

```
1 ssh://root@206.189.20.152:22/root/
  anaconda3/envs/decagon/bin/python3.6 -u
    /root/.pycharm_helpers/pydev/
  pydevconsole.py 0 0
2
3 import sys; print('Python %s on %s' % (
  sys.version, sys.platform))
4 sys.path.extend(['/tmp/
  pycharm_project_904', '/tmp/
  pycharm_project_904'])
5
6 PyDev console: starting.
7
8 Python 3.6.8 |Anaconda, Inc.| (default,
  Dec 30 2018, 01:22:34)
9 [GCC 7.3.0] on linux
10 >>> runfile('/tmp/pycharm_project_904/
  main.py', wdir='/tmp/pycharm_project_904
  ')
11 Edge types: 10
12 Defining placeholders
13 Create minibatch iterator
14 Minibatch edge type: (0, 0, 0)
15 Constructing test edges= 0000/0657
16 Constructing val edges= 0000/0657
17 Train edges= 11834
18 Val edges= 0657
19 Test edges= 0657
20 Minibatch edge type: (0, 0, 1)
21 Constructing test edges= 0000/0657
22 Constructing val edges= 0000/0657
23 Train edges= 11834
24 Val edges= 0657
25 Test edges= 0657
26 Minibatch edge type: (0, 1, 0)
```

```
27 Constructing test edges= 0000/0664
28 Constructing val edges= 0000/0664
29 Train edges= 11958
30 Val edges= 0664
31 Test edges= 0664
32 Minibatch edge type: (1, 0, 0)
33 Constructing test edges= 0000/0664
34 Constructing val edges= 0000/0664
35 Train edges= 11958
36 Val edges= 0664
37 Test edges= 0664
38 Minibatch edge type: (1, 1, 0)
39 Constructing test edges= 0000/0868
40 Constructing test edges= 0000/0868
41 Constructing val edges= 0000/0868
42 Train edges= 15642
43 Val edges= 0868
44 Test edges= 0868
45 Minibatch edge type: (1, 1, 1)
46 Constructing test edges= 0000/0378
47 Constructing val edges= 0000/0378
48 Train edges= 6810
49 Val edges= 0378
50 Test edges= 0378
51 Minibatch edge type: (1, 1, 2)
52 Constructing test edges= 0000/0136
53 Constructing val edges= 0000/0136
54 Train edges= 2466
55 Val edges= 0136
56 Test edges= 0136
57 Minibatch edge type: (1, 1, 3)
58 Constructing test edges= 0000/0868
59 Constructing val edges= 0000/0868
60 Train edges= 15642
61 Val edges= 0868
```

```
62 Test edges= 0868
63 Minibatch edge type: (1, 1, 4)
64 Constructing test edges= 0000/0378
65 Constructing val edges= 0000/0378
66 Train edges= 6810
67 Val edges= 0378
68 Test edges= 0378
69 Minibatch edge type: (1, 1, 5)
70 Constructing test edges= 0000/0136
71 Constructing val edges= 0000/0136
72 Train edges= 2466
73 Val edges= 0136
74 Test edges= 0136
75 Create model
76 WARNING:tensorflow:From /tmp/
    pycharm_project_904/decagon深深/layer.
    py:93: calling l2_normalize (from
    tensorflow.python.ops.nn_impl) with dim
    is deprecated and will be removed in a
    future version.
77 Instructions for updating:
78 dim is deprecated, use axis instead
79 Create optimizer
80 WARNING:tensorflow:tf.op_scope(values,
    name, default_name) is deprecated, use
    tf.name_scope(name, default_name, values
    )
81 WARNING:tensorflow:tf.op_scope(values,
    name, default_name) is deprecated, use
    tf.name_scope(name, default_name, values
    )
82 /root/anaconda3/envs/decagon/lib/python3
    .6/site-packages/tensorflow/python/ops/
    gradients_impl.py:100: UserWarning:
    Converting sparse IndexedSlices to a
```

```
82 dense Tensor of unknown shape. This may
    consume a large amount of memory.
