

```
1 C:\dev\python\ML_venv\Scripts\python.exe C:/dev/ML_Project/
model/main.py
2 2020-11-25 11:05:19.710008: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library cudart64_101.dll
3 2020-11-25 11:05:21.820933: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library nvcuda.dll
4 2020-11-25 11:05:21.838250: I tensorflow/core/
common_runtime/gpu/gpu_device.cc:1716] Found device 0 with
properties:
5 pciBusID: 0000:01:00.0 name: GeForce GTX 1070
computeCapability: 6.1
6 coreClock: 1.7845GHz coreCount: 15 deviceMemorySize: 8.
00GiB deviceMemoryBandwidth: 238.66GiB/s
7 2020-11-25 11:05:21.838459: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library cudart64_101.dll
8 2020-11-25 11:05:21.841717: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library cublas64_10.dll
9 2020-11-25 11:05:21.845011: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library cufft64_10.dll
10 2020-11-25 11:05:21.846149: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library curand64_10.dll
11 2020-11-25 11:05:21.849567: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library cusolver64_10.dll
12 2020-11-25 11:05:21.851757: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library cusparse64_10.dll
13 2020-11-25 11:05:21.859823: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library cudnn64_7.dll
14 2020-11-25 11:05:21.859991: I tensorflow/core/
common_runtime/gpu/gpu_device.cc:1858] Adding visible gpu
devices: 0
15 2020-11-25 11:05:21.860407: I tensorflow/core/platform/
cpu_feature_guard.cc:142] This TensorFlow binary is
optimized with oneAPI Deep Neural Network Library (oneDNN)
to use the following CPU instructions in performance-
critical operations: AVX2
16 To enable them in other operations, rebuild TensorFlow with
the appropriate compiler flags.
```

```
17 2020-11-25 11:05:21.867480: I tensorflow/compiler/xla/
    service/service.cc:168] XLA service 0x18a660e04e0
    initialized for platform Host (this does not guarantee that
    XLA will be used). Devices:
18 2020-11-25 11:05:21.867625: I tensorflow/compiler/xla/
    service/service.cc:176] StreamExecutor device (0): Host,
    Default Version
19 2020-11-25 11:05:21.867894: I tensorflow/core/
    common_runtime/gpu/gpu_device.cc:1716] Found device 0 with
    properties:
20 pciBusID: 0000:01:00.0 name: GeForce GTX 1070
    computeCapability: 6.1
21 coreClock: 1.7845GHz coreCount: 15 deviceMemorySize: 8.
    00GiB deviceMemoryBandwidth: 238.66GiB/s
22 2020-11-25 11:05:21.868091: I tensorflow/stream_executor/
    platform/default/dso_loader.cc:48] Successfully opened
    dynamic library cudart64_101.dll
23 2020-11-25 11:05:21.868192: I tensorflow/stream_executor/
    platform/default/dso_loader.cc:48] Successfully opened
    dynamic library cublas64_10.dll
24 2020-11-25 11:05:21.868287: I tensorflow/stream_executor/
    platform/default/dso_loader.cc:48] Successfully opened
    dynamic library cufft64_10.dll
25 2020-11-25 11:05:21.868391: I tensorflow/stream_executor/
    platform/default/dso_loader.cc:48] Successfully opened
    dynamic library curand64_10.dll
26 2020-11-25 11:05:21.868494: I tensorflow/stream_executor/
    platform/default/dso_loader.cc:48] Successfully opened
    dynamic library cusolver64_10.dll
27 2020-11-25 11:05:21.868592: I tensorflow/stream_executor/
    platform/default/dso_loader.cc:48] Successfully opened
    dynamic library cusparse64_10.dll
28 2020-11-25 11:05:21.868692: I tensorflow/stream_executor/
    platform/default/dso_loader.cc:48] Successfully opened
    dynamic library cudnn64_7.dll
29 2020-11-25 11:05:21.869060: I tensorflow/core/
    common_runtime/gpu/gpu_device.cc:1858] Adding visible gpu
    devices: 0
30 2020-11-25 11:05:22.332731: I tensorflow/core/
    common_runtime/gpu/gpu_device.cc:1257] Device interconnect
    StreamExecutor with strength 1 edge matrix:
31 2020-11-25 11:05:22.332846: I tensorflow/core/
    common_runtime/gpu/gpu_device.cc:1263]      0
32 2020-11-25 11:05:22.332909: I tensorflow/core/
    common_runtime/gpu/gpu_device.cc:1276] 0:      N
33 2020-11-25 11:05:22.333106: I tensorflow/core/
```

```
33 common_runtime/gpu/gpu_device.cc:1402] Created TensorFlow
device (/job:localhost/replica:0/task:0/device:GPU:0 with
6301 MB memory) -> physical GPU (device: 0, name: GeForce
GTX 1070, pci bus id: 0000:01:00.0, compute capability: 6.1
)
34 2020-11-25 11:05:22.335762: I tensorflow/compiler/xla/
