

```
1 C:\Users\M314386\AppData\Local\Programs\Python\
  Python312\python.exe C:\Users\M314386\Research\Imp\
  J25.py
2
3 Training GCN
4 Fold 1/5
5 Epoch 0, Loss: 1.3096, Val Acc: 0.5548, Val F1: 0.
  5856
6 Epoch 10, Loss: 0.6469, Val Acc: 0.6777, Val F1: 0.
  6460
7 Epoch 20, Loss: 0.5659, Val Acc: 0.6894, Val F1: 0.
  6292
8 Epoch 30, Loss: 0.5170, Val Acc: 0.7193, Val F1: 0.
  6742
9 Epoch 40, Loss: 0.4703, Val Acc: 0.7176, Val F1: 0.
  6751
10 Epoch 50, Loss: 0.4235, Val Acc: 0.7143, Val F1: 0.
  6703
11 Epoch 60, Loss: 0.3739, Val Acc: 0.6894, Val F1: 0.
  6417
12 Early stopping at epoch 63
13 Fold 2/5
14 Epoch 0, Loss: 1.4533, Val Acc: 0.5100, Val F1: 0.
  5357
15 Epoch 10, Loss: 0.6414, Val Acc: 0.7326, Val F1: 0.
  6958
16 Epoch 20, Loss: 0.5473, Val Acc: 0.7326, Val F1: 0.
  6905
17 Epoch 30, Loss: 0.4956, Val Acc: 0.7126, Val F1: 0.
  6770
18 Epoch 40, Loss: 0.4465, Val Acc: 0.6611, Val F1: 0.
  6335
19 Early stopping at epoch 40
20 Fold 3/5
21 Epoch 0, Loss: 1.5550, Val Acc: 0.3056, Val F1: 0.
  4036
22 Epoch 10, Loss: 0.6754, Val Acc: 0.6960, Val F1: 0.
  6750
23 Epoch 20, Loss: 0.5837, Val Acc: 0.7143, Val F1: 0.
  6447
24 Epoch 30, Loss: 0.5369, Val Acc: 0.7143, Val F1: 0.
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24 6759
25 Epoch 40, Loss: 0.4985, Val Acc: 0.7110, Val F1: 0.
6723
26 Epoch 50, Loss: 0.4564, Val Acc: 0.6993, Val F1: 0.
6699
27 Epoch 60, Loss: 0.4122, Val Acc: 0.6777, Val F1: 0.
6532
28 Early stopping at epoch 61
29 Fold 4/5
30 Epoch 0, Loss: 1.7012, Val Acc: 0.3339, Val F1: 0.
3387
31 Epoch 10, Loss: 0.6659, Val Acc: 0.6761, Val F1: 0.
6401
32 Epoch 20, Loss: 0.5804, Val Acc: 0.6977, Val F1: 0.
6173
33 Epoch 30, Loss: 0.5315, Val Acc: 0.7043, Val F1: 0.
6613
34 Epoch 40, Loss: 0.4916, Val Acc: 0.6860, Val F1: 0.
6487
35 Epoch 50, Loss: 0.4517, Val Acc: 0.6794, Val F1: 0.
6469
36 Epoch 60, Loss: 0.4092, Val Acc: 0.6678, Val F1: 0.
6368
37 Early stopping at epoch 60
38 Fold 5/5
39 Epoch 0, Loss: 1.5303, Val Acc: 0.2326, Val F1: 0.
3162
40 Epoch 10, Loss: 0.6741, Val Acc: 0.7043, Val F1: 0.
6699
41 Epoch 20, Loss: 0.5762, Val Acc: 0.7093, Val F1: 0.
6544
42 Epoch 30, Loss: 0.5297, Val Acc: 0.7060, Val F1: 0.
6659
43 Epoch 40, Loss: 0.4883, Val Acc: 0.7043, Val F1: 0.
6679
44 Early stopping at epoch 41
45
46 GCN Average Results:
47 accuracy = 0.7910
48 f1_score = 0.7632
49 auroc = 0.8309
```