83 "Converting sparse IndexedSlices to a
    dense Tensor of unknown shape. "
84 Initialize session
85 2019-03-22 10:18:00.166172: I
    tensorflow/core/platform/
    cpu_feature_guard.cc:140] Your CPU
    supports instructions that this
    TensorFlow binary was not compiled to
    use: AVX2 AVX512F FMA
86 Train model
87 Epoch: 0001 Iter: 0001 Edge: 0000
    train_loss= 64.32995 val_roc= 0.48130
    val_auprc= 0.49000 val_apk= 0.28732
    time= 1.18172
88 Epoch: 0001 Iter: 0151 Edge: 0003
    train_loss= 48.29780 val_roc= 0.52848
    val_auprc= 0.52365 val_apk= 0.30309
    time= 0.23695
89 Epoch: 0001 Iter: 0301 Edge: 0000
    train_loss= 42.02776 val_roc= 0.54584
    val_auprc= 0.53945 val_apk= 0.30578
    time= 0.12799
90 Epoch: 0001 Iter: 0451 Edge: 0003
    train_loss= 34.56348 val_roc= 0.60298
    val_auprc= 0.59717 val_apk= 0.55375
    time= 0.22483
91 Epoch: 0002 Iter: 0001 Edge: 0000
    train_loss= 37.20164 val_roc= 0.58298
    val_auprc= 0.56354 val_apk= 0.33226
    time= 0.12831
92 Epoch: 0002 Iter: 0151 Edge: 0003
    train_loss= 29.24668 val_roc= 0.61295
    val_auprc= 0.60004 val_apk= 0.50690
```

```
92 time= 0.22052
93 Epoch: 0002 Iter: 0301 Edge: 0000
    train_loss= 35.50757 val_roc= 0.60484
    val_auprc= 0.57912 val_apk= 0.43064
    time= 0.13180
94 Epoch: 0002 Iter: 0451 Edge: 0003
    train_loss= 32.75289 val_roc= 0.60982
    val_auprc= 0.61147 val_apk= 0.58116
    time= 0.23695
95 Epoch: 0003 Iter: 0001 Edge: 0000
    train_loss= 30.06441 val_roc= 0.62878
    val_auprc= 0.60604 val_apk= 0.50144
    time= 0.11966
96 Epoch: 0003 Iter: 0151 Edge: 0003
    train_loss= 29.22716 val_roc= 0.63164
    val_auprc= 0.62402 val_apk= 0.56541
    time= 0.22567
97 Epoch: 0003 Iter: 0301 Edge: 0000
    train_loss= 31.87806 val_roc= 0.65281
    val_auprc= 0.62774 val_apk= 0.54715
    time= 0.13040
98 Epoch: 0003 Iter: 0451 Edge: 0003
    train_loss= 28.80405 val_roc= 0.64591
    val_auprc= 0.63831 val_apk= 0.58002
    time= 0.21961
99 Epoch: 0004 Iter: 0001 Edge: 0000
    train_loss= 30.31399 val_roc= 0.65479
    val_auprc= 0.62061 val_apk= 0.44183
    time= 0.12180
100 Epoch: 0004 Iter: 0151 Edge: 0003
    train_loss= 31.75086 val_roc= 0.65816
    val_auprc= 0.65119 val_apk= 0.62607
    time= 0.21994
101 Epoch: 0004 Iter: 0301 Edge: 0000
    train_loss= 27.37544 val_roc= 0.65096
```

```
101 val_auprc= 0.62609 val_apk= 0.53596
     time= 0.12289
102 Epoch: 0004 Iter: 0451 Edge: 0003
     train_loss= 24.77939 val_roc= 0.66235
     val_auprc= 0.65221 val_apk= 0.59106
     time= 0.22300
103 Epoch: 0005 Iter: 0001 Edge: 0000
     train_loss= 28.37494 val_roc= 0.66653
     val_auprc= 0.63276 val_apk= 0.48998
     time= 0.12298
104 Epoch: 0005 Iter: 0151 Edge: 0003
     train_loss= 25.61831 val_roc= 0.67346
     val_auprc= 0.65661 val_apk= 0.58352
     time= 0.21845
105 Epoch: 0005 Iter: 0301 Edge: 0000
     train_loss= 24.76484 val_roc= 0.66661
