 -
    252ms/epoch - 2ms/step
513 Epoch 250/400
514 132/132 - 0s - loss: 0.0092 - val_loss: 0.0088 -
    242ms/epoch - 2ms/step
515 Epoch 251/400
516 132/132 - 0s - loss: 0.0090 - val_loss: 0.0091 -
    243ms/epoch - 2ms/step
517 Epoch 252/400
518 132/132 - 0s - loss: 0.0091 - val_loss: 0.0089 -
    283ms/epoch - 2ms/step
519 Epoch 253/400
520 132/132 - 0s - loss: 0.0090 - val_loss: 0.0091 -
    250ms/epoch - 2ms/step
521 Epoch 254/400
522 132/132 - 0s - loss: 0.0091 - val_loss: 0.0086 -
    262ms/epoch - 2ms/step
523 Epoch 255/400
524 132/132 - 0s - loss: 0.0090 - val_loss: 0.0089 -
    253ms/epoch - 2ms/step
525 Epoch 256/400
526 132/132 - 0s - loss: 0.0090 - val_loss: 0.0091 -
    334ms/epoch - 3ms/step
527 Epoch 257/400
528 132/132 - 0s - loss: 0.0090 - val_loss: 0.0089 -
    263ms/epoch - 2ms/step
529 Epoch 258/400
530 132/132 - 0s - loss: 0.0090 - val_loss: 0.0091 -
    265ms/epoch - 2ms/step
531 Epoch 259/400
532 132/132 - 0s - loss: 0.0090 - val_loss: 0.0085 -
    230ms/epoch - 2ms/step
533 Epoch 260/400
534 132/132 - 0s - loss: 0.0089 - val_loss: 0.0089 -
    243ms/epoch - 2ms/step
535 Epoch 261/400
536 132/132 - 0s - loss: 0.0089 - val_loss: 0.0089 -
    260ms/epoch - 2ms/step
537 Epoch 262/400
538 132/132 - 0s - loss: 0.0090 - val_loss: 0.0089 -
    274ms/epoch - 2ms/step
```

```
539 Epoch 263/400
540 132/132 - 0s - loss: 0.0089 - val_loss: 0.0089 -
    294ms/epoch - 2ms/step
541 Epoch 264/400
542 132/132 - 0s - loss: 0.0090 - val_loss: 0.0086 -
    285ms/epoch - 2ms/step
543 Epoch 265/400
544 132/132 - 0s - loss: 0.0091 - val_loss: 0.0086 -
    259ms/epoch - 2ms/step
545 Epoch 266/400
546 132/132 - 0s - loss: 0.0090 - val_loss: 0.0086 -
    260ms/epoch - 2ms/step
547 Epoch 267/400
548 132/132 - 0s - loss: 0.0091 - val_loss: 0.0084 -
    300ms/epoch - 2ms/step
549 Epoch 268/400
550 132/132 - 0s - loss: 0.0089 - val_loss: 0.0083 -
    267ms/epoch - 2ms/step
551 Epoch 269/400
552 132/132 - 0s - loss: 0.0091 - val_loss: 0.0085 -
    277ms/epoch - 2ms/step
553 Epoch 270/400
554 132/132 - 0s - loss: 0.0090 - val_loss: 0.0084 -
    254ms/epoch - 2ms/step
555 Epoch 271/400
556 132/132 - 0s - loss: 0.0089 - val_loss: 0.0084 -
    264ms/epoch - 2ms/step
557 Epoch 272/400
558 132/132 - 0s - loss: 0.0089 - val_loss: 0.0084 -
    247ms/epoch - 2ms/step
559 Epoch 273/400
560 132/132 - 0s - loss: 0.0092 - val_loss: 0.0084 -
    255ms/epoch - 2ms/step
561 Epoch 274/400
562 132/132 - 0s - loss: 0.0090 - val_loss: 0.0082 -
    238ms/epoch - 2ms/step
563 Epoch 275/400
564 132/132 - 0s - loss: 0.0089 - val_loss: 0.0083 -
    268ms/epoch - 2ms/step
565 Epoch 276/400
566 132/132 - 0s - loss: 0.0091 - val_loss: 0.0083 -
```