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50 precision = 0.7772
51
52 Training GAT
53 Fold 1/5
54 Epoch 0, Loss: 1.2700, Val Acc: 0.7076, Val F1: 0.
6263
55 Epoch 10, Loss: 0.6143, Val Acc: 0.6694, Val F1: 0.
6405
56 Epoch 20, Loss: 0.5853, Val Acc: 0.6445, Val F1: 0.
6188
57 Epoch 30, Loss: 0.5603, Val Acc: 0.6811, Val F1: 0.
6373
58 Epoch 40, Loss: 0.5357, Val Acc: 0.6944, Val F1: 0.
6575
59 Epoch 50, Loss: 0.5033, Val Acc: 0.6827, Val F1: 0.
6505
60 Epoch 60, Loss: 0.4491, Val Acc: 0.6761, Val F1: 0.
6434
61 Early stopping at epoch 68
62 Fold 2/5
63 Epoch 0, Loss: 1.1446, Val Acc: 0.7027, Val F1: 0.
5816
64 Epoch 10, Loss: 0.6247, Val Acc: 0.6811, Val F1: 0.
6501
65 Epoch 20, Loss: 0.5884, Val Acc: 0.6429, Val F1: 0.
6246
66 Epoch 30, Loss: 0.5640, Val Acc: 0.6844, Val F1: 0.
6444
67 Early stopping at epoch 32
68 Fold 3/5
69 Epoch 0, Loss: 1.1958, Val Acc: 0.7126, Val F1: 0.
6178
70 Epoch 10, Loss: 0.6144, Val Acc: 0.6645, Val F1: 0.
6421
71 Epoch 20, Loss: 0.5885, Val Acc: 0.6495, Val F1: 0.
6310
72 Epoch 30, Loss: 0.5620, Val Acc: 0.6993, Val F1: 0.
6642
73 Epoch 40, Loss: 0.5447, Val Acc: 0.7043, Val F1: 0.
6717
74 Epoch 50, Loss: 0.5188, Val Acc: 0.7143, Val F1: 0.
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74 6787
75 Epoch 60, Loss: 0.4722, Val Acc: 0.6927, Val F1: 0.
6585
76 Epoch 70, Loss: 0.4271, Val Acc: 0.6811, Val F1: 0.
6634
77 Epoch 80, Loss: 0.3602, Val Acc: 0.6694, Val F1: 0.
6609
78 Epoch 90, Loss: 0.3170, Val Acc: 0.7027, Val F1: 0.
6800
79 Epoch 100, Loss: 0.2625, Val Acc: 0.6960, Val F1: 0.
6786
80 Epoch 110, Loss: 0.2155, Val Acc: 0.6694, Val F1: 0.
6568
81 Early stopping at epoch 114
82 Fold 4/5
83 Epoch 0, Loss: 1.2125, Val Acc: 0.7176, Val F1: 0.
6322
84 Epoch 10, Loss: 0.6185, Val Acc: 0.6628, Val F1: 0.
6368
85 Epoch 20, Loss: 0.5979, Val Acc: 0.6595, Val F1: 0.
6340
86 Epoch 30, Loss: 0.5707, Val Acc: 0.6827, Val F1: 0.
6428
87 Epoch 40, Loss: 0.5515, Val Acc: 0.6977, Val F1: 0.
6586
88 Epoch 50, Loss: 0.5195, Val Acc: 0.6777, Val F1: 0.
6414
89 Epoch 60, Loss: 0.4672, Val Acc: 0.6711, Val F1: 0.
6426
90 Epoch 70, Loss: 0.4114, Val Acc: 0.6628, Val F1: 0.
6427
91 Early stopping at epoch 73
92 Fold 5/5
93 Epoch 0, Loss: 1.2037, Val Acc: 0.7143, Val F1: 0.
6140
94 Epoch 10, Loss: 0.6029, Val Acc: 0.6794, Val F1: 0.
6497
95 Epoch 20, Loss: 0.5747, Val Acc: 0.6478, Val F1: 0.
6271
96 Epoch 30, Loss: 0.5541, Val Acc: 0.6728, Val F1: 0.
6406
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97 Early stopping at epoch 33
98
99 GAT Average Results:
100 accuracy = 0.7734
101 f1_score = 0.7493
102 auroc = 0.8061
103 precision = 0.7593
104
105 Training GraphSAGE
106 Fold 1/5
107 Epoch 0, Loss: 1.2041, Val Acc: 0.6877, Val F1: 0.
      5722
108 Epoch 10, Loss: 0.6141, Val Acc: 0.6777, Val F1: 0.
      5841
109 Epoch 20, Loss: 0.5248, Val Acc: 0.7176, Val F1: 0.
      6783
110 Epoch 30, Loss: 0.4380, Val Acc: 0.6860, Val F1: 0.
      6495
111 Epoch 40, Loss: 0.3452, Val Acc: 0.6595, Val F1: 0.
      6221
112 Epoch 50, Loss: 0.2547, Val Acc: 0.6561, Val F1: 0.
      6297
113 Early stopping at epoch 51
114 Fold 2/5
115 Epoch 0, Loss: 1.0754, Val Acc: 0.6944, Val F1: 0.
      5775
116 Epoch 10, Loss: 0.6102, Val Acc: 0.6944, Val F1: 0.
      6113
117 Epoch 20, Loss: 0.5146, Val Acc: 0.7276, Val F1: 0.
      6877
118 Epoch 30, Loss: 0.4253, Val Acc: 0.7076, Val F1: 0.
      6836
119 Epoch 40, Loss: 0.3263, Val Acc: 0.6877, Val F1: 0.
      6627
120 Early stopping at epoch 47
121 Fold 3/5
122 Epoch 0, Loss: 1.1542, Val Acc: 0.7126, Val F1: 0.
      5964
123 Epoch 10, Loss: 0.6009, Val Acc: 0.7093, Val F1: 0.
      6373
124 Epoch 20, Loss: 0.5262, Val Acc: 0.7076, Val F1: 0.
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124 6771
125 Epoch 30, Loss: 0.4502, Val Acc: 0.6728, Val F1: 0.
       6414
126 Epoch 40, Loss: 0.3697, Val Acc: 0.6744, Val F1: 0.
       6476
127 Early stopping at epoch 47
128 Fold 4/5
129 Epoch 0, Loss: 1.3574, Val Acc: 0.6528, Val F1: 0.
       5765
130 Epoch 10, Loss: 0.6312, Val Acc: 0.7243, Val F1: 0.
       6559
131 Epoch 20, Loss: 0.5384, Val Acc: 0.7043, Val F1: 0.
       6589
132 Epoch 30, Loss: 0.4570, Val Acc: 0.6694, Val F1: 0.
       6413
133 Epoch 40, Loss: 0.3752, Val Acc: 0.6711, Val F1: 0.
       6269
134 Epoch 50, Loss: 0.2928, Val Acc: 0.6495, Val F1: 0.
       6146
135 Early stopping at epoch 53
136 Fold 5/5
137 Epoch 0, Loss: 1.2306, Val Acc: 0.6927, Val F1: 0.
       5751
138 Epoch 10, Loss: 0.6043, Val Acc: 0.7076, Val F1: 0.
       6277
139 Epoch 20, Loss: 0.5173, Val Acc: 0.6927, Val F1: 0.
       6450
140 Epoch 30, Loss: 0.4261, Val Acc: 0.6761, Val F1: 0.
       6388
141 Epoch 40, Loss: 0.3338, Val Acc: 0.6528, Val F1: 0.
       6171
142 Epoch 50, Loss: 0.2514, Val Acc: 0.6578, Val F1: 0.
       6308
143 Early stopping at epoch 53
144
145 GraphSAGE Average Results:
146 accuracy = 0.8215
147 f1_score = 0.8091
148 auroc = 0.8726
149 precision = 0.8158
150
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151 Training TGCN
152 Fold 1/5
153 Epoch 0, Loss: 1.1845, Val Acc: 0.6910, Val F1: 0.
      5648
154 Epoch 10, Loss: 0.6915, Val Acc: 0.6910, Val F1: 0.
      5648
155 Epoch 20, Loss: 0.6222, Val Acc: 0.7076, Val F1: 0.
      6091
156 Epoch 30, Loss: 0.5242, Val Acc: 0.7043, Val F1: 0.
      6658
157 Epoch 40, Loss: 0.4013, Val Acc: 0.6844, Val F1: 0.
      6389
158 Epoch 50, Loss: 0.2794, Val Acc: 0.6827, Val F1: 0.
      6707
159 Early stopping at epoch 58
160 Fold 2/5
161 Epoch 0, Loss: 1.1682, Val Acc: 0.7010, Val F1: 0.
      5778
162 Epoch 10, Loss: 0.6796, Val Acc: 0.7110, Val F1: 0.
      6004
163 Epoch 20, Loss: 0.6158, Val Acc: 0.7110, Val F1: 0.
      6289
164 Epoch 30, Loss: 0.5137, Val Acc: 0.6993, Val F1: 0.
      6773
165 Epoch 40, Loss: 0.3682, Val Acc: 0.6993, Val F1: 0.
      6731
166 Epoch 50, Loss: 0.2981, Val Acc: 0.6661, Val F1: 0.
      6793
167 Epoch 60, Loss: 0.2629, Val Acc: 0.6761, Val F1: 0.
      6322
168 Epoch 70, Loss: 0.1740, Val Acc: 0.6860, Val F1: 0.
      6581
169 Epoch 80, Loss: 0.1194, Val Acc: 0.6794, Val F1: 0.
      6648
170 Early stopping at epoch 87
171 Fold 3/5
172 Epoch 0, Loss: 1.1079, Val Acc: 0.7093, Val F1: 0.
      5887
173 Epoch 10, Loss: 0.6735, Val Acc: 0.7292, Val F1: 0.
      6484
174 Epoch 20, Loss: 0.6023, Val Acc: 0.7126, Val F1: 0.
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174 6724
175 Epoch 30, Loss: 0.4959, Val Acc: 0.6811, Val F1: 0.
6539
176 Epoch 40, Loss: 0.3556, Val Acc: 0.6462, Val F1: 0.
6498
177 Epoch 50, Loss: 0.2382, Val Acc: 0.6678, Val F1: 0.
6551
178 Epoch 60, Loss: 0.1233, Val Acc: 0.6312, Val F1: 0.
6107
179 Epoch 70, Loss: 0.0787, Val Acc: 0.6312, Val F1: 0.
6353
180 Early stopping at epoch 74
181 Fold 4/5
182 Epoch 0, Loss: 1.0646, Val Acc: 0.7027, Val F1: 0.
5799
183 Epoch 10, Loss: 0.6856, Val Acc: 0.7093, Val F1: 0.
5952
184 Epoch 20, Loss: 0.6213, Val Acc: 0.7143, Val F1: 0.
6301
185 Epoch 30, Loss: 0.5458, Val Acc: 0.6561, Val F1: 0.
6358
186 Epoch 40, Loss: 0.3973, Val Acc: 0.6993, Val F1: 0.
6776
187 Epoch 50, Loss: 0.2525, Val Acc: 0.6694, Val F1: 0.
6699
188 Epoch 60, Loss: 0.1365, Val Acc: 0.6429, Val F1: 0.
6415
189 Epoch 70, Loss: 0.0878, Val Acc: 0.6429, Val F1: 0.
6223
190 Early stopping at epoch 74
191 Fold 5/5
192 Epoch 0, Loss: 1.2240, Val Acc: 0.7176, Val F1: 0.
6209
193 Epoch 10, Loss: 0.6949, Val Acc: 0.7027, Val F1: 0.
5799
194 Epoch 20, Loss: 0.6281, Val Acc: 0.7143, Val F1: 0.
6435
195 Epoch 30, Loss: 0.5381, Val Acc: 0.6960, Val F1: 0.
6645
196 Epoch 40, Loss: 0.4319, Val Acc: 0.7143, Val F1: 0.
6736
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197 Epoch 50, Loss: 0.3076, Val Acc: 0.6694, Val F1: 0.  
6655  
198 Epoch 60, Loss: 0.2297, Val Acc: 0.6412, Val F1: 0.  
6356  
199 Epoch 70, Loss: 0.1428, Val Acc: 0.6113, Val F1: 0.  
6077  
200 Early stopping at epoch 75  
201 [I 2024-07-26 10:37:44,696] A new study created in  
memory with name: no-name-d48072f0-5f4a-4350-855e-  
2ad2f6b806ce  
202  
203 TGCN Average Results:  
204 accuracy = 0.8661  
205 f1_score = 0.8642  
206 auroc = 0.9090  
207 precision = 0.8655  
208 Analysis complete. Results saved to gnn_results.pkl  
209 Epoch 0, Loss: 1.4141, Val Acc: 0.2608, Val F1: 0.  
3274  
210 Epoch 10, Loss: 0.7940, Val Acc: 0.7126, Val F1: 0.  
6079  
211 Epoch 20, Loss: 0.6888, Val Acc: 0.7159, Val F1: 0.  
6372  
212 Epoch 30, Loss: 0.6523, Val Acc: 0.6894, Val F1: 0.  
6247  
213 Early stopping at epoch 36  
214 [I 2024-07-26 10:37:45,478] Trial 0 finished with  
value: 0.6326190986784928 and parameters: {'  
hidden_channels': 64, 'learning_rate': 0.  
002193292924617374, 'dropout': 0.6724498510381608, '  
weight_decay': 0.00031888393363404356}. Best is  
trial 0 with value: 0.6326190986784928.  
215 Epoch 0, Loss: 1.3111, Val Acc: 0.4618, Val F1: 0.  
4896  
216 Epoch 10, Loss: 0.6227, Val Acc: 0.6977, Val F1: 0.  
6686  
217 Epoch 20, Loss: 0.5396, Val Acc: 0.7010, Val F1: 0.  
6562  
218 Epoch 30, Loss: 0.4840, Val Acc: 0.6894, Val F1: 0.  
6428  
219 Early stopping at epoch 31
```

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220 [I 2024-07-26 10:37:46,080] Trial 1 finished with
    value: 0.6450610208907077 and parameters: {'  

        hidden_channels': 32, 'learning_rate': 0.  

        03045477794753225, 'dropout': 0.4614461461250121, '  

        weight_decay': 0.00035888844809107984}. Best is
    trial 1 with value: 0.6450610208907077.
221 Epoch 0, Loss: 1.4597, Val Acc: 0.3654, Val F1: 0.
    4435
222 Epoch 10, Loss: 1.0169, Val Acc: 0.5615, Val F1: 0.
    5795
223 Epoch 20, Loss: 0.9154, Val Acc: 0.6811, Val F1: 0.
    6262
224 Epoch 30, Loss: 0.8405, Val Acc: 0.7159, Val F1: 0.
    6435
225 Epoch 40, Loss: 0.7875, Val Acc: 0.7126, Val F1: 0.
    6369
226 Epoch 50, Loss: 0.7497, Val Acc: 0.7076, Val F1: 0.
    6354
227 Early stopping at epoch 55
228 [I 2024-07-26 10:37:47,497] Trial 2 finished with
    value: 0.6312965628679152 and parameters: {'  

        hidden_channels': 128, 'learning_rate': 0.  

        0003312675669585801, 'dropout': 0.28437654410233343
        , 'weight_decay': 0.003174856330237419}. Best is
    trial 1 with value: 0.6450610208907077.
229 Epoch 0, Loss: 1.3003, Val Acc: 0.5764, Val F1: 0.
    5882
230 Epoch 10, Loss: 0.5868, Val Acc: 0.7010, Val F1: 0.
    5851
231 Epoch 20, Loss: 0.4936, Val Acc: 0.7159, Val F1: 0.
    6578
232 Epoch 30, Loss: 0.3820, Val Acc: 0.6595, Val F1: 0.
    6299
233 Early stopping at epoch 33
234 [I 2024-07-26 10:37:48,708] Trial 3 finished with
    value: 0.6131573262955498 and parameters: {'  

        hidden_channels': 256, 'learning_rate': 0.  

        030172156850242056, 'dropout': 0.1367283831500441, '  

        weight_decay': 1.9736093600670734e-05}. Best is
    trial 1 with value: 0.6450610208907077.
235 Epoch 0, Loss: 1.3482, Val Acc: 0.6329, Val F1: 0.
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235 6188
236 Epoch 10, Loss: 0.6706, Val Acc: 0.6794, Val F1: 0.
6257
237 Epoch 20, Loss: 0.5792, Val Acc: 0.7093, Val F1: 0.
6484
238 Epoch 30, Loss: 0.5366, Val Acc: 0.7093, Val F1: 0.
6661
239 Epoch 40, Loss: 0.4986, Val Acc: 0.7043, Val F1: 0.
6635
240 Epoch 50, Loss: 0.4618, Val Acc: 0.6977, Val F1: 0.
6595
241 Early stopping at epoch 52
242 [I 2024-07-26 10:37:50,643] Trial 4 finished with
value: 0.6535272257629957 and parameters: {'hidden_channels': 256, 'learning_rate': 0.
003402437490342794, 'dropout': 0.2594964639459137, 'weight_decay': 4.0531563043010086e-05}. Best is
trial 4 with value: 0.6535272257629957.
243 Epoch 0, Loss: 1.3764, Val Acc: 0.5797, Val F1: 0.
6032
244 Epoch 10, Loss: 0.6692, Val Acc: 0.7209, Val F1: 0.
6405
245 Epoch 20, Loss: 0.6154, Val Acc: 0.6977, Val F1: 0.
6416
246 Epoch 30, Loss: 0.5725, Val Acc: 0.7060, Val F1: 0.
6520
247 Epoch 40, Loss: 0.5382, Val Acc: 0.7126, Val F1: 0.
6662
248 Epoch 50, Loss: 0.5109, Val Acc: 0.7110, Val F1: 0.
6697
249 Epoch 60, Loss: 0.4835, Val Acc: 0.7143, Val F1: 0.
6787
250 Epoch 70, Loss: 0.4560, Val Acc: 0.7027, Val F1: 0.
6696
251 Early stopping at epoch 78
252 [I 2024-07-26 10:37:53,499] Trial 5 finished with
value: 0.6471043218479474 and parameters: {'hidden_channels': 256, 'learning_rate': 0.
002185040861233359, 'dropout': 0.38854168418578683
, 'weight_decay': 0.00015284443723080038}. Best is
trial 4 with value: 0.6535272257629957.
```