     val_auprc= 0.63264 val_apk= 0.48308
     time= 0.12149
106 Epoch: 0005 Iter: 0451 Edge: 0003
     train_loss= 23.18157 val_roc= 0.67594
     val_auprc= 0.66442 val_apk= 0.64051
     time= 0.22138
107 Epoch: 0006 Iter: 0001 Edge: 0000
     train_loss= 26.87997 val_roc= 0.69081
     val_auprc= 0.65919 val_apk= 0.57116
     time= 0.13248
108 Epoch: 0006 Iter: 0151 Edge: 0003
     train_loss= 24.85127 val_roc= 0.69447
     val_auprc= 0.67483 val_apk= 0.63349
     time= 0.22654
109 Epoch: 0006 Iter: 0301 Edge: 0000
     train_loss= 23.82792 val_roc= 0.69203
     val_auprc= 0.66563 val_apk= 0.61989
     time= 0.12050
110 Epoch: 0006 Iter: 0451 Edge: 0003
```

```
110 train_loss= 22.84997 val_roc= 0.69104
    val_auprc= 0.68013 val_apk= 0.67888
    time= 0.21756
111 Epoch: 0007 Iter: 0001 Edge: 0000
    train_loss= 25.72732 val_roc= 0.70014
    val_auprc= 0.66245 val_apk= 0.56422
    time= 0.12232
112 Epoch: 0007 Iter: 0151 Edge: 0003
    train_loss= 22.22663 val_roc= 0.69934
    val_auprc= 0.68336 val_apk= 0.72533
    time= 0.22114
113 Epoch: 0007 Iter: 0301 Edge: 0000
    train_loss= 24.14945 val_roc= 0.70550
    val_auprc= 0.67041 val_apk= 0.55424
    time= 0.12386
114 Epoch: 0007 Iter: 0451 Edge: 0003
    train_loss= 25.68709 val_roc= 0.70564
    val_auprc= 0.69805 val_apk= 0.77198
    time= 0.21944
115 Epoch: 0008 Iter: 0001 Edge: 0000
    train_loss= 23.95962 val_roc= 0.70409
    val_auprc= 0.67139 val_apk= 0.62728
    time= 0.12046
116 Epoch: 0008 Iter: 0151 Edge: 0003
    train_loss= 24.52692 val_roc= 0.70465
    val_auprc= 0.67898 val_apk= 0.69601
    time= 0.22229
117 Epoch: 0008 Iter: 0301 Edge: 0000
    train_loss= 20.01065 val_roc= 0.69915
    val_auprc= 0.66980 val_apk= 0.62626
    time= 0.12283
118 Epoch: 0008 Iter: 0451 Edge: 0003
    train_loss= 22.03597 val_roc= 0.71114
    val_auprc= 0.69831 val_apk= 0.66373
    time= 0.22140
```

```
119 Epoch: 0009 Iter: 0001 Edge: 0000
    train_loss= 21.23435 val_roc= 0.70760
    val_auprc= 0.67313 val_apk= 0.58726
    time= 0.12886
120 Epoch: 0009 Iter: 0151 Edge: 0003
    train_loss= 22.61319 val_roc= 0.72199
    val_auprc= 0.69873 val_apk= 0.66113
    time= 0.24801
121 Epoch: 0009 Iter: 0301 Edge: 0000
    train_loss= 26.22399 val_roc= 0.70552
    val_auprc= 0.67723 val_apk= 0.66863
    time= 0.12429
122 Epoch: 0009 Iter: 0451 Edge: 0003
    train_loss= 19.91114 val_roc= 0.71260
    val_auprc= 0.69367 val_apk= 0.68687
    time= 0.22373
123 Epoch: 0010 Iter: 0001 Edge: 0000
    train_loss= 24.56591 val_roc= 0.70972
    val_auprc= 0.68597 val_apk= 0.61025
    time= 0.12513
124 Epoch: 0010 Iter: 0151 Edge: 0003
    train_loss= 20.21018 val_roc= 0.70623
    val_auprc= 0.68985 val_apk= 0.71224
    time= 0.22261
125 Epoch: 0010 Iter: 0301 Edge: 0000
    train_loss= 21.78814 val_roc= 0.72507
    val_auprc= 0.68909 val_apk= 0.67277
    time= 0.12158
126 Epoch: 0010 Iter: 0451 Edge: 0003