```
566 256ms/epoch - 2ms/step
567 Epoch 277/400
568 132/132 - 0s - loss: 0.0090 - val_loss: 0.0083 -
    242ms/epoch - 2ms/step
569 Epoch 278/400
570 132/132 - 0s - loss: 0.0089 - val_loss: 0.0083 -
    278ms/epoch - 2ms/step
571 Epoch 279/400
572 132/132 - 0s - loss: 0.0090 - val_loss: 0.0081 -
    249ms/epoch - 2ms/step
573 Epoch 280/400
574 132/132 - 0s - loss: 0.0091 - val_loss: 0.0083 -
    276ms/epoch - 2ms/step
575 Epoch 281/400
576 132/132 - 0s - loss: 0.0091 - val_loss: 0.0081 -
    279ms/epoch - 2ms/step
577 Epoch 282/400
578 132/132 - 0s - loss: 0.0089 - val_loss: 0.0081 -
    269ms/epoch - 2ms/step
579 Epoch 283/400
580 132/132 - 0s - loss: 0.0095 - val_loss: 0.0082 -
    261ms/epoch - 2ms/step
581 Epoch 284/400
582 132/132 - 0s - loss: 0.0090 - val_loss: 0.0083 -
    233ms/epoch - 2ms/step
583 Epoch 285/400
584 132/132 - 0s - loss: 0.0090 - val_loss: 0.0081 -
    264ms/epoch - 2ms/step
585 Epoch 286/400
586 132/132 - 0s - loss: 0.0091 - val_loss: 0.0081 -
    271ms/epoch - 2ms/step
587 Epoch 287/400
588 132/132 - 0s - loss: 0.0092 - val_loss: 0.0080 -
    268ms/epoch - 2ms/step
589 Epoch 288/400
590 132/132 - 0s - loss: 0.0089 - val_loss: 0.0079 -
    281ms/epoch - 2ms/step
591 Epoch 289/400
592 132/132 - 0s - loss: 0.0091 - val_loss: 0.0079 -
    285ms/epoch - 2ms/step
593 Epoch 290/400
```

```
594 132/132 - 0s - loss: 0.0098 - val_loss: 0.0078 -
    276ms/epoch - 2ms/step
595 Epoch 291/400
596 132/132 - 0s - loss: 0.0094 - val_loss: 0.0078 -
    239ms/epoch - 2ms/step
597 Epoch 292/400
598 132/132 - 0s - loss: 0.0095 - val_loss: 0.0078 -
    283ms/epoch - 2ms/step
599 Epoch 293/400
600 132/132 - 0s - loss: 0.0093 - val_loss: 0.0078 -
    279ms/epoch - 2ms/step
601 Epoch 294/400
602 132/132 - 0s - loss: 0.0096 - val_loss: 0.0078 -
    267ms/epoch - 2ms/step
603 Epoch 295/400
604 132/132 - 0s - loss: 0.0091 - val_loss: 0.0079 -
    251ms/epoch - 2ms/step
605 Epoch 296/400
606 132/132 - 0s - loss: 0.0091 - val_loss: 0.0077 -
    248ms/epoch - 2ms/step
607 Epoch 297/400
608 132/132 - 0s - loss: 0.0091 - val_loss: 0.0078 -
    261ms/epoch - 2ms/step
609 Epoch 298/400
610 132/132 - 0s - loss: 0.0091 - val_loss: 0.0079 -
    239ms/epoch - 2ms/step
611 Epoch 299/400
612 132/132 - 0s - loss: 0.0094 - val_loss: 0.0078 -
    237ms/epoch - 2ms/step
613 Epoch 300/400
614 132/132 - 0s - loss: 0.0091 - val_loss: 0.0077 -
    240ms/epoch - 2ms/step
615 Epoch 301/400
616 132/132 - 0s - loss: 0.0091 - val_loss: 0.0078 -
    232ms/epoch - 2ms/step
617 Epoch 302/400
618 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
    250ms/epoch - 2ms/step
619 Epoch 303/400
620 132/132 - 0s - loss: 0.0095 - val_loss: 0.0078 -
    226ms/epoch - 2ms/step
```