service/service.cc:168] XLA service 0x18a0d03be30
initialized for platform CUDA (this does not guarantee that
XLA will be used). Devices:
35 2020-11-25 11:05:22.335902: I tensorflow/compiler/xla/
service/service.cc:176] StreamExecutor device (0):
    GeForce GTX 1070, Compute Capability 6.1
36 100% (109 of 109) |#####| Elapsed Time: 0:
00:03 Time: 0:00:03
37 100% (133 of 133) |#####| Elapsed Time: 0:
00:03 Time: 0:00:03
38 100% (181 of 181) |#####| Elapsed Time: 0:
00:05 Time: 0:00:05
39 100% (108 of 108) |#####| Elapsed Time: 0:
00:02 Time: 0:00:02
40 100% (154 of 154) |#####| Elapsed Time: 0:
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41 100% (136 of 136) |#####| Elapsed Time: 0:
00:03 Time: 0:00:03
42 100% (141 of 141) |#####| Elapsed Time: 0:
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43 100% (124 of 124) |#####| Elapsed Time: 0:
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44 100% (124 of 124) |#####| Elapsed Time: 0:
00:03 Time: 0:00:03
45 100% (172 of 172) |#####| Elapsed Time: 0:
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46 100% (126 of 126) |#####| Elapsed Time: 0:
00:04 Time: 0:00:04
47 100% (140 of 140) |#####| Elapsed Time: 0:
00:04 Time: 0:00:04
48 100% (135 of 135) |#####| Elapsed Time: 0:
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49 100% (123 of 123) |#####| Elapsed Time: 0:
00:04 Time: 0:00:04
50 100% (115 of 115) |#####| Elapsed Time: 0:
00:03 Time: 0:00:03
51 100% (110 of 110) |#####| Elapsed Time: 0:
00:03 Time: 0:00:03
52 100% (113 of 113) |#####| Elapsed Time: 0:
00:03 Time: 0:00:03
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| 53 | 100% (107 of 107) | ##### | Elapsed Time: 0: 00:03 Time: 0:00:03 |
| 54 | 100% (108 of 108) | ##### | Elapsed Time: 0: 00:03 Time: 0:00:03 |
| 55 | 100% (157 of 157) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 56 | 100% (131 of 131) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 57 | 100% (135 of 135) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 58 | 100% (136 of 136) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 59 | 100% (141 of 141) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 60 | 100% (108 of 108) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 61 | 100% (144 of 144) | ##### | Elapsed Time: 0: 00:05 Time: 0:00:05 |
| 62 | 100% (167 of 167) | ##### | Elapsed Time: 0: 00:06 Time: 0:00:06 |
| 63 | 100% (116 of 116) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 64 | 100% (112 of 112) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 65 | 100% (118 of 118) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 66 | 100% (131 of 131) | ##### | Elapsed Time: 0: 00:05 Time: 0:00:05 |
| 67 | 100% (124 of 124) | ##### | Elapsed Time: 0: 00:05 Time: 0:00:05 |
| 68 | 100% (129 of 129) | ##### | Elapsed Time: 0: 00:05 Time: 0:00:05 |
| 69 | 100% (122 of 122) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 70 | 100% (124 of 124) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 71 | 100% (133 of 133) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 72 | 100% (118 of 118) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 73 | 100% (113 of 113) | ##### | Elapsed Time: 0: 00:03 Time: 0:00:03 |
| 74 | 100% (142 of 142) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |
| 75 | 100% (145 of 145) | ##### | Elapsed Time: 0: 00:04 Time: 0:00:04 |

76 100% (27 of 27) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
77 100% (33 of 33) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
78 100% (45 of 45) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
79 100% (26 of 26) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
80 100% (38 of 38) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
81 100% (33 of 33) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
82 100% (35 of 35) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
83 100% (30 of 30) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
84 100% (30 of 30) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
85 100% (43 of 43) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
86 100% (31 of 31) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
87 100% (35 of 35) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
88 100% (33 of 33) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
89 100% (30 of 30) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
