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1 C:\Users\iitfypvadmin\PycharmProjects\IIT-MSc-FYP-ML\venv\Scripts\python.exe "C:/Program Files/
  JetBrains/PyCharm 2023.1/plugins/python/helpers/pydev/pydevconsole.py" --mode=client --host=127.0.0.1
  --port=57574
2
3 import sys; print('Python %s on %s' % (sys.version, sys.platform))
4 sys.path.extend(['C:\\Users\\iitfypvadmin\\PycharmProjects\\IIT-MSc-FYP-ML'])
5
6 PyDev console: starting.
7
8 Python 3.10.10 (tags/v3.10.10:aad5f6a, Feb  7 2023, 17:20:36) [MSC v.1929 64 bit (AMD64)] on win32
9 >>> runfile('C:\\Users\\iitfypvadmin\\PycharmProjects\\IIT-MSc-FYP-ML\\ds_train\\CNN_Training.py',
  wdir='C:\\Users\\iitfypvadmin\\PycharmProjects\\IIT-MSc-FYP-ML\\ds_train')
10 Device -  cpu
11 Full Train Set -  3840
12 Train Set -  3072
13 Validation Set -  768
14 Test Set -  1631
15 Available Classes ['0', '0', '0', '0', '0', '0', '0', '0', '0', '0', '0', '0', '0', '00', '00', '00', '00
  ', '00', '00', '00', '00']
16 Net -  Net(
17     (conv1): Conv2d(1, 16, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
18     (bn1): BatchNorm2d(16, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
19     (conv2): Conv2d(16, 16, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
20     (bn2): BatchNorm2d(16, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
21     (pool1): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)
22     (conv3): Conv2d(16, 32, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
23     (bn3): BatchNorm2d(32, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
24     (conv4): Conv2d(32, 32, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
25     (bn4): BatchNorm2d(32, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
26     (pool2): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)
27     (conv5): Conv2d(32, 64, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
28     (bn5): BatchNorm2d(64, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
29     (conv6): Conv2d(64, 64, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
30     (bn6): BatchNorm2d(64, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
31     (pool3): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)
32     (fc1): Linear(in_features=4096, out_features=1024, bias=True)
33     (bn7): BatchNorm1d(1024, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
34     (fc2): Linear(in_features=1024, out_features=256, bias=True)
35     (bn8): BatchNorm1d(256, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
36     (fc3): Linear(in_features=256, out_features=31, bias=True)
37 )
38 -----
39 EPOCH          : 1
40 Training loss   : 0.7725637520973881
41 Training accuracy : 79.39453125%
42 Validation loss : 0.2450073684255282
43 Validation accuracy: 93.09895833333333%
44 -----
45 EPOCH          : 2
46 Training loss   : 0.08618670131545514
47 Training accuracy : 98.30729166666667%
48 Validation loss : 0.13437400882442793
49 Validation accuracy: 97.00520833333333%
50 -----
51 EPOCH          : 3
52 Training loss   : 0.024185386622169364
53 Training accuracy : 99.90234375%
54 Validation loss : 0.15041565087934336
55 Validation accuracy: 96.22395833333333%
56 -----
57 EPOCH          : 4
58 Training loss   : 0.02483904144416253
59 Training accuracy : 99.77213541666667%
60 Validation loss : 0.19551417914529642
61 Validation accuracy: 95.18229166666667%
62 -----
63 EPOCH          : 5
64 Training loss   : 0.04402934608515352
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65 Training accuracy : 99.4140625%