```
621 Epoch 304/400
622 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
    246ms/epoch - 2ms/step
623 Epoch 305/400
624 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
    231ms/epoch - 2ms/step
625 Epoch 306/400
626 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
    255ms/epoch - 2ms/step
627 Epoch 307/400
628 132/132 - 0s - loss: 0.0091 - val_loss: 0.0078 -
    225ms/epoch - 2ms/step
629 Epoch 308/400
630 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
    269ms/epoch - 2ms/step
631 Epoch 309/400
632 132/132 - 0s - loss: 0.0092 - val_loss: 0.0077 -
    256ms/epoch - 2ms/step
633 Epoch 310/400
634 132/132 - 0s - loss: 0.0089 - val_loss: 0.0078 -
    269ms/epoch - 2ms/step
635 Epoch 311/400
636 132/132 - 0s - loss: 0.0089 - val_loss: 0.0078 -
    288ms/epoch - 2ms/step
637 Epoch 312/400
638 132/132 - 0s - loss: 0.0095 - val_loss: 0.0078 -
    278ms/epoch - 2ms/step
639 Epoch 313/400
640 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
    280ms/epoch - 2ms/step
641 Epoch 314/400
642 132/132 - 0s - loss: 0.0090 - val_loss: 0.0077 -
    286ms/epoch - 2ms/step
643 Epoch 315/400
644 132/132 - 0s - loss: 0.0090 - val_loss: 0.0077 -
    301ms/epoch - 2ms/step
645 Epoch 316/400
646 132/132 - 0s - loss: 0.0095 - val_loss: 0.0078 -
    292ms/epoch - 2ms/step
647 Epoch 317/400
648 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
```

```
648 281ms/epoch - 2ms/step
649 Epoch 318/400
650 132/132 - 0s - loss: 0.0089 - val_loss: 0.0078 -
    257ms/epoch - 2ms/step
651 Epoch 319/400
652 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
    242ms/epoch - 2ms/step
653 Epoch 320/400
654 132/132 - 0s - loss: 0.0089 - val_loss: 0.0078 -
    242ms/epoch - 2ms/step
655 Epoch 321/400
656 132/132 - 0s - loss: 0.0089 - val_loss: 0.0076 -
    254ms/epoch - 2ms/step
657 Epoch 322/400
658 132/132 - 0s - loss: 0.0088 - val_loss: 0.0077 -
    233ms/epoch - 2ms/step
659 Epoch 323/400
660 132/132 - 0s - loss: 0.0091 - val_loss: 0.0076 -
    272ms/epoch - 2ms/step
661 Epoch 324/400
662 132/132 - 0s - loss: 0.0091 - val_loss: 0.0077 -
    245ms/epoch - 2ms/step
663 Epoch 325/400
664 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
    276ms/epoch - 2ms/step
665 Epoch 326/400
666 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
    223ms/epoch - 2ms/step
667 Epoch 327/400
668 132/132 - 0s - loss: 0.0089 - val_loss: 0.0078 -
    237ms/epoch - 2ms/step
669 Epoch 328/400
670 132/132 - 0s - loss: 0.0089 - val_loss: 0.0077 -
    231ms/epoch - 2ms/step
671 Epoch 329/400
672 132/132 - 0s - loss: 0.0090 - val_loss: 0.0077 -
    252ms/epoch - 2ms/step
673 Epoch 330/400
674 132/132 - 0s - loss: 0.0089 - val_loss: 0.0078 -
    228ms/epoch - 2ms/step
675 Epoch 331/400
```

```
676 132/132 - 0s - loss: 0.0091 - val_loss: 0.0078 -
    245ms/epoch - 2ms/step
677 Epoch 332/400
678 132/132 - 0s - loss: 0.0090 - val_loss: 0.0078 -
    228ms/epoch - 2ms/step
679 Epoch 333/400
680 132/132 - 0s - loss: 0.0089 - val_loss: 0.0077 -
    247ms/epoch - 2ms/step
681 Epoch 334/400
682 132/132 - 0s - loss: 0.0089 - val_loss: 0.0077 -
    231ms/epoch - 2ms/step
683 Epoch 335/400
684 132/132 - 0s - loss: 0.0090 - val_loss: 0.0077 -
    249ms/epoch - 2ms/step
685 Epoch 336/400
686 132/132 - 0s - loss: 0.0089 - val_loss: 0.0078 -
    227ms/epoch - 2ms/step
687 Epoch 337/400
688 132/132 - 0s - loss: 0.0089 - val_loss: 0.0078 -
    248ms/epoch - 2ms/step
689 Epoch 338/400
690 132/132 - 0s - loss: 0.0089 - val_loss: 0.0077 -
    230ms/epoch - 2ms/step
691 Epoch 339/400
692 132/132 - 0s - loss: 0.0089 - val_loss: 0.0078 -
    237ms/epoch - 2ms/step
693 Epoch 340/400
694 132/132 - 0s - loss: 0.0090 - val_loss: 0.0076 -
    232ms/epoch - 2ms/step
695 Epoch 341/400
696 132/132 - 0s - loss: 0.0089 - val_loss: 0.0077 -
    245ms/epoch - 2ms/step
697 Epoch 342/400
698 132/132 - 0s - loss: 0.0089 - val_loss: 0.0077 -
    308ms/epoch - 2ms/step
699 Epoch 343/400
700 132/132 - 0s - loss: 0.0093 - val_loss: 0.0076 -
    233ms/epoch - 2ms/step
701 Epoch 344/400
702 132/132 - 0s - loss: 0.0090 - val_loss: 0.0076 -
    229ms/epoch - 2ms/step
```