90 100% (28 of 28) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
91 100% (27 of 27) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
92 100% (28 of 28) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
93 100% (26 of 26) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
94 100% (27 of 27) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
95 100% (39 of 39) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
96 100% (32 of 32) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
97 100% (33 of 33) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
98 100% (33 of 33) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01

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99 100% (35 of 35) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
100 100% (27 of 27) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
101 100% (36 of 36) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
102 100% (41 of 41) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
103 100% (28 of 28) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
104 100% (27 of 27) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
105 100% (29 of 29) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
106 100% (32 of 32) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
107 100% (30 of 30) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
108 100% (32 of 32) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
109 100% (30 of 30) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
110 100% (30 of 30) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
111 100% (33 of 33) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
112 100% (29 of 29) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
113 100% (28 of 28) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
114 100% (35 of 35) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
115 100% (36 of 36) |#####| Elapsed Time: 0 :00:01 Time: 0:00:01
116 100% (16 of 16) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
117 100% (19 of 19) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
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120 100% (22 of 22) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
121 100% (19 of 19) |#####| Elapsed Time: 0 :00:00 Time: 0:00:00
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122 100% (20 of 20) |#####| Elapsed Time: 0  
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123 100% (18 of 18) |#####| Elapsed Time: 0  
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124 100% (18 of 18) |#####| Elapsed Time: 0  
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125 100% (24 of 24) |#####| Elapsed Time: 0  
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126 100% (18 of 18) |#####| Elapsed Time: 0  
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127 100% (20 of 20) |#####| Elapsed Time: 0  
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128 100% (19 of 19) |#####| Elapsed Time: 0  
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129 100% (18 of 18) |#####| Elapsed Time: 0  
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130 100% (16 of 16) |#####| Elapsed Time: 0  
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134 100% (16 of 16) |#####| Elapsed Time: 0  
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135 100% (22 of 22) |#####| Elapsed Time: 0  
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136 100% (19 of 19) |#####| Elapsed Time: 0  
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138 100% (19 of 19) |#####| Elapsed Time: 0  
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139 100% (20 of 20) |#####| Elapsed Time: 0  
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140 100% (16 of 16) |#####| Elapsed Time: 0  
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141 100% (20 of 20) |#####| Elapsed Time: 0  
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142 100% (24 of 24) |#####| Elapsed Time: 0  
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143 100% (16 of 16) |#####| Elapsed Time: 0  
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144 100% (16 of 16) |#####| Elapsed Time: 0  
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145 100% (17 of 17) | #####| Elapsed Time: 0
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146 100% (19 of 19) | #####| Elapsed Time: 0