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253 Epoch 0, Loss: 1.4215, Val Acc: 0.7193, Val F1: 0.  
6266  
254 Epoch 10, Loss: 0.6206, Val Acc: 0.7276, Val F1: 0.  
6490  
255 Epoch 20, Loss: 0.4486, Val Acc: 0.7010, Val F1: 0.  
6610  
256 Epoch 30, Loss: 0.3132, Val Acc: 0.6561, Val F1: 0.  
6332  
257 Early stopping at epoch 39  
258 [I 2024-07-26 10:37:54,885] Trial 6 finished with  
value: 0.6054038795698056 and parameters: {'  
hidden_channels': 256, 'learning_rate': 0.  
09278227500436846, 'dropout': 0.6098850680476365, '  
weight_decay': 0.0002556878488857352}. Best is trial  
4 with value: 0.6535272257629957.  
259 Epoch 0, Loss: 1.5144, Val Acc: 0.2309, Val F1: 0.  
2204  
260 Epoch 10, Loss: 0.9002, Val Acc: 0.5814, Val F1: 0.  
5952  
261 Epoch 20, Loss: 0.7326, Val Acc: 0.7027, Val F1: 0.  
6307  
262 Epoch 30, Loss: 0.6969, Val Acc: 0.7060, Val F1: 0.  
6324  
263 Epoch 40, Loss: 0.6659, Val Acc: 0.7043, Val F1: 0.  
6313  
264 Epoch 50, Loss: 0.6432, Val Acc: 0.7126, Val F1: 0.  
6369  
265 Epoch 60, Loss: 0.6256, Val Acc: 0.7193, Val F1: 0.  
6433  
266 Epoch 70, Loss: 0.6110, Val Acc: 0.7193, Val F1: 0.  
6470  
267 Epoch 80, Loss: 0.5978, Val Acc: 0.7110, Val F1: 0.  
6412  
268 Early stopping at epoch 88  
269 [I 2024-07-26 10:37:56,566] Trial 7 finished with  
value: 0.6458576424194677 and parameters: {'  
hidden_channels': 32, 'learning_rate': 0.  
0019964133144824694, 'dropout': 0.1001181270496254  
, 'weight_decay': 0.0003456894740363803}. Best is  
trial 4 with value: 0.6535272257629957.  
270 Epoch 0, Loss: 1.3418, Val Acc: 0.5050, Val F1: 0.
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270 5099
271 Epoch 10, Loss: 1.0159, Val Acc: 0.5365, Val F1: 0.
5489
272 Epoch 20, Loss: 0.9634, Val Acc: 0.5515, Val F1: 0.
5676
273 Epoch 30, Loss: 0.9155, Val Acc: 0.5847, Val F1: 0.
5969
274 Epoch 40, Loss: 0.8737, Val Acc: 0.6047, Val F1: 0.
6101
275 Epoch 50, Loss: 0.8384, Val Acc: 0.6379, Val F1: 0.
6286
276 Epoch 60, Loss: 0.8092, Val Acc: 0.6645, Val F1: 0.
6417
277 Epoch 70, Loss: 0.7850, Val Acc: 0.6777, Val F1: 0.
6433
278 Epoch 80, Loss: 0.7652, Val Acc: 0.6860, Val F1: 0.
6401
279 Early stopping at epoch 81
280 [I 2024-07-26 10:37:58,193] Trial 8 finished with
value: 0.6413377664176622 and parameters: {'hidden_channels': 64, 'learning_rate': 0.
00018709675800229771, 'dropout': 0.41801604928360814
, 'weight_decay': 0.009595834527993948}. Best is
trial 4 with value: 0.6535272257629957.
281 Epoch 0, Loss: 1.5744, Val Acc: 0.1811, Val F1: 0.
2287
282 Epoch 10, Loss: 1.0894, Val Acc: 0.3870, Val F1: 0.
4649
283 Epoch 20, Loss: 1.0293, Val Acc: 0.5316, Val F1: 0.
5394
284 Epoch 30, Loss: 0.9748, Val Acc: 0.6329, Val F1: 0.
5831
285 Epoch 40, Loss: 0.9264, Val Acc: 0.6794, Val F1: 0.
5826
286 Epoch 50, Loss: 0.8848, Val Acc: 0.6927, Val F1: 0.
5808
287 Early stopping at epoch 53
288 [I 2024-07-26 10:38:00,259] Trial 9 finished with
value: 0.5853623829903815 and parameters: {'hidden_channels': 256, 'learning_rate': 0.
00010092121854668486, 'dropout': 0.3420791109529999
```