```
703 Epoch 345/400
704 132/132 - 0s - loss: 0.0090 - val_loss: 0.0077 -
    248ms/epoch - 2ms/step
705 Epoch 346/400
706 132/132 - 0s - loss: 0.0090 - val_loss: 0.0077 -
    234ms/epoch - 2ms/step
707 Epoch 347/400
708 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    237ms/epoch - 2ms/step
709 Epoch 348/400
710 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    238ms/epoch - 2ms/step
711 Epoch 349/400
712 132/132 - 0s - loss: 0.0090 - val_loss: 0.0077 -
    231ms/epoch - 2ms/step
713 Epoch 350/400
714 132/132 - 0s - loss: 0.0091 - val_loss: 0.0077 -
    264ms/epoch - 2ms/step
715 Epoch 351/400
716 132/132 - 0s - loss: 0.0090 - val_loss: 0.0076 -
    228ms/epoch - 2ms/step
717 Epoch 352/400
718 132/132 - 0s - loss: 0.0087 - val_loss: 0.0076 -
    245ms/epoch - 2ms/step
719 Epoch 353/400
720 132/132 - 0s - loss: 0.0092 - val_loss: 0.0077 -
    229ms/epoch - 2ms/step
721 Epoch 354/400
722 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    264ms/epoch - 2ms/step
723 Epoch 355/400
724 132/132 - 0s - loss: 0.0089 - val_loss: 0.0077 -
    226ms/epoch - 2ms/step
725 Epoch 356/400
726 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    266ms/epoch - 2ms/step
727 Epoch 357/400
728 132/132 - 0s - loss: 0.0089 - val_loss: 0.0076 -
    251ms/epoch - 2ms/step
729 Epoch 358/400
730 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
```

```
730 276ms/epoch - 2ms/step
731 Epoch 359/400
732 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    233ms/epoch - 2ms/step
733 Epoch 360/400
734 132/132 - 0s - loss: 0.0088 - val_loss: 0.0075 -
    255ms/epoch - 2ms/step
735 Epoch 361/400
736 132/132 - 0s - loss: 0.0090 - val_loss: 0.0076 -
    236ms/epoch - 2ms/step
737 Epoch 362/400
738 132/132 - 0s - loss: 0.0087 - val_loss: 0.0076 -
    268ms/epoch - 2ms/step
739 Epoch 363/400
740 132/132 - 0s - loss: 0.0089 - val_loss: 0.0076 -
    239ms/epoch - 2ms/step
741 Epoch 364/400
742 132/132 - 0s - loss: 0.0089 - val_loss: 0.0076 -
    250ms/epoch - 2ms/step
743 Epoch 365/400
744 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    303ms/epoch - 2ms/step
745 Epoch 366/400
746 132/132 - 0s - loss: 0.0089 - val_loss: 0.0076 -
    266ms/epoch - 2ms/step
747 Epoch 367/400
748 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    273ms/epoch - 2ms/step
749 Epoch 368/400
750 132/132 - 0s - loss: 0.0087 - val_loss: 0.0077 -
    254ms/epoch - 2ms/step
751 Epoch 369/400
752 132/132 - 0s - loss: 0.0088 - val_loss: 0.0075 -
    312ms/epoch - 2ms/step
753 Epoch 370/400
754 132/132 - 0s - loss: 0.0088 - val_loss: 0.0075 -
    299ms/epoch - 2ms/step
755 Epoch 371/400
756 132/132 - 0s - loss: 0.0088 - val_loss: 0.0075 -
    258ms/epoch - 2ms/step
757 Epoch 372/400
```