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147 100% (18 of 18) | #####| Elapsed Time: 0
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148 100% (18 of 18) | #####| Elapsed Time: 0
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150 100% (18 of 18) | #####| Elapsed Time: 0
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152 100% (17 of 17) | #####| Elapsed Time: 0
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153 100% (16 of 16) | #####| Elapsed Time: 0
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154 100% (20 of 20) | #####| Elapsed Time: 0
:00:00 Time: 0:00:00
155 100% (21 of 21) | #####| Elapsed Time: 0
:00:00 Time: 0:00:00
156 Found 46845 files belonging to 40 classes.
157 Found 11520 files belonging to 40 classes.
158 Found 742 files belonging to 40 classes.
159 Model: "functional_1"
160 _____
161 Layer (type) Output Shape
Param #
162 =====
=====
163 input_1 (InputLayer) [(None, 128, 128, 3)] 0
164 _____
165 rescaling (Rescaling) (None, 128, 128, 3) 0
166 _____
167 conv2d (Conv2D) (None, 128, 128, 64)
4864
168 _____
169 activation (Activation) (None, 128, 128, 64) 0

```

| | | |
|-----|---|---------------------|
| 170 | | |
| 171 | max_pooling2d (MaxPooling2D) (None, 63, 63, 64) | 0 |
| 172 | | |
| 173 | dropout (Dropout) (None, 63, 63, 64) | 0 |
| 174 | | |
| 175 | batch_normalization (BatchNo (None, 63, 63, 64) | 256 |
| 176 | | |
| 177 | conv2d_1 (Conv2D) 73856 | (None, 63, 63, 128) |
| 178 | | |
| 179 | activation_1 (Activation) | (None, 63, 63, 128) |
| 180 | | |
| 181 | dropout_1 (Dropout) | (None, 63, 63, 128) |
| 182 | | |
| 183 | batch_normalization_1 (Batch | (None, 63, 63, 128) |
| 184 | | |
| 185 | conv2d_2 (Conv2D) 295168 | (None, 63, 63, 256) |
| 186 | | |
| 187 | activation_2 (Activation) | (None, 63, 63, 256) |
| 188 | | |
| 189 | dropout_2 (Dropout) | (None, 63, 63, 256) |
| 190 | | |
| 191 | batch_normalization_2 (Batch 1024 | (None, 63, 63, 256) |
| 192 | | |

| | | | |
|-----|---|---------------------|---|
| 193 | conv2d_3 (Conv2D) 590080 | (None, 63, 63, 256) | |
| 194 | | | |
| 195 | activation_3 (Activation) | (None, 63, 63, 256) | 0 |
| 196 | | | |
| 197 | max_pooling2d_1 (MaxPooling2D) | (None, 31, 31, 256) | 0 |
| 198 | | | |
| 199 | dropout_3 (Dropout) | (None, 31, 31, 256) | 0 |
| 200 | | | |
| 201 | batch_normalization_3 (Batch Normalization) 1024 | (None, 31, 31, 256) | |
| 202 | | | |
| 203 | conv2d_4 (Conv2D) 590080 | (None, 31, 31, 256) | |
| 204 | | | |
| 205 | activation_4 (Activation) | (None, 31, 31, 256) | 0 |
| 206 | | | |
| 207 | dropout_4 (Dropout) | (None, 31, 31, 256) | 0 |
| 208 | | | |
| 209 | batch_normalization_4 (Batch Normalization) 1024 | (None, 31, 31, 256) | |
| 210 | | | |
| 211 | conv2d_5 (Conv2D) 590080 | (None, 31, 31, 256) | |
| 212 | | | |
| 213 | activation_5 (Activation) | (None, 31, 31, 256) | 0 |
| 214 | | | |
| 215 | dropout_5 (Dropout) | (None, 31, 31, 256) | 0 |

```
216 _____  
217 batch_normalization_5 (Batch (None, 31, 31, 256)  
1024  
218 _____  
219 conv2d_6 (Conv2D) (None, 31, 31, 256)  
590080  
220 _____  
221 activation_6 (Activation) (None, 31, 31, 256) 0  
222 _____  
223 max_pooling2d_2 (MaxPooling2 (None, 15, 15, 256) 0  
224 _____  
225 dropout_6 (Dropout) (None, 15, 15, 256) 0  
226 _____  
227 batch_normalization_6 (Batch (None, 15, 15, 256)  
1024  
228 _____  
229 flatten (Flatten) (None, 57600) 0  
230 _____  
231 dense (Dense) (None, 512)  
29491712  
232 _____  
233 dropout_7 (Dropout) (None, 512) 0  
234 _____  
235 batch_normalization_7 (Batch (None, 512)  
2048  
236 _____  
237 dense_1 (Dense) (None, 256)  
131328  
238 _____  
_____
```

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239 dropout_8 (Dropout)           (None, 256)          0
240 _____
241 batch_normalization_8 (Batch (None, 256)
1024
242 _____
243 dense_2 (Dense)             (None, 40)
10280
244 =====
=====
245 Total params: 32,376,488
246 Trainable params: 32,372,008
247 Non-trainable params: 4,480
248 _____
249 None
250 WARNING:tensorflow:From C:\dev\ML_Project\model\models\CNN
.py:87: Model.fit_generator (from tensorflow.python.keras.
engine.training) is deprecated and will be removed in a
future version.
251 Instructions for updating:
252 Please use Model.fit, which supports generators.
253 Epoch 1/50
254 2020-11-25 11:09:12.389577: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library cublas64_10.dll