```
288 , 'weight_decay': 0.006335954151693747}. Best is
trial 4 with value: 0.6535272257629957.
289 Epoch 0, Loss: 1.3679, Val Acc: 0.2841, Val F1: 0.
3436
290 Epoch 10, Loss: 0.8687, Val Acc: 0.6445, Val F1: 0.
6057
291 Epoch 20, Loss: 0.7488, Val Acc: 0.7043, Val F1: 0.
6150
292 Epoch 30, Loss: 0.6983, Val Acc: 0.7076, Val F1: 0.
6257
293 Epoch 40, Loss: 0.6720, Val Acc: 0.7043, Val F1: 0.
6349
294 Epoch 50, Loss: 0.6526, Val Acc: 0.6894, Val F1: 0.
6247
295 Epoch 60, Loss: 0.6361, Val Acc: 0.6977, Val F1: 0.
6354
296 Epoch 70, Loss: 0.6214, Val Acc: 0.7010, Val F1: 0.
6440
297 Epoch 80, Loss: 0.6082, Val Acc: 0.7060, Val F1: 0.
6505
298 Epoch 90, Loss: 0.5964, Val Acc: 0.7043, Val F1: 0.
6493
299 Early stopping at epoch 97
300 [I 2024-07-26 10:38:02,752] Trial 10 finished with
value: 0.6445105525528804 and parameters: {'  

hidden_channels': 128, 'learning_rate': 0.  

0006856534677297584, 'dropout': 0.22937063580631292  

, 'weight_decay': 1.7993906634079788e-05}. Best is
trial 4 with value: 0.6535272257629957.
301 Epoch 0, Loss: 1.8454, Val Acc: 0.5415, Val F1: 0.
5597
302 Epoch 10, Loss: 0.5978, Val Acc: 0.6894, Val F1: 0.
6426
303 Epoch 20, Loss: 0.5218, Val Acc: 0.7076, Val F1: 0.
6683
304 Epoch 30, Loss: 0.4642, Val Acc: 0.6960, Val F1: 0.
6682
305 Epoch 40, Loss: 0.4063, Val Acc: 0.6711, Val F1: 0.
6433
306 Early stopping at epoch 43
307 [I 2024-07-26 10:38:04,371] Trial 11 finished with
```

```
307 value: 0.6313814299711253 and parameters: {'  
    hidden_channels': 256, 'learning_rate': 0.  
    008414473317178183, 'dropout': 0.4997734411005362, '  
    weight_decay': 6.830645677315923e-05}. Best is trial  
    4 with value: 0.6535272257629957.  
308 Epoch 0, Loss: 1.3070, Val Acc: 0.6628, Val F1: 0.  
    6615  
309 Epoch 10, Loss: 0.6100, Val Acc: 0.6894, Val F1: 0.  
    6521  
310 Epoch 20, Loss: 0.5262, Val Acc: 0.6993, Val F1: 0.  
    6630  
311 Epoch 30, Loss: 0.4672, Val Acc: 0.6844, Val F1: 0.  
    6590  
312 Epoch 40, Loss: 0.4139, Val Acc: 0.6661, Val F1: 0.  
    6413  
313 Early stopping at epoch 42  
314 [I 2024-07-26 10:38:06,007] Trial 12 finished with  
    value: 0.6299838876257684 and parameters: {'  
    hidden_channels': 256, 'learning_rate': 0.  
    007140406427660985, 'dropout': 0.2254385358033038, '  
    weight_decay': 7.9612753292286e-05}. Best is trial 4  
    with value: 0.6535272257629957.  
315 Epoch 0, Loss: 1.1639, Val Acc: 0.5316, Val F1: 0.  
    5642  
316 Epoch 10, Loss: 0.7596, Val Acc: 0.7093, Val F1: 0.  
    6086  
317 Epoch 20, Loss: 0.6714, Val Acc: 0.7159, Val F1: 0.  
    6391  
318 Epoch 30, Loss: 0.6389, Val Acc: 0.7076, Val F1: 0.  
    6407  
319 Epoch 40, Loss: 0.6096, Val Acc: 0.7143, Val F1: 0.  
    6504  
320 Epoch 50, Loss: 0.5876, Val Acc: 0.6993, Val F1: 0.  
    6428  
321 Epoch 60, Loss: 0.5691, Val Acc: 0.7043, Val F1: 0.  
    6535  
322 Epoch 70, Loss: 0.5523, Val Acc: 0.7076, Val F1: 0.  
    6573  
323 Epoch 80, Loss: 0.5369, Val Acc: 0.7076, Val F1: 0.  
    6573  
324 Early stopping at epoch 83
```

```
325 [I 2024-07-26 10:38:09,258] Trial 13 finished with
    value: 0.6560965877622346 and parameters: {'  

        hidden_channels': 256, 'learning_rate': 0.  

        0008730050299775283, 'dropout': 0.3546974303013142  

        , 'weight_decay': 6.026339318535492e-05}. Best is
    trial 13 with value: 0.6560965877622346.
326 Epoch 0, Loss: 1.3189, Val Acc: 0.3887, Val F1: 0.
    4371
327 Epoch 10, Loss: 0.8895, Val Acc: 0.7110, Val F1: 0.
    6464
328 Epoch 20, Loss: 0.7540, Val Acc: 0.7176, Val F1: 0.
    6256
329 Epoch 30, Loss: 0.6968, Val Acc: 0.7243, Val F1: 0.
    6448
330 Early stopping at epoch 32
331 [I 2024-07-26 10:38:10,545] Trial 14 finished with
    value: 0.6436470476597609 and parameters: {'  

        hidden_channels': 256, 'learning_rate': 0.  

        0005194783988233494, 'dropout': 0.31193563940113206  

        , 'weight_decay': 4.2294833084880295e-05}. Best is
    trial 13 with value: 0.6560965877622346.
332 Epoch 0, Loss: 1.4717, Val Acc: 0.3887, Val F1: 0.
    3836
333 Epoch 10, Loss: 0.7810, Val Acc: 0.7027, Val F1: 0.
    5799
334 Epoch 20, Loss: 0.6856, Val Acc: 0.7342, Val F1: 0.
    6516
335 Epoch 30, Loss: 0.6488, Val Acc: 0.7159, Val F1: 0.
    6429
336 Epoch 40, Loss: 0.6153, Val Acc: 0.7176, Val F1: 0.
    6440
337 Early stopping at epoch 40
338 [I 2024-07-26 10:38:12,049] Trial 15 finished with
    value: 0.6440308956649226 and parameters: {'  

        hidden_channels': 256, 'learning_rate': 0.  