```
758 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    247ms/epoch - 2ms/step
759 Epoch 373/400
760 132/132 - 0s - loss: 0.0089 - val_loss: 0.0076 -
    243ms/epoch - 2ms/step
761 Epoch 374/400
762 132/132 - 0s - loss: 0.0090 - val_loss: 0.0076 -
    253ms/epoch - 2ms/step
763 Epoch 375/400
764 132/132 - 0s - loss: 0.0091 - val_loss: 0.0077 -
    222ms/epoch - 2ms/step
765 Epoch 376/400
766 132/132 - 0s - loss: 0.0088 - val_loss: 0.0075 -
    253ms/epoch - 2ms/step
767 Epoch 377/400
768 132/132 - 0s - loss: 0.0089 - val_loss: 0.0075 -
    229ms/epoch - 2ms/step
769 Epoch 378/400
770 132/132 - 0s - loss: 0.0088 - val_loss: 0.0075 -
    258ms/epoch - 2ms/step
771 Epoch 379/400
772 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    231ms/epoch - 2ms/step
773 Epoch 380/400
774 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    243ms/epoch - 2ms/step
775 Epoch 381/400
776 132/132 - 0s - loss: 0.0087 - val_loss: 0.0075 -
    260ms/epoch - 2ms/step
777 Epoch 382/400
778 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    267ms/epoch - 2ms/step
779 Epoch 383/400
780 132/132 - 0s - loss: 0.0088 - val_loss: 0.0075 -
    236ms/epoch - 2ms/step
781 Epoch 384/400
782 132/132 - 0s - loss: 0.0087 - val_loss: 0.0075 -
    242ms/epoch - 2ms/step
783 Epoch 385/400
784 132/132 - 0s - loss: 0.0088 - val_loss: 0.0076 -
    274ms/epoch - 2ms/step
```

```
785 Epoch 386/400
786 132/132 - 0s - loss: 0.0088 - val_loss: 0.0075 -
    241ms/epoch - 2ms/step
787 Epoch 387/400
788 132/132 - 0s - loss: 0.0087 - val_loss: 0.0077 -
    255ms/epoch - 2ms/step
789 Epoch 388/400
790 132/132 - 0s - loss: 0.0087 - val_loss: 0.0075 -
    248ms/epoch - 2ms/step
791 Epoch 389/400
792 132/132 - 0s - loss: 0.0087 - val_loss: 0.0076 -
    243ms/epoch - 2ms/step
793 Epoch 390/400
794 132/132 - 0s - loss: 0.0087 - val_loss: 0.0076 -
    255ms/epoch - 2ms/step
795 Epoch 391/400
796 132/132 - 0s - loss: 0.0087 - val_loss: 0.0076 -
    229ms/epoch - 2ms/step
797 Epoch 392/400
798 132/132 - 0s - loss: 0.0088 - val_loss: 0.0074 -
    252ms/epoch - 2ms/step
799 Epoch 393/400
800 132/132 - 0s - loss: 0.0087 - val_loss: 0.0076 -
    236ms/epoch - 2ms/step
801 Epoch 394/400
802 132/132 - 0s - loss: 0.0087 - val_loss: 0.0075 -
    243ms/epoch - 2ms/step
803 Epoch 395/400
804 132/132 - 0s - loss: 0.0087 - val_loss: 0.0074 -
    231ms/epoch - 2ms/step
805 Epoch 396/400
806 132/132 - 0s - loss: 0.0088 - val_loss: 0.0074 -
    234ms/epoch - 2ms/step
807 Epoch 397/400
808 132/132 - 0s - loss: 0.0087 - val_loss: 0.0074 -
    235ms/epoch - 2ms/step
809 Epoch 398/400
810 132/132 - 0s - loss: 0.0087 - val_loss: 0.0074 -
    234ms/epoch - 2ms/step
811 Epoch 399/400
812 132/132 - 0s - loss: 0.0087 - val_loss: 0.0075 -
```

```
812 231ms/epoch - 2ms/step
813 Epoch 400/400
814 132/132 - 0s - loss: 0.0088 - val_loss: 0.0074 -
228ms/epoch - 2ms/step
815 15/15 [=====] - 0s 1ms/
step
816 Test RMSE: 0.113
817
818 进程已结束, 退出代码0
819
```