255 2020-11-25 11:09:14.009863: I tensorflow/stream_executor/
platform/default/dso_loader.cc:48] Successfully opened
dynamic library cudnn64_7.dll
256 2020-11-25 11:09:14.642950: W tensorflow/stream_executor/
gpu/redzone_allocator.cc:314] Internal: Invoking GPU asm
compilation is supported on Cuda non-Windows platforms
only
257 Relying on driver to perform ptx compilation.
258 Modify $PATH to customize ptxas location.
259 This message will be only logged once.
260 2020-11-25 11:09:15.682256: W tensorflow/core/
common_runtime/bfc_allocator.cc:246] Allocator (GPU_0_bfc
) ran out of memory trying to allocate 2.60GiB with
freed_by_count=0. The caller indicates that this is not a
failure, but may mean that there could be performance
gains if more memory were available.
261 732/732 [=====] - 248s 339ms/step
- loss: 3.1706 - accuracy: 0.1534 - val_loss: 5.8994 -
```

```
261 val_accuracy: 0.0417
262 Epoch 2/50
263 732/732 [=====] - 239s 326ms/step
    - loss: 2.4785 - accuracy: 0.2887 - val_loss: 5.0020 -
    val_accuracy: 0.0736
264 Epoch 3/50
265 732/732 [=====] - 241s 330ms/step
    - loss: 2.0390 - accuracy: 0.3990 - val_loss: 2.5790 -
    val_accuracy: 0.2865
266 Epoch 4/50
267 732/732 [=====] - 235s 321ms/step
    - loss: 1.6991 - accuracy: 0.4849 - val_loss: 2.7550 -
    val_accuracy: 0.2817
268 Epoch 5/50
269 732/732 [=====] - 235s 322ms/step
    - loss: 1.3783 - accuracy: 0.5780 - val_loss: 2.4824 -
    val_accuracy: 0.3397
270 Epoch 6/50
271 732/732 [=====] - 237s 323ms/step
    - loss: 1.0880 - accuracy: 0.6578 - val_loss: 2.5153 -
    val_accuracy: 0.3459
272 Epoch 7/50
273 732/732 [=====] - 237s 324ms/step
    - loss: 0.8146 - accuracy: 0.7403 - val_loss: 2.6207 -
    val_accuracy: 0.3694
274 Epoch 8/50
275 732/732 [=====] - 236s 322ms/step
    - loss: 0.7330 - accuracy: 0.7673 - val_loss: 2.7861 -
    val_accuracy: 0.3459
276 Epoch 9/50
277 732/732 [=====] - 234s 319ms/step
    - loss: 0.6006 - accuracy: 0.8101 - val_loss: 2.6083 -
    val_accuracy: 0.3805
278 Epoch 10/50
279 732/732 [=====] - 234s 320ms/step
    - loss: 0.4229 - accuracy: 0.8625 - val_loss: 2.8500 -
    val_accuracy: 0.3719
280 Epoch 11/50
281 732/732 [=====] - 234s 320ms/step
    - loss: 0.3952 - accuracy: 0.8716 - val_loss: 3.7349 -
    val_accuracy: 0.3199
282 Epoch 12/50
283 732/732 [=====] - 234s 320ms/step
    - loss: 0.3476 - accuracy: 0.8873 - val_loss: 3.2233 -
    val_accuracy: 0.3510
284 Epoch 13/50
```

```
285 732/732 [=====] - 234s 319ms/step
    - loss: 0.3039 - accuracy: 0.9005 - val_loss: 3.0970 -
    val_accuracy: 0.3891
286 Epoch 14/50
287 732/732 [=====] - 234s 319ms/step
    - loss: 0.2864 - accuracy: 0.9067 - val_loss: 3.2347 -
    val_accuracy: 0.3753
288 Epoch 15/50
289 732/732 [=====] - 234s 319ms/step
    - loss: 0.3373 - accuracy: 0.8932 - val_loss: 3.1064 -
    val_accuracy: 0.3891
290 Epoch 16/50
291 732/732 [=====] - 234s 319ms/step
    - loss: 0.2319 - accuracy: 0.9255 - val_loss: 3.2300 -
    val_accuracy: 0.3666
292 Epoch 17/50
293 732/732 [=====] - 234s 319ms/step
    - loss: 0.2426 - accuracy: 0.9226 - val_loss: 3.4400 -
    val_accuracy: 0.3671
294 Epoch 18/50
295 732/732 [=====] - 241s 329ms/step
    - loss: 0.2007 - accuracy: 0.9349 - val_loss: 3.0880 -
    val_accuracy: 0.3976
296 Epoch 19/50
297 732/732 [=====] - 246s 335ms/step
    - loss: 0.1967 - accuracy: 0.9365 - val_loss: 7.8514 -
    val_accuracy: 0.1446
298 Epoch 20/50
299 732/732 [=====] - 240s 328ms/step
    - loss: 0.2009 - accuracy: 0.9352 - val_loss: 3.7592 -
    val_accuracy: 0.3771
300 Epoch 21/50
301 732/732 [=====] - 238s 325ms/step
    - loss: 0.1783 - accuracy: 0.9415 - val_loss: 3.4666 -
    val_accuracy: 0.3865
302 Epoch 22/50
303 732/732 [=====] - 238s 325ms/step
    - loss: 0.2694 - accuracy: 0.9208 - val_loss: 4.5512 -
    val_accuracy: 0.2969
304 Epoch 23/50
305 732/732 [=====] - 238s 325ms/step
    - loss: 0.2421 - accuracy: 0.9223 - val_loss: 3.4614 -
    val_accuracy: 0.3775
306 Epoch 24/50
307 732/732 [=====] - 235s 321ms/step
    - loss: 0.1566 - accuracy: 0.9496 - val_loss: 3.2190 -
```

```
307 val_accuracy: 0.3843
308 Epoch 25/50
309 732/732 [=====] - 242s 330ms/step
    - loss: 0.1306 - accuracy: 0.9574 - val_loss: 3.5617 -
    val_accuracy: 0.3632
310 Epoch 26/50
311 732/732 [=====] - 236s 322ms/step
    - loss: 0.1293 - accuracy: 0.9577 - val_loss: 4.4300 -
    val_accuracy: 0.3377