        0010006548075788314, 'dropout': 0.528785042254286, '  

        weight_decay': 0.001168662904830157}. Best is trial
    13 with value: 0.6560965877622346.
339 Epoch 0, Loss: 1.2763, Val Acc: 0.5864, Val F1: 0.
    5709
340 Epoch 10, Loss: 0.7037, Val Acc: 0.7126, Val F1: 0.
```

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340 6369
341 Epoch 20, Loss: 0.6376, Val Acc: 0.6777, Val F1: 0.
       6185
342 Early stopping at epoch 26
343 [I 2024-07-26 10:38:12,607] Trial 16 finished with
       value: 0.6292492222266216 and parameters: {'hidden_channels': 32, 'learning_rate': 0.
       005889528831359732, 'dropout': 0.2377490549263006, 'weight_decay': 1.2432715675254687e-05}. Best is
       trial 13 with value: 0.6560965877622346.
344 Epoch 0, Loss: 1.3690, Val Acc: 0.6445, Val F1: 0.
       6013
345 Epoch 10, Loss: 0.6033, Val Acc: 0.7110, Val F1: 0.
       6556
346 Epoch 20, Loss: 0.5282, Val Acc: 0.7143, Val F1: 0.
       6734
347 Epoch 30, Loss: 0.4655, Val Acc: 0.6777, Val F1: 0.
       6523
348 Epoch 40, Loss: 0.4054, Val Acc: 0.6561, Val F1: 0.
       6256
349 Early stopping at epoch 42
350 [I 2024-07-26 10:38:13,607] Trial 17 finished with
       value: 0.6248291473636813 and parameters: {'hidden_channels': 64, 'learning_rate': 0.
       015248130161017177, 'dropout': 0.16125916172967641
       , 'weight_decay': 3.408777781697907e-05}. Best is
       trial 13 with value: 0.6560965877622346.
351 Epoch 0, Loss: 1.6955, Val Acc: 0.2774, Val F1: 0.
       1353
352 Epoch 10, Loss: 0.9184, Val Acc: 0.6429, Val F1: 0.
       6099
353 Epoch 20, Loss: 0.7476, Val Acc: 0.7027, Val F1: 0.
       5799
354 Epoch 30, Loss: 0.6905, Val Acc: 0.7193, Val F1: 0.
       6219
355 Early stopping at epoch 31
356 [I 2024-07-26 10:38:14,486] Trial 18 finished with
       value: 0.6276670358065707 and parameters: {'hidden_channels': 128, 'learning_rate': 0.
       0009079183778693317, 'dropout': 0.3831503472932213
       , 'weight_decay': 0.000128372575114888}. Best is
```

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356 trial 13 with value: 0.6560965877622346.  
357 Epoch 0, Loss: 1.4092, Val Acc: 0.6030, Val F1: 0.  
5692  
358 Epoch 10, Loss: 0.6516, Val Acc: 0.6611, Val F1: 0.  
6195  
359 Epoch 20, Loss: 0.5667, Val Acc: 0.7027, Val F1: 0.  
6481  
360 Epoch 30, Loss: 0.5183, Val Acc: 0.7043, Val F1: 0.  
6623  
361 Epoch 40, Loss: 0.4742, Val Acc: 0.6910, Val F1: 0.  
6586  
362 Epoch 50, Loss: 0.4309, Val Acc: 0.6694, Val F1: 0.  
6404  
363 Early stopping at epoch 55  
364 [I 2024-07-26 10:38:16,651] Trial 19 finished with  
value: 0.6327778602191964 and parameters: {'  
hidden_channels': 256, 'learning_rate': 0.  
0038312243298134793, 'dropout': 0.28911034495303456  
, 'weight_decay': 0.0009811409873088156}. Best is  
trial 13 with value: 0.6560965877622346.  
365 Epoch 0, Loss: 1.5659, Val Acc: 0.2990, Val F1: 0.  
2214  
366 Epoch 10, Loss: 0.7025, Val Acc: 0.7027, Val F1: 0.  
5799  
367 Epoch 20, Loss: 0.6439, Val Acc: 0.6877, Val F1: 0.  
6236  
368 Early stopping at epoch 23  
369 [I 2024-07-26 10:38:17,557] Trial 20 finished with  
value: 0.6189004142344049 and parameters: {'  
hidden_channels': 256, 'learning_rate': 0.  
0015445518894416903, 'dropout': 0.18116243441640817  
, 'weight_decay': 3.743300386806623e-05}. Best is  
trial 13 with value: 0.6560965877622346.  
370 Epoch 0, Loss: 1.3790, Val Acc: 0.5565, Val F1: 0.  
5933  
371 Epoch 10, Loss: 0.6567, Val Acc: 0.6761, Val F1: 0.  
6263  
372 Epoch 20, Loss: 0.5807, Val Acc: 0.6844, Val F1: 0.  
6048  
373 Early stopping at epoch 21  
374 [I 2024-07-26 10:38:18,376] Trial 21 finished with
```

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374 value: 0.613895637555484 and parameters: {'  
    hidden_channels': 256, 'learning_rate': 0.  
    003520961295857236, 'dropout': 0.37952793799200785  
    , 'weight_decay': 0.00012363883217410344}. Best is  
    trial 13 with value: 0.6560965877622346.  
375 Epoch 0, Loss: 1.4495, Val Acc: 0.4568, Val F1: 0.  
    5443  
376 Epoch 10, Loss: 0.7067, Val Acc: 0.7143, Val F1: 0.  
    6140  
377 Epoch 20, Loss: 0.6493, Val Acc: 0.7027, Val F1: 0.  
    6389  
378 Epoch 30, Loss: 0.6088, Val Acc: 0.7076, Val F1: 0.  
    6517  
379 Epoch 40, Loss: 0.5797, Val Acc: 0.7093, Val F1: 0.  
    6572  
380 Epoch 50, Loss: 0.5531, Val Acc: 0.7043, Val F1: 0.  
    6549  
381 Epoch 60, Loss: 0.5306, Val Acc: 0.7110, Val F1: 0.  
    6674  
382 Epoch 70, Loss: 0.5089, Val Acc: 0.7110, Val F1: 0.  
    6697  
383 Epoch 80, Loss: 0.4876, Val Acc: 0.7076, Val F1: 0.  
    6694  
384 Epoch 90, Loss: 0.4663, Val Acc: 0.7027, Val F1: 0.  
    6676  
385 [I 2024-07-26 10:38:22,378] Trial 22 finished with  
    value: 0.6642572193190082 and parameters: {'  
    hidden_channels': 256, 'learning_rate': 0.  
    0014183388028609855, 'dropout': 0.4358850838382176  
    , 'weight_decay': 0.0001459641340090066}. Best is  
    trial 22 with value: 0.6642572193190082.  
386 Epoch 0, Loss: 1.5336, Val Acc: 0.3439, Val F1: 0.  
    3608  
387 Epoch 10, Loss: 0.7600, Val Acc: 0.7043, Val F1: 0.  
    5838  
388 Epoch 20, Loss: 0.6739, Val Acc: 0.6993, Val F1: 0.  
    6280  
389 Epoch 30, Loss: 0.6340, Val Acc: 0.6844, Val F1: 0.  
    6262  
390 Early stopping at epoch 37  
391 [I 2024-07-26 10:38:23,883] Trial 23 finished with
```