    train_loss= 21.48920 val_roc= 0.71949
    val_auprc= 0.70044 val_apk= 0.71391
    time= 0.21747
127 Epoch: 0011 Iter: 0001 Edge: 0000
    train_loss= 19.34212 val_roc= 0.72074
    val_auprc= 0.68872 val_apk= 0.66026
```

```
127 time= 0.12357
128 Epoch: 0011 Iter: 0151 Edge: 0003
    train_loss= 20.62632 val_roc= 0.72553
    val_auprc= 0.70174 val_apk= 0.71992
    time= 0.21952
129 Epoch: 0011 Iter: 0301 Edge: 0000
    train_loss= 20.98510 val_roc= 0.71240
    val_auprc= 0.68126 val_apk= 0.59814
    time= 0.12433
130 Epoch: 0011 Iter: 0451 Edge: 0003
    train_loss= 18.15252 val_roc= 0.70955
    val_auprc= 0.69290 val_apk= 0.64480
    time= 0.22407
131 Epoch: 0012 Iter: 0001 Edge: 0000
    train_loss= 21.86792 val_roc= 0.72135
    val_auprc= 0.68901 val_apk= 0.67672
    time= 0.12431
132 Epoch: 0012 Iter: 0151 Edge: 0003
    train_loss= 20.22406 val_roc= 0.72452
    val_auprc= 0.70790 val_apk= 0.74235
    time= 0.22037
133 Epoch: 0012 Iter: 0301 Edge: 0000
    train_loss= 20.84523 val_roc= 0.72382
    val_auprc= 0.69801 val_apk= 0.76021
    time= 0.12197
134 Epoch: 0012 Iter: 0451 Edge: 0003
    train_loss= 20.55237 val_roc= 0.73224
    val_auprc= 0.70854 val_apk= 0.71408
    time= 0.22131
135 Epoch: 0013 Iter: 0001 Edge: 0000
    train_loss= 21.54555 val_roc= 0.72657
    val_auprc= 0.69592 val_apk= 0.73891
    time= 0.12244
136 Epoch: 0013 Iter: 0151 Edge: 0003
    train_loss= 19.55487 val_roc= 0.73028
```

```
136 val_auprc= 0.70923 val_apk= 0.66099
    time= 0.22334
137 Epoch: 0013 Iter: 0301 Edge: 0000
    train_loss= 22.45126 val_roc= 0.72462
    val_auprc= 0.69902 val_apk= 0.75188
    time= 0.12369
138 Epoch: 0013 Iter: 0451 Edge: 0003
    train_loss= 18.22643 val_roc= 0.71581
    val_auprc= 0.69563 val_apk= 0.73419
    time= 0.23239
139 Epoch: 0014 Iter: 0001 Edge: 0000
    train_loss= 19.69478 val_roc= 0.73102
    val_auprc= 0.70652 val_apk= 0.77481
    time= 0.13741
140 Epoch: 0014 Iter: 0151 Edge: 0003
    train_loss= 21.67591 val_roc= 0.72826
    val_auprc= 0.71140 val_apk= 0.75227
    time= 0.23723
141 Epoch: 0014 Iter: 0301 Edge: 0000
    train_loss= 19.11533 val_roc= 0.72916
    val_auprc= 0.69971 val_apk= 0.68416
    time= 0.13238
142 Epoch: 0014 Iter: 0451 Edge: 0003
    train_loss= 19.31122 val_roc= 0.72581
    val_auprc= 0.70872 val_apk= 0.81506
    time= 0.22336
143 Epoch: 0015 Iter: 0001 Edge: 0000
    train_loss= 20.23600 val_roc= 0.73192
    val_auprc= 0.69821 val_apk= 0.67896
    time= 0.13416
144 Epoch: 0015 Iter: 0151 Edge: 0003
    train_loss= 15.08457 val_roc= 0.73094
    val_auprc= 0.71710 val_apk= 0.85005
    time= 0.22397
145 Epoch: 0015 Iter: 0301 Edge: 0000
```

```
145 train_loss= 21.15770 val_roc= 0.73587
    val_auprc= 0.69806 val_apk= 0.65901
    time= 0.12496
146 Epoch: 0015 Iter: 0451 Edge: 0003
    train_loss= 17.66884 val_roc= 0.72647
    val_auprc= 0.71159 val_apk= 0.82586
    time= 0.24418