312 Epoch 27/50
313 732/732 [=====] - 238s 325ms/step
    - loss: 0.1245 - accuracy: 0.9605 - val_loss: 4.1088 -
    val_accuracy: 0.3584
314 Epoch 28/50
315 732/732 [=====] - 238s 326ms/step
    - loss: 0.1418 - accuracy: 0.9535 - val_loss: 3.7559 -
    val_accuracy: 0.3777
316 Epoch 29/50
317 732/732 [=====] - 240s 328ms/step
    - loss: 0.1316 - accuracy: 0.9572 - val_loss: 3.5873 -
    val_accuracy: 0.4027
318 Epoch 30/50
319 732/732 [=====] - 238s 325ms/step
    - loss: 0.1251 - accuracy: 0.9600 - val_loss: 4.2299 -
    val_accuracy: 0.3220
320 Epoch 31/50
321 732/732 [=====] - 241s 329ms/step
    - loss: 0.1209 - accuracy: 0.9612 - val_loss: 3.4760 -
    val_accuracy: 0.3966
322 Epoch 32/50
323 732/732 [=====] - 249s 340ms/step
    - loss: 0.1227 - accuracy: 0.9598 - val_loss: 3.5889 -
    val_accuracy: 0.4020
324 Epoch 33/50
325 732/732 [=====] - 251s 343ms/step
    - loss: 0.1201 - accuracy: 0.9608 - val_loss: 5.2485 -
    val_accuracy: 0.3070
326 Epoch 34/50
327 732/732 [=====] - 240s 327ms/step
    - loss: 0.1021 - accuracy: 0.9671 - val_loss: 3.5793 -
    val_accuracy: 0.3963
328 Epoch 35/50
329 732/732 [=====] - 235s 321ms/step
    - loss: 0.1029 - accuracy: 0.9666 - val_loss: 3.3813 -
    val_accuracy: 0.3950
330 Epoch 36/50
```

```
331 732/732 [=====] - 237s 324ms/step
    - loss: 0.1005 - accuracy: 0.9670 - val_loss: 3.5631 -
    val_accuracy: 0.4044
332 Epoch 37/50
333 732/732 [=====] - 239s 326ms/step
    - loss: 0.1666 - accuracy: 0.9510 - val_loss: 3.5319 -
    val_accuracy: 0.3931
334 Epoch 38/50
335 732/732 [=====] - 241s 330ms/step
    - loss: 0.0939 - accuracy: 0.9694 - val_loss: 3.6202 -
    val_accuracy: 0.3674
336 Epoch 39/50
337 732/732 [=====] - 235s 321ms/step
    - loss: 0.0846 - accuracy: 0.9731 - val_loss: 3.5076 -
    val_accuracy: 0.3737
338 Epoch 40/50
339 732/732 [=====] - 235s 321ms/step
    - loss: 0.0835 - accuracy: 0.9737 - val_loss: 3.8479 -
    val_accuracy: 0.3806
340 Epoch 41/50
341 732/732 [=====] - 235s 320ms/step
    - loss: 0.0981 - accuracy: 0.9681 - val_loss: 3.7726 -
    val_accuracy: 0.3737
342 Epoch 42/50
343 732/732 [=====] - 235s 321ms/step
    - loss: 0.0887 - accuracy: 0.9721 - val_loss: 3.4521 -
    val_accuracy: 0.3970
344 Epoch 43/50
345 732/732 [=====] - 239s 326ms/step
    - loss: 0.0915 - accuracy: 0.9706 - val_loss: 3.6705 -
    val_accuracy: 0.3915
346 Epoch 44/50
347 732/732 [=====] - 237s 323ms/step
    - loss: 0.1220 - accuracy: 0.9624 - val_loss: 3.7624 -
    val_accuracy: 0.3788
348 Epoch 45/50
349 732/732 [=====] - 244s 333ms/step
    - loss: 0.1109 - accuracy: 0.9650 - val_loss: 3.4220 -
    val_accuracy: 0.3951
350 Epoch 46/50
351 732/732 [=====] - 255s 348ms/step
    - loss: 0.0853 - accuracy: 0.9727 - val_loss: 3.3335 -
    val_accuracy: 0.4144
352 Epoch 47/50
353 732/732 [=====] - 236s 322ms/step
    - loss: 0.0692 - accuracy: 0.9771 - val_loss: 3.5224 -
```

```
353 val_accuracy: 0.3946
354 Epoch 48/50
355 732/732 [=====] - 236s 322ms/step
    - loss: 0.0646 - accuracy: 0.9793 - val_loss: 6.6835 -
    val_accuracy: 0.2343
356 Epoch 49/50
357 732/732 [=====] - 236s 322ms/step
    - loss: 0.0669 - accuracy: 0.9779 - val_loss: 4.1392 -
    val_accuracy: 0.3774
358 Epoch 50/50
359 732/732 [=====] - 236s 322ms/step
    - loss: 0.0702 - accuracy: 0.9774 - val_loss: 3.8299 -
    val_accuracy: 0.3786
360 12/12 - 2s - loss: 3.7380 - accuracy: 0.4151
361 0.4150943458080292
362 WARNING:tensorflow:From C:\dev\python\ML_venv\lib\site-
    packages\tensorflow\python\training\tracking\tracking.py:
  111: Model.state_updates (from tensorflow.python.keras.
    engine.training) is deprecated and will be removed in a
    future version.
363 Instructions for updating:
364 This property should not be used in TensorFlow 2.0, as
    updates are applied automatically.
365 2020-11-25 14:28:13.288969: W tensorflow/python/util/util.
    cc:348] Sets are not currently considered sequences, but
    this may change in the future, so consider avoiding using
    them.
366 WARNING:tensorflow:From C:\dev\python\ML_venv\lib\site-
    packages\tensorflow\python\training\tracking\tracking.py:
  111: Layer.updates (from tensorflow.python.keras.engine.
    base_layer) is deprecated and will be removed in a future
    version.
367 Instructions for updating:
368 This property should not be used in TensorFlow 2.0, as
    updates are applied automatically.