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391 value: 0.6045350826876621 and parameters: {'  
    hidden_channels': 256, 'learning_rate': 0.  
    001134898199288717, 'dropout': 0.4475644193161611, '  
    weight_decay': 5.205737288585108e-05}. Best is trial  
    22 with value: 0.6642572193190082.  
392 Epoch 0, Loss: 1.7776, Val Acc: 0.2359, Val F1: 0.  
    1538  
393 Epoch 10, Loss: 0.9849, Val Acc: 0.5249, Val F1: 0.  
    5419  
394 Epoch 20, Loss: 0.8276, Val Acc: 0.7010, Val F1: 0.  
    5880  
395 Epoch 30, Loss: 0.7464, Val Acc: 0.7027, Val F1: 0.  
    5799  
396 Epoch 40, Loss: 0.7034, Val Acc: 0.7143, Val F1: 0.  
    6165  
397 Epoch 50, Loss: 0.6770, Val Acc: 0.7243, Val F1: 0.  
    6428  
398 Epoch 60, Loss: 0.6574, Val Acc: 0.7259, Val F1: 0.  
    6479  
399 Epoch 70, Loss: 0.6410, Val Acc: 0.7176, Val F1: 0.  
    6458  
400 Epoch 80, Loss: 0.6270, Val Acc: 0.7076, Val F1: 0.  
    6372  
401 Early stopping at epoch 86  
402 [I 2024-07-26 10:38:27,240] Trial 24 finished with  
    value: 0.6360483742604502 and parameters: {'  
    hidden_channels': 256, 'learning_rate': 0.  
    0004107859141842884, 'dropout': 0.5546959329251165  
    , 'weight_decay': 0.0007165827330885326}. Best is  
    trial 22 with value: 0.6642572193190082.  
403 Epoch 0, Loss: 1.4461, Val Acc: 0.2043, Val F1: 0.  
    1916  
404 Epoch 10, Loss: 1.0414, Val Acc: 0.5764, Val F1: 0.  
    6003  
405 Epoch 20, Loss: 0.9154, Val Acc: 0.7375, Val F1: 0.  
    6579  
406 Epoch 30, Loss: 0.8277, Val Acc: 0.7326, Val F1: 0.  
    6463  
407 Early stopping at epoch 37  
408 [I 2024-07-26 10:38:28,770] Trial 25 finished with  
    value: 0.6495422326294993 and parameters: {'
```

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408 'hidden_channels': 256, 'learning_rate': 0.  
00027259494578558784, 'dropout': 0.35127690542321366  
, 'weight_decay': 2.7179049350166384e-05}. Best is  
trial 22 with value: 0.6642572193190082.  
409 Epoch 0, Loss: 2.1931, Val Acc: 0.1047, Val F1: 0.  
1313  
410 Epoch 10, Loss: 0.7093, Val Acc: 0.7193, Val F1: 0.  
6414  
411 Epoch 20, Loss: 0.6410, Val Acc: 0.6944, Val F1: 0.  
6462  
412 Epoch 30, Loss: 0.5880, Val Acc: 0.7010, Val F1: 0.  
6344  
413 Epoch 40, Loss: 0.5482, Val Acc: 0.7043, Val F1: 0.  
6600  
414 Epoch 50, Loss: 0.5177, Val Acc: 0.7010, Val F1: 0.  
6598  
415 Epoch 60, Loss: 0.4878, Val Acc: 0.7093, Val F1: 0.  
6717  
416 Epoch 70, Loss: 0.4574, Val Acc: 0.7126, Val F1: 0.  
6774  
417 Epoch 80, Loss: 0.4260, Val Acc: 0.7027, Val F1: 0.  
6706  
418 Epoch 90, Loss: 0.3937, Val Acc: 0.6944, Val F1: 0.  
6650  
419 Early stopping at epoch 91  
420 [I 2024-07-26 10:38:31,200] Trial 26 finished with  
value: 0.6628114528535846 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
004129250132004975, 'dropout': 0.4639033262122348, '  
weight_decay': 0.00010447060532698085}. Best is  
trial 22 with value: 0.6642572193190082.  
421 Epoch 0, Loss: 1.4888, Val Acc: 0.1512, Val F1: 0.  
1409  
422 Epoch 10, Loss: 0.8395, Val Acc: 0.6977, Val F1: 0.  
5775  
423 Epoch 20, Loss: 0.6971, Val Acc: 0.7143, Val F1: 0.  
6115  
424 Epoch 30, Loss: 0.6593, Val Acc: 0.6944, Val F1: 0.  
6281  
425 Epoch 40, Loss: 0.6242, Val Acc: 0.6993, Val F1: 0.  
6332
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426 Epoch 50, Loss: 0.5983, Val Acc: 0.7143, Val F1: 0.  
6470  
427 Epoch 60, Loss: 0.5777, Val Acc: 0.7060, Val F1: 0.  
6476  
428 Epoch 70, Loss: 0.5593, Val Acc: 0.7060, Val F1: 0.  
6505  
429 Epoch 80, Loss: 0.5428, Val Acc: 0.7060, Val F1: 0.  
6534  
430 Epoch 90, Loss: 0.5273, Val Acc: 0.7060, Val F1: 0.  
6534  
431 [I 2024-07-26 10:38:34,139] Trial 27 finished with  
value: 0.6548659764982713 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
0014078597122069302, 'dropout': 0.4851646680570309  
, 'weight_decay': 0.00018915560133319937}. Best is  
trial 22 with value: 0.6642572193190082.  
432 Epoch 0, Loss: 1.7091, Val Acc: 0.6047, Val F1: 0.  
6028  
433 Epoch 10, Loss: 0.5743, Val Acc: 0.6927, Val F1: 0.  
6253  
434 Epoch 20, Loss: 0.4960, Val Acc: 0.6728, Val F1: 0.  
6523  
435 Epoch 30, Loss: 0.4140, Val Acc: 0.6628, Val F1: 0.  
6343  
436 Early stopping at epoch 32  
437 [I 2024-07-26 10:38:35,063] Trial 28 finished with  
value: 0.6282635671896927 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
016816322808170282, 'dropout': 0.552062261520578, '  
weight_decay': 9.296184056981683e-05}. Best is trial  
22 with value: 0.6642572193190082.  
438 Epoch 0, Loss: 1.0897, Val Acc: 0.4751, Val F1: 0.  
5127  
439 Epoch 10, Loss: 0.9303, Val Acc: 0.6462, Val F1: 0.  
6085  
440 Epoch 20, Loss: 0.8344, Val Acc: 0.6811, Val F1: 0.  
5854  
441 Epoch 30, Loss: 0.7719, Val Acc: 0.6977, Val F1: 0.  
5805  
442 Early stopping at epoch 31  
443 [I 2024-07-26 10:38:35,827] Trial 29 finished with
```

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443 value: 0.5805049926947523 and parameters: {'  
    hidden_channels': 64, 'learning_rate': 0.  
    0006176232251874684, 'dropout': 0.6837750713200954  
    , 'weight_decay': 0.0005083880514819153}. Best is  
    trial 22 with value: 0.6642572193190082.  
444 Epoch 0, Loss: 1.2548, Val Acc: 0.4734, Val F1: 0.  
    5081  
445 Epoch 10, Loss: 0.6533, Val Acc: 0.6661, Val F1: 0.  
    6192  
446 Epoch 20, Loss: 0.5725, Val Acc: 0.6944, Val F1: 0.  
    6310  
447 Epoch 30, Loss: 0.5314, Val Acc: 0.7209, Val F1: 0.  
    6850  
448 Epoch 40, Loss: 0.4955, Val Acc: 0.7110, Val F1: 0.  
    6741  
449 Early stopping at epoch 48  
450 [I 2024-07-26 10:38:37,090] Trial 30 finished with  
    value: 0.6647664351152723 and parameters: {'  
    hidden_channels': 128, 'learning_rate': 0.  
    004618929587138882, 'dropout': 0.6120809252685867,  
    'weight_decay': 0.00022268924296112172}. Best is  
    trial 30 with value: 0.6647664351152723.  
451 Epoch 0, Loss: 1.4042, Val Acc: 0.5897, Val F1: 0.  
    5715  
452 Epoch 10, Loss: 0.6762, Val Acc: 0.7126, Val F1: 0.  
    6202  
453 Epoch 20, Loss: 0.6314, Val Acc: 0.7043, Val F1: 0.  
    6448  
454 Epoch 30, Loss: 0.5871, Val Acc: 0.7076, Val F1: 0.  
    6424  
455 Epoch 40, Loss: 0.5573, Val Acc: 0.7093, Val F1: 0.  
    6572  
456 Epoch 50, Loss: 0.5315, Val Acc: 0.7110, Val F1: 0.  
    6637  
457 Epoch 60, Loss: 0.5067, Val Acc: 0.7093, Val F1: 0.  
    6637  
458 Epoch 70, Loss: 0.4827, Val Acc: 0.7076, Val F1: 0.  
    6649  
459 Early stopping at epoch 76  
460 [I 2024-07-26 10:38:39,194] Trial 31 finished with  
    value: 0.6671739363412281 and parameters: {'
```

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460 'hidden_channels': 128, 'learning_rate': 0.  
002593138949504669, 'dropout': 0.5954609932811485, '  
weight_decay': 0.00020890497134648197}. Best is  
trial 31 with value: 0.6671739363412281.  
461 Epoch 0, Loss: 1.6086, Val Acc: 0.3904, Val F1: 0.  
4077  
462 Epoch 10, Loss: 0.6675, Val Acc: 0.6993, Val F1: 0.  
6349  
463 Epoch 20, Loss: 0.5875, Val Acc: 0.7060, Val F1: 0.  
6460  
464 Epoch 30, Loss: 0.5466, Val Acc: 0.7126, Val F1: 0.  
6687  
465 Epoch 40, Loss: 0.5109, Val Acc: 0.7126, Val F1: 0.  
6698  
466 Epoch 50, Loss: 0.4755, Val Acc: 0.7126, Val F1: 0.  
6721  
467 Epoch 60, Loss: 0.4403, Val Acc: 0.7093, Val F1: 0.  
6696  
468 Epoch 70, Loss: 0.4041, Val Acc: 0.6944, Val F1: 0.  
6559  
469 Early stopping at epoch 77  
470 [I 2024-07-26 10:38:41,220] Trial 32 finished with  
value: 0.6515062166987723 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
005017926365898459, 'dropout': 0.631651325224962, '  
weight_decay': 0.00023864209874883328}. Best is  
trial 31 with value: 0.6671739363412281.  
471 Epoch 0, Loss: 1.5358, Val Acc: 0.6777, Val F1: 0.  
5815  
472 Epoch 10, Loss: 0.6055, Val Acc: 0.7076, Val F1: 0.  
6532  
473 Epoch 20, Loss: 0.5193, Val Acc: 0.6860, Val F1: 0.  
6517  
474 Epoch 30, Loss: 0.4521, Val Acc: 0.6412, Val F1: 0.  
6158  
475 Early stopping at epoch 34  
476 [I 2024-07-26 10:38:42,176] Trial 33 finished with  
value: 0.6128669068282984 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
010018235115052159, 'dropout': 0.6075246222110503, '  
weight_decay': 0.0004772902580286359}. Best is trial
```