66 Validation loss   : 0.2370574710269769
67 Validation accuracy: 93.22916666666667%
68 -----
69 EPOCH             : 6
70 Training loss     : 0.1042213891632855
71 Training accuracy : 97.65625%
72 Validation loss   : 0.2258019900570313
73 Validation accuracy: 93.88020833333333%
74 -----
75 EPOCH             : 7
76 Training loss     : 0.1013890429555128
77 Training accuracy : 97.23307291666667%
78 Validation loss   : 0.1729802656918764
79 Validation accuracy: 95.96354166666667%
80 -----
81 EPOCH             : 8
82 Training loss     : 0.06118078657891601
83 Training accuracy : 98.60026041666667%
84 Validation loss   : 0.1847995122273763
85 Validation accuracy: 95.44270833333333%
86 -----
87 EPOCH             : 9
88 Training loss     : 0.03810453360589842
89 Training accuracy : 99.34895833333333%
90 Validation loss   : 0.14016533891359964
91 Validation accuracy: 96.09375%
92 -----
93 EPOCH             : 10
94 Training loss     : 0.016895383305381984
95 Training accuracy : 99.90234375%
96 Validation loss   : 0.1264246879145503
97 Validation accuracy: 96.484375%
98 -----
99 EPOCH             : 11
100 Training loss    : 0.008641448764440915
101 Training accuracy: 100.0%
102 Validation loss  : 0.09995667403563857
103 Validation accuracy: 97.52604166666667%
104 -----
105 EPOCH            : 12
106 Training loss    : 0.007605326303746551
107 Training accuracy: 100.0%
108 Validation loss  : 0.11404705482224624
109 Validation accuracy: 97.265625%
110 -----
111 EPOCH            : 13
112 Training loss    : 0.00886785564944148
113 Training accuracy: 100.0%
114 Validation loss  : 0.1273490066329638
115 Validation accuracy: 96.875%
116 -----
117 EPOCH            : 14
118 Training loss    : 0.1440672742028255
119 Training accuracy: 97.10286458333333%
120 Validation loss  : 0.31685256337126094
121 Validation accuracy: 92.44791666666667%
122 -----
123 EPOCH            : 15
124 Training loss    : 0.12939317043249807
125 Training accuracy: 97.03776041666667%
126 Validation loss  : 0.179581663881739
127 Validation accuracy: 95.18229166666667%
128 -----
129 EPOCH            : 16
130 Training loss    : 0.05428838015844425
131 Training accuracy: 98.99088541666667%
132 Validation loss  : 0.13647448488821587
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133 Validation accuracy: 95.96354166666667%
134 -----
135 EPOCH          : 17
136 Training loss   : 0.03055123860637347
137 Training accuracy : 99.73958333333333%
138 Validation loss   : 0.19373178016394377
139 Validation accuracy: 94.79166666666667%
140 -----
141 EPOCH          : 18
142 Training loss   : 0.049984819100548826
143 Training accuracy : 99.15364583333333%
144 Validation loss   : 0.20599287717292705
145 Validation accuracy: 95.18229166666667%
146 -----
147 EPOCH          : 19
148 Training loss   : 0.07319667978057016
149 Training accuracy : 98.60026041666667%
150 Validation loss   : 0.23262400490542254
151 Validation accuracy: 94.140625%
152 -----
153 EPOCH          : 20
154 Training loss   : 0.059873830333041646
155 Training accuracy : 99.08854166666667%
156 Validation loss   : 0.12246637636174758
157 Validation accuracy: 96.875%
158 -----
159 EPOCH          : 21
160 Training loss   : 0.02974888503861924
161 Training accuracy : 99.77213541666667%
162 Validation loss   : 0.1128425629188617
163 Validation accuracy: 97.39583333333333%
164 -----
165 EPOCH          : 22
166 Training loss   : 0.030152783069449168
167 Training accuracy : 99.57682291666667%