369 Found 46845 files belonging to 40 classes.
370 Found 11520 files belonging to 40 classes.
371 Found 742 files belonging to 40 classes.
372 Epoch 1/50
373 732/732 [=====] - 35s 48ms/step
    - loss: 3.6753 - accuracy: 0.0732 - val_loss: 3.4091 -
    val_accuracy: 0.0887
374 Epoch 2/50
375 732/732 [=====] - 35s 48ms/step
    - loss: 3.3617 - accuracy: 0.0966 - val_loss: 3.2991 -
    val_accuracy: 0.0998
```

```
376 Epoch 3/50
377 732/732 [=====] - 35s 48ms/step
    - loss: 3.3013 - accuracy: 0.1050 - val_loss: 3.3215 -
    val_accuracy: 0.1020
378 Epoch 4/50
379 732/732 [=====] - 34s 47ms/step
    - loss: 3.2597 - accuracy: 0.1130 - val_loss: 3.3397 -
    val_accuracy: 0.1007
380 Epoch 5/50
381 732/732 [=====] - 35s 48ms/step
    - loss: 3.2067 - accuracy: 0.1244 - val_loss: 3.1994 -
    val_accuracy: 0.1305
382 Epoch 6/50
383 732/732 [=====] - 35s 48ms/step
    - loss: 3.1843 - accuracy: 0.1277 - val_loss: 3.2888 -
    val_accuracy: 0.1163
384 Epoch 7/50
385 732/732 [=====] - 35s 48ms/step
    - loss: 3.1651 - accuracy: 0.1293 - val_loss: 3.2444 -
    val_accuracy: 0.1310
386 Epoch 8/50
387 732/732 [=====] - 35s 47ms/step
    - loss: 3.1510 - accuracy: 0.1356 - val_loss: 3.7712 -
    val_accuracy: 0.0772
388 Epoch 9/50
389 732/732 [=====] - 35s 48ms/step
    - loss: 3.1285 - accuracy: 0.1400 - val_loss: 3.1940 -
    val_accuracy: 0.1449
390 Epoch 10/50
391 732/732 [=====] - 34s 47ms/step
    - loss: 3.1039 - accuracy: 0.1403 - val_loss: 3.2626 -
    val_accuracy: 0.1369
392 Epoch 11/50
393 732/732 [=====] - 35s 48ms/step
    - loss: 3.0974 - accuracy: 0.1452 - val_loss: 3.3486 -
    val_accuracy: 0.1432
394 Epoch 12/50
395 732/732 [=====] - 35s 47ms/step
    - loss: 3.0842 - accuracy: 0.1463 - val_loss: 3.2377 -
    val_accuracy: 0.1522
396 Epoch 13/50
397 732/732 [=====] - 35s 48ms/step
    - loss: 3.0474 - accuracy: 0.1522 - val_loss: 3.2926 -
    val_accuracy: 0.1385
398 Epoch 14/50
399 732/732 [=====] - 35s 47ms/step
```

```
399 - loss: 3.0362 - accuracy: 0.1566 - val_loss: 3.2438 -
      val_accuracy: 0.1399
400 Epoch 15/50
401 732/732 [=====] - 35s 48ms/step
      - loss: 3.0241 - accuracy: 0.1587 - val_loss: 3.2593 -
      val_accuracy: 0.1556
402 Epoch 16/50
403 732/732 [=====] - 35s 48ms/step
      - loss: 2.9977 - accuracy: 0.1667 - val_loss: 3.3212 -
      val_accuracy: 0.1367
404 Epoch 17/50
405 732/732 [=====] - 35s 48ms/step
      - loss: 2.9848 - accuracy: 0.1657 - val_loss: 3.3393 -
      val_accuracy: 0.1512
406 Epoch 18/50
407 732/732 [=====] - 35s 47ms/step
      - loss: 2.9706 - accuracy: 0.1703 - val_loss: 3.3264 -
      val_accuracy: 0.1459
408 Epoch 19/50
409 732/732 [=====] - 35s 48ms/step
      - loss: 2.9557 - accuracy: 0.1718 - val_loss: 3.3505 -
      val_accuracy: 0.1617
410 Epoch 20/50
411 732/732 [=====] - 35s 48ms/step
      - loss: 2.9346 - accuracy: 0.1760 - val_loss: 3.3469 -
      val_accuracy: 0.1587
412 Epoch 21/50
413 732/732 [=====] - 35s 48ms/step
      - loss: 2.9221 - accuracy: 0.1799 - val_loss: 3.5778 -
      val_accuracy: 0.1504
414 Epoch 22/50
415 732/732 [=====] - 35s 48ms/step
      - loss: 2.9107 - accuracy: 0.1812 - val_loss: 3.5380 -
      val_accuracy: 0.1541
416 Epoch 23/50
417 732/732 [=====] - 35s 48ms/step
      - loss: 2.9042 - accuracy: 0.1848 - val_loss: 3.6646 -
      val_accuracy: 0.1520
418 Epoch 24/50
419 732/732 [=====] - 35s 48ms/step
      - loss: 2.8885 - accuracy: 0.1845 - val_loss: 3.6421 -
      val_accuracy: 0.1601
420 Epoch 25/50
421 732/732 [=====] - 35s 48ms/step
      - loss: 2.8761 - accuracy: 0.1904 - val_loss: 3.6680 -
      val_accuracy: 0.1568