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476 31 with value: 0.6671739363412281.  
477 Epoch 0, Loss: 1.5690, Val Acc: 0.4635, Val F1: 0.  
      5345  
478 Epoch 10, Loss: 0.6742, Val Acc: 0.6894, Val F1: 0.  
      6327  
479 Epoch 20, Loss: 0.5893, Val Acc: 0.6960, Val F1: 0.  
      6220  
480 Early stopping at epoch 21  
481 [I 2024-07-26 10:38:42,763] Trial 34 finished with  
      value: 0.6200952142246074 and parameters: {'  
      hidden_channels': 128, 'learning_rate': 0.  
      004946793043894932, 'dropout': 0.580818492837146, '  
      weight_decay': 0.0022714279652600246}. Best is trial  
      31 with value: 0.6671739363412281.  
482 Epoch 0, Loss: 1.6882, Val Acc: 0.2209, Val F1: 0.  
      2555  
483 Epoch 10, Loss: 0.6943, Val Acc: 0.7010, Val F1: 0.  
      5822  
484 Epoch 20, Loss: 0.6507, Val Acc: 0.6877, Val F1: 0.  
      6300  
485 Epoch 30, Loss: 0.6059, Val Acc: 0.7143, Val F1: 0.  
      6580  
486 Epoch 40, Loss: 0.5744, Val Acc: 0.7110, Val F1: 0.  
      6584  
487 Early stopping at epoch 48  
488 [I 2024-07-26 10:38:44,124] Trial 35 finished with  
      value: 0.6511812307415962 and parameters: {'  
      hidden_channels': 128, 'learning_rate': 0.  
      0025507756446414885, 'dropout': 0.6593610751116347  
      , 'weight_decay': 0.00019588160080576713}. Best is  
      trial 31 with value: 0.6671739363412281.  
489 Epoch 0, Loss: 1.2382, Val Acc: 0.5432, Val F1: 0.  
      5482  
490 Epoch 10, Loss: 0.7197, Val Acc: 0.7143, Val F1: 0.  
      6089  
491 Epoch 20, Loss: 0.6604, Val Acc: 0.7010, Val F1: 0.  
      6361  
492 Epoch 30, Loss: 0.6198, Val Acc: 0.7027, Val F1: 0.  
      6389  
493 Epoch 40, Loss: 0.5887, Val Acc: 0.7010, Val F1: 0.  
      6409
```

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494 Epoch 50, Loss: 0.5644, Val Acc: 0.7143, Val F1: 0.  
6636  
495 Epoch 60, Loss: 0.5430, Val Acc: 0.7043, Val F1: 0.  
6612  
496 Epoch 70, Loss: 0.5236, Val Acc: 0.7060, Val F1: 0.  
6636  
497 Epoch 80, Loss: 0.5056, Val Acc: 0.6993, Val F1: 0.  
6586  
498 Epoch 90, Loss: 0.4879, Val Acc: 0.7060, Val F1: 0.  
6712  
499 [I 2024-07-26 10:38:46,967] Trial 36 finished with  
value: 0.6650400284009206 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
0017320808320323866, 'dropout': 0.47057676389998115  
, 'weight_decay': 0.00011360066610409653}. Best is  
trial 31 with value: 0.6671739363412281.  
500 Epoch 0, Loss: 1.6785, Val Acc: 0.3671, Val F1: 0.  
4464  
501 Epoch 10, Loss: 0.7120, Val Acc: 0.7226, Val F1: 0.  
6376  
502 Epoch 20, Loss: 0.6508, Val Acc: 0.7043, Val F1: 0.  
6400  
503 Epoch 30, Loss: 0.6034, Val Acc: 0.7143, Val F1: 0.  
6580  
504 Epoch 40, Loss: 0.5724, Val Acc: 0.7093, Val F1: 0.  
6599  
505 Epoch 50, Loss: 0.5461, Val Acc: 0.7143, Val F1: 0.  
6699  
506 Epoch 60, Loss: 0.5232, Val Acc: 0.7093, Val F1: 0.  
6637  
507 Epoch 70, Loss: 0.5010, Val Acc: 0.7010, Val F1: 0.  
6575  
508 Early stopping at epoch 70  
509 [I 2024-07-26 10:38:49,421] Trial 37 finished with  
value: 0.6574515669265826 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
0021102524226775314, 'dropout': 0.425595998758253,  
'weight_decay': 0.000372689621883343}. Best is trial  
31 with value: 0.6671739363412281.  
510 Epoch 0, Loss: 1.6218, Val Acc: 0.2359, Val F1: 0.  
2474
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511 Epoch 10, Loss: 0.9602, Val Acc: 0.5947, Val F1: 0.  
5654  
512 Epoch 20, Loss: 0.7554, Val Acc: 0.7176, Val F1: 0.  
6511  
513 Epoch 30, Loss: 0.6817, Val Acc: 0.7276, Val F1: 0.  
6679  
514 Epoch 40, Loss: 0.6454, Val Acc: 0.7143, Val F1: 0.  
6599  
515 Epoch 50, Loss: 0.6212, Val Acc: 0.7159, Val F1: 0.  
6578  
516 Early stopping at epoch 51  
517 [I 2024-07-26 10:38:50,562] Trial 38 finished with  
value: 0.6604863952115537 and parameters: {'  
hidden_channels': 32, 'learning_rate': 0.  
0026807693055746324, 'dropout': 0.5025629943139558  
, 'weight_decay': 0.00026338069820039633}. Best is  
trial 31 with value: 0.6671739363412281.  
518 Epoch 0, Loss: 1.2073, Val Acc: 0.6429, Val F1: 0.  
5584  
519 Epoch 10, Loss: 0.7269, Val Acc: 0.7060, Val F1: 0.  
5906  
520 Epoch 20, Loss: 0.6558, Val Acc: 0.7110, Val F1: 0.  
6395  
521 Epoch 30, Loss: 0.6245, Val Acc: 0.6960, Val F1: 0.  
6326  
522 Epoch 40, Loss: 0.5922, Val Acc: 0.7027, Val F1: 0.  
6452  
523 Epoch 50, Loss: 0.5683, Val Acc: 0.7060, Val F1: 0.  
6505  
524 Epoch 60, Loss: 0.5457, Val Acc: 0.7010, Val F1: 0.  
6483  
525 Epoch 70, Loss: 0.5249, Val Acc: 0.7043, Val F1: 0.  
6549  
526 Epoch 80, Loss: 0.5049, Val Acc: 0.7043, Val F1: 0.  
6562  
527 Epoch 90, Loss: 0.4855, Val Acc: 0.7060, Val F1: 0.  
6636  
528 [I 2024-07-26 10:38:53,157] Trial 39 finished with  
value: 0.664867686575913 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
0015965508081532214, 'dropout': 0.6311810590903445
```