168 Validation loss   : 0.13087381112078825
169 Validation accuracy: 96.61458333333333%
170 -----
171 EPOCH          : 23
172 Training loss   : 0.030873886736420292
173 Training accuracy : 99.93489583333333%
174 Validation loss   : 0.13483347619573274
175 Validation accuracy: 96.875%
176 -----
177 EPOCH          : 24
178 Training loss   : 0.04401301627513021
179 Training accuracy : 99.51171875%
180 Validation loss   : 0.11654213846971591
181 Validation accuracy: 97.39583333333333%
182 -----
183 GroundTruth:      0      0      0      00      00      0      00      00      00      0
184 Predicted:        0      0      0      00      0      0      00      00      00      0
185 Accuracy of the network on the test images: 76.885346 %
186 Non-normalized Confusion Matrix
187 Confusion Matrix for Test Set
188 [[ 48   0   4   3   0   0   0   0   0   0   0   0   0   0   0   0   0   5
189      0   0]
190 [   1  44   0   2   0   0   0   0   0   0   0   0   0   1   0   0   0   0
191      0   0]
192 [   1   1  49   9   0   0   0   0   0   0   2   0   0   0   0   0   0   1
193      0   0]
194 [   2   2   2  44   0   0   0   0   0   0   3   0   0   0   0   0   0   1
195      0   0]
196 [   0   0   0   0  53   0   0   0   0   0   0   0   0   0   0   0   0   0
197      0   3]
198 [   0   0   0   0   0  35   0   3   0   0   0   0   0   0   0   3   0   0
199      0   2]
200 [   0   0   0   0   0   0  39   0   0   0   4   0   0   0   0   0   0   0
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201		1	0]																
202	[0	0	0	0	0	0	5	52	5	2	0	0	0	0	0	1	2	0
203		2	0]																
204	[0	0	0	0	1	1	0	0	66	0	0	0	0	0	0	0	3	0
205		0	10]																
206	[0	0	0	0	0	0	0	1	0	58	3	3	0	0	0	3	2	1
207		0	0]																
208	[	1	0	0	0	2	1	2	4	3	2	57	2	0	0	0	4	4	0
209		7	0]																
210	[	0	2	0	0	2	0	0	1	0	5	0	54	9	2	0	0	0	36
211		0	0]																
212	[	0	5	0	0	0	0	0	0	0	3	0	1	103	1	0	0	0	3
213		2	0]																
214	[	1	0	0	0	6	1	0	2	0	0	0	0	6	85	14	0	0	3
215		0	0]																
216	[	0	0	0	0	0	0	0	0	0	0	0	2	2	6	73	0	0	5
217		3	0]																
218	[	0	0	0	2	0	1	0	0	0	0	3	2	0	0	0	71	22	0
219		6	3]																
220	[	2	0	0	3	0	5	6	10	0	1	18	0	0	0	0	14	49	0
221		0	1]																
222	[	6	10	0	0	4	1	0	5	0	2	0	2	5	3	5	0	0	52
223		1	0]																
224	[	14	1	1	2	15	2	0	2	1	1	0	2	3	1	7	0	0	10
225		42	0]																
226	[	0	5	0	0	0	2	0	2	6	0	1	0	1	2	0	2	0	0
227		0	75]]]																

228	Classification report																		
229																			
230																			
231			0		0.78		0.78		0.78		0.78						60		
232			1		0.71		0.94		0.81								48		
233			2		0.87		0.73		0.79								63		
234			3		0.64		0.81		0.72								54		
235			4		0.72		0.96		0.82								56		
236			5		0.90		0.84		0.87								43		
237			6		0.87		0.91		0.89								44		
238			7		0.70		0.77		0.73								69		
239			8		0.86		0.88		0.87								81		
240			9		0.77		0.83		0.80								71		
241			10		0.66		0.64		0.65								89		
242			11		0.89		0.60		0.72								111		
243			12		0.77		0.92		0.84								118		
244			13		0.83		0.67		0.74								118		
245			14		0.79		0.79		0.79								91		
246			15		0.73		0.67		0.70								110		
247			16		0.70		0.63		0.67								109		
248			17		0.62		0.80		0.70								96		
249			18		0.86		0.65		0.74								104		
250			19		0.89		0.91		0.90								96		
251																			
252		accuracy							0.77								1631		
253		macro avg			0.78		0.79		0.78								1631		
254		weighted avg			0.78		0.77		0.77								1631		
255																			
256																			