```

```
422 Epoch 26/50
423 732/732 [=====] - 35s 48ms/step
    - loss: 2.8593 - accuracy: 0.1945 - val_loss: 3.6128 -
    val_accuracy: 0.1576
424 Epoch 27/50
425 732/732 [=====] - 35s 48ms/step
    - loss: 2.8483 - accuracy: 0.1951 - val_loss: 3.6280 -
    val_accuracy: 0.1499
426 Epoch 28/50
427 732/732 [=====] - 35s 48ms/step
    - loss: 2.8437 - accuracy: 0.1972 - val_loss: 3.6240 -
    val_accuracy: 0.1659
428 Epoch 29/50
429 732/732 [=====] - 35s 48ms/step
    - loss: 2.8309 - accuracy: 0.2010 - val_loss: 3.7247 -
    val_accuracy: 0.1562
430 Epoch 30/50
431 732/732 [=====] - 35s 48ms/step
    - loss: 2.8176 - accuracy: 0.2023 - val_loss: 3.6832 -
    val_accuracy: 0.1558
432 Epoch 31/50
433 732/732 [=====] - 35s 48ms/step
    - loss: 2.8131 - accuracy: 0.2019 - val_loss: 3.9495 -
    val_accuracy: 0.1488
434 Epoch 32/50
435 732/732 [=====] - 35s 48ms/step
    - loss: 2.7988 - accuracy: 0.2065 - val_loss: 3.7321 -
    val_accuracy: 0.1483
436 Epoch 33/50
437 732/732 [=====] - 35s 48ms/step
    - loss: 2.7837 - accuracy: 0.2086 - val_loss: 3.6311 -
    val_accuracy: 0.1461
438 Epoch 34/50
439 732/732 [=====] - 35s 48ms/step
    - loss: 2.7713 - accuracy: 0.2120 - val_loss: 3.5039 -
    val_accuracy: 0.1520
440 Epoch 35/50
441 732/732 [=====] - 35s 48ms/step
    - loss: 2.7615 - accuracy: 0.2137 - val_loss: 3.3566 -
    val_accuracy: 0.1562
442 Epoch 36/50
443 732/732 [=====] - 35s 48ms/step
    - loss: 2.7748 - accuracy: 0.2086 - val_loss: 3.4695 -
    val_accuracy: 0.1445
444 Epoch 37/50
445 732/732 [=====] - 35s 48ms/step
```

```
445 - loss: 2.7584 - accuracy: 0.2161 - val_loss: 3.3723 -
      val_accuracy: 0.1491
446 Epoch 38/50
447 732/732 [=====] - 35s 48ms/step
      - loss: 2.7581 - accuracy: 0.2147 - val_loss: 3.7075 -
      val_accuracy: 0.1313
448 Epoch 39/50
449 732/732 [=====] - 35s 48ms/step
      - loss: 2.7510 - accuracy: 0.2164 - val_loss: 3.5494 -
      val_accuracy: 0.1417
450 Epoch 40/50
451 732/732 [=====] - 35s 48ms/step
      - loss: 2.7387 - accuracy: 0.2198 - val_loss: 4.7868 -
      val_accuracy: 0.1536
452 Epoch 41/50
453 732/732 [=====] - 35s 48ms/step
      - loss: 2.7321 - accuracy: 0.2183 - val_loss: 4.0215 -
      val_accuracy: 0.1484
454 Epoch 42/50
455 732/732 [=====] - 35s 48ms/step
      - loss: 2.7322 - accuracy: 0.2212 - val_loss: 3.4665 -
      val_accuracy: 0.1476
456 Epoch 43/50
457 732/732 [=====] - 35s 48ms/step
      - loss: 2.7187 - accuracy: 0.2247 - val_loss: 3.4217 -
      val_accuracy: 0.1467
458 Epoch 44/50
459 732/732 [=====] - 35s 48ms/step
      - loss: 2.7105 - accuracy: 0.2247 - val_loss: 3.4441 -
      val_accuracy: 0.1407
460 Epoch 45/50
461 732/732 [=====] - 35s 48ms/step
      - loss: 2.7073 - accuracy: 0.2253 - val_loss: 3.5059 -
      val_accuracy: 0.1522
462 Epoch 46/50
463 732/732 [=====] - 35s 48ms/step
      - loss: 2.6989 - accuracy: 0.2261 - val_loss: 4.4707 -
      val_accuracy: 0.1488
464 Epoch 47/50
465 732/732 [=====] - 35s 48ms/step
      - loss: 2.6883 - accuracy: 0.2293 - val_loss: 3.4187 -
      val_accuracy: 0.1431
466 Epoch 48/50
467 732/732 [=====] - 35s 48ms/step
      - loss: 2.6887 - accuracy: 0.2296 - val_loss: 4.4015 -
      val_accuracy: 0.1470
```

```
468 Epoch 49/50
469 732/732 [=====] - 35s 48ms/step
    - loss: 2.6777 - accuracy: 0.2338 - val_loss: 3.5598 -
    val_accuracy: 0.1430
470 Epoch 50/50
471 732/732 [=====] - 35s 48ms/step
    - loss: 2.6714 - accuracy: 0.2318 - val_loss: 3.4642 -
    val_accuracy: 0.1476
472 12/12 - 0s - loss: 3.2821 - accuracy: 0.1429
473 0.1428571492433548
474
475 Process finished with exit code 0
476
```