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528 , 'weight_decay': 0.0001515651121243462}. Best is
trial 31 with value: 0.6671739363412281.
529 Epoch 0, Loss: 1.0649, Val Acc: 0.6179, Val F1: 0.
6181
530 Epoch 10, Loss: 0.5788, Val Acc: 0.6827, Val F1: 0.
6471
531 Epoch 20, Loss: 0.4378, Val Acc: 0.6761, Val F1: 0.
6388
532 Epoch 30, Loss: 0.2964, Val Acc: 0.6030, Val F1: 0.
5896
533 Early stopping at epoch 32
534 [I 2024-07-26 10:38:54,021] Trial 40 finished with
value: 0.6029110979503867 and parameters: {'hidden_channels': 128, 'learning_rate': 0.
06662588529246437, 'dropout': 0.6656539914418292, 'weight_decay': 0.0006208872328448717}. Best is trial
31 with value: 0.6671739363412281.
535 Epoch 0, Loss: 1.3342, Val Acc: 0.6163, Val F1: 0.
5969
536 Epoch 10, Loss: 0.7166, Val Acc: 0.7243, Val F1: 0.
6298
537 Epoch 20, Loss: 0.6580, Val Acc: 0.6944, Val F1: 0.
6298
538 Epoch 30, Loss: 0.6164, Val Acc: 0.6894, Val F1: 0.
6296
539 Early stopping at epoch 33
540 [I 2024-07-26 10:38:54,937] Trial 41 finished with
value: 0.6326190986784928 and parameters: {'hidden_channels': 128, 'learning_rate': 0.
001769758564447935, 'dropout': 0.6294200275783481, 'weight_decay': 0.00016258659111851703}. Best is
trial 31 with value: 0.6671739363412281.
541 Epoch 0, Loss: 1.3927, Val Acc: 0.5581, Val F1: 0.
5887
542 Epoch 10, Loss: 0.7651, Val Acc: 0.7243, Val F1: 0.
6387
543 Epoch 20, Loss: 0.6792, Val Acc: 0.7193, Val F1: 0.
6571
544 Early stopping at epoch 23
545 [I 2024-07-26 10:38:55,585] Trial 42 finished with
value: 0.6499407730765551 and parameters: {'
```

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545 'hidden_channels': 128, 'learning_rate': 0.  
0013952715714163348, 'dropout': 0.5911344169222086  
, 'weight_decay': 0.0003579110194249475}. Best is  
trial 31 with value: 0.6671739363412281.  
546 Epoch 0, Loss: 1.1605, Val Acc: 0.5814, Val F1: 0.  
5960  
547 Epoch 10, Loss: 0.6805, Val Acc: 0.7209, Val F1: 0.  
6229  
548 Epoch 20, Loss: 0.6286, Val Acc: 0.7010, Val F1: 0.  
6537  
549 Epoch 30, Loss: 0.5778, Val Acc: 0.7143, Val F1: 0.  
6435  
550 Epoch 40, Loss: 0.5455, Val Acc: 0.7076, Val F1: 0.  
6587  
551 Epoch 50, Loss: 0.5181, Val Acc: 0.7159, Val F1: 0.  
6769  
552 Epoch 60, Loss: 0.4915, Val Acc: 0.7060, Val F1: 0.  
6681  
553 Epoch 70, Loss: 0.4648, Val Acc: 0.7010, Val F1: 0.  
6663  
554 Early stopping at epoch 70  
555 [I 2024-07-26 10:38:57,455] Trial 43 finished with  
value: 0.6663408664310828 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
002911801099010492, 'dropout': 0.5416228783692518,  
'weight_decay': 0.00014116893700889083}. Best is  
trial 31 with value: 0.6671739363412281.  
556 Epoch 0, Loss: 1.3423, Val Acc: 0.6777, Val F1: 0.  
6056  
557 Epoch 10, Loss: 0.5788, Val Acc: 0.6844, Val F1: 0.  
6027  
558 Epoch 20, Loss: 0.5080, Val Acc: 0.7010, Val F1: 0.  
6610  
559 Epoch 30, Loss: 0.4393, Val Acc: 0.6711, Val F1: 0.  
6395  
560 Early stopping at epoch 35  
561 [I 2024-07-26 10:38:58,389] Trial 44 finished with  
value: 0.6372661209599695 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
01145562307074424, 'dropout': 0.5574163266014222,  
'weight_decay': 7.691156995033336e-05}. Best is trial
```

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561 31 with value: 0.6671739363412281.  
562 Epoch 0, Loss: 1.4636, Val Acc: 0.5100, Val F1: 0.  
5368  
563 Epoch 10, Loss: 0.6844, Val Acc: 0.7193, Val F1: 0.  
6195  
564 Epoch 20, Loss: 0.6320, Val Acc: 0.6910, Val F1: 0.  
6424  
565 Early stopping at epoch 22  
566 [I 2024-07-26 10:38:59,089] Trial 45 finished with  
value: 0.6472913756810202 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
0027804963988411497, 'dropout': 0.6447029426868021  
, 'weight_decay': 0.000235560238581986}. Best is  
trial 31 with value: 0.6671739363412281.  
567 Epoch 0, Loss: 1.5556, Val Acc: 0.3239, Val F1: 0.  
4113  
568 Epoch 10, Loss: 0.6758, Val Acc: 0.7076, Val F1: 0.  
6076  
569 Epoch 20, Loss: 0.6295, Val Acc: 0.6910, Val F1: 0.  
6369  
570 Epoch 30, Loss: 0.5791, Val Acc: 0.6960, Val F1: 0.  
6220  
571 Epoch 40, Loss: 0.5440, Val Acc: 0.7110, Val F1: 0.  
6637  
572 Epoch 50, Loss: 0.5156, Val Acc: 0.7093, Val F1: 0.  
6673  
573 Epoch 60, Loss: 0.4872, Val Acc: 0.7143, Val F1: 0.  
6723  
574 Epoch 70, Loss: 0.4586, Val Acc: 0.6977, Val F1: 0.  
6595  
575 Early stopping at epoch 79  
576 [I 2024-07-26 10:39:01,164] Trial 46 finished with  
value: 0.6358641028385367 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
003233522876088658, 'dropout': 0.5806433018692745, '  
weight_decay': 9.428171284977074e-05}. Best is trial  
31 with value: 0.6671739363412281.  
577 Epoch 0, Loss: 1.5919, Val Acc: 0.4535, Val F1: 0.  
5004  
578 Epoch 10, Loss: 0.6526, Val Acc: 0.6894, Val F1: 0.  
6583
```

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579 Epoch 20, Loss: 0.5643, Val Acc: 0.6927, Val F1: 0.  
6335  
580 Epoch 30, Loss: 0.5138, Val Acc: 0.7143, Val F1: 0.  
6756  
581 Epoch 40, Loss: 0.4647, Val Acc: 0.7076, Val F1: 0.  
6683  
582 Epoch 50, Loss: 0.4131, Val Acc: 0.6711, Val F1: 0.  
6373  
583 Early stopping at epoch 51  
584 [I 2024-07-26 10:39:02,634] Trial 47 finished with  
value: 0.6297890284376165 and parameters: {'  
hidden_channels': 128, 'learning_rate': 0.  
007247140781104906, 'dropout': 0.5290962790539581, '  
weight_decay': 0.00030280089796205995}. Best is  
trial 31 with value: 0.6671739363412281.  
585 Epoch 0, Loss: 1.6751, Val Acc: 0.4203, Val F1: 0.  
4920  
586 Epoch 10, Loss: 0.9708, Val Acc: 0.6860, Val F1: 0.  
5960  
587 Epoch 20, Loss: 0.8025, Val Acc: 0.6927, Val F1: 0.  
5844  
588 Epoch 30, Loss: 0.7169, Val Acc: 0.6827, Val F1: 0.  
5896  
589 Early stopping at epoch 30  
590 [I 2024-07-26 10:39:03,271] Trial 48 finished with  
value: 0.5896191614356748 and parameters: {'  
hidden_channels': 32, 'learning_rate': 0.  
002083074126238984, 'dropout': 0.5254644953046153, '  
weight_decay': 5.531941008826618e-05}. Best is trial  
31 with value: 0.6671739363412281.  
591 Epoch 0, Loss: 1.3797, Val Acc: 0.4850, Val F1: 0.  
4962  
592 Epoch 10, Loss: 0.6780, Val Acc: 0.7126, Val F1: 0.  
6369  
593 Epoch 20, Loss: 0.6064, Val Acc: 0.7193, Val F1: 0.  
6587  
594 Epoch 30, Loss: 0.5682, Val Acc: 0.6977, Val F1: 0.  
6486  
595 Epoch 40, Loss: 0.5332, Val Acc: 0.7060, Val F1: 0.  
6624  
596 Epoch 50, Loss: 0.5011, Val Acc: 0.7060, Val F1: 0.
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596 6692
597 Epoch 60, Loss: 0.4692, Val Acc: 0.6960, Val F1: 0.
      6645
598 Early stopping at epoch 64
599 Best parameters for GCN: {'hidden_channels': 128, 'learning_rate': 0.002593138949504669, 'dropout': 0.5954609932811485, 'weight_decay': 0.00020890497134648197}
600 [I 2024-07-26 10:39:04,621] Trial 49 finished with value: 0.6670419791507 and parameters: {'hidden_channels': 64, 'learning_rate': 0.005633276989882929, 'dropout': 0.6898222094508761, 'weight_decay': 0.0001751576989154183}. Best is trial 31 with value: 0.6671739363412281.
601
602 Process finished with exit code 0
603
```