147 Epoch: 0016 Iter: 0001 Edge: 0000
    train_loss= 22.32899 val_roc= 0.73669
    val_auprc= 0.69992 val_apk= 0.70477
    time= 0.12321
148 Epoch: 0016 Iter: 0151 Edge: 0003
    train_loss= 19.66230 val_roc= 0.73718
    val_auprc= 0.71881 val_apk= 0.74280
    time= 0.22524
149 Epoch: 0016 Iter: 0301 Edge: 0000
    train_loss= 19.73067 val_roc= 0.73202
    val_auprc= 0.69731 val_apk= 0.72475
    time= 0.12207
150 Epoch: 0016 Iter: 0451 Edge: 0003
    train_loss= 16.82333 val_roc= 0.73079
    val_auprc= 0.70844 val_apk= 0.77252
    time= 0.23717
151 Epoch: 0017 Iter: 0001 Edge: 0000
    train_loss= 20.75897 val_roc= 0.73477
    val_auprc= 0.70026 val_apk= 0.77045
    time= 0.12346
152 Epoch: 0017 Iter: 0151 Edge: 0003
    train_loss= 18.97147 val_roc= 0.73687
    val_auprc= 0.72232 val_apk= 0.78609
    time= 0.21728
153 Epoch: 0017 Iter: 0301 Edge: 0000
    train_loss= 20.43417 val_roc= 0.74359
    val_auprc= 0.71895 val_apk= 0.82955
    time= 0.12836
```

```
154 Epoch: 0017 Iter: 0451 Edge: 0003
    train_loss= 17.30733 val_roc= 0.73564
    val_auprc= 0.71394 val_apk= 0.77139
    time= 0.23471
155 Epoch: 0018 Iter: 0001 Edge: 0000
    train_loss= 18.95872 val_roc= 0.74077
    val_auprc= 0.70665 val_apk= 0.77469
    time= 0.12197
156 Epoch: 0018 Iter: 0151 Edge: 0003
    train_loss= 15.67046 val_roc= 0.73778
    val_auprc= 0.71938 val_apk= 0.77543
    time= 0.22075
157 Epoch: 0018 Iter: 0301 Edge: 0000
    train_loss= 18.96581 val_roc= 0.74444
    val_auprc= 0.71194 val_apk= 0.78698
    time= 0.13449
158 Epoch: 0018 Iter: 0451 Edge: 0003
    train_loss= 17.10439 val_roc= 0.74350
    val_auprc= 0.71560 val_apk= 0.75639
    time= 0.22050
159 Epoch: 0019 Iter: 0001 Edge: 0000
    train_loss= 21.38833 val_roc= 0.74357
    val_auprc= 0.70555 val_apk= 0.66682
    time= 0.12568
160 Epoch: 0019 Iter: 0151 Edge: 0003
    train_loss= 20.50461 val_roc= 0.74285
    val_auprc= 0.71435 val_apk= 0.71334
    time= 0.21891
161 Epoch: 0019 Iter: 0301 Edge: 0000
    train_loss= 20.14600 val_roc= 0.74506
    val_auprc= 0.71301 val_apk= 0.72526
    time= 0.12292
162 Epoch: 0019 Iter: 0451 Edge: 0003
    train_loss= 16.73146 val_roc= 0.74698
    val_auprc= 0.72659 val_apk= 0.85827
```

```
162 time= 0.22630
163 Epoch: 0020 Iter: 0001 Edge: 0000
    train_loss= 18.93536 val_roc= 0.74330
    val_auprc= 0.71423 val_apk= 0.77135
    time= 0.12316
164 Epoch: 0020 Iter: 0151 Edge: 0003
    train_loss= 18.67901 val_roc= 0.75014
    val_auprc= 0.72903 val_apk= 0.79155
    time= 0.22108
165 Epoch: 0020 Iter: 0301 Edge: 0000
    train_loss= 21.65210 val_roc= 0.73927
    val_auprc= 0.69943 val_apk= 0.66072
    time= 0.12404
166 Epoch: 0020 Iter: 0451 Edge: 0003
    train_loss= 17.65717 val_roc= 0.75299
    val_auprc= 0.72990 val_apk= 0.82821
    time= 0.23279
167 Epoch: 0021 Iter: 0001 Edge: 0000
    train_loss= 17.95407 val_roc= 0.74991
    val_auprc= 0.71145 val_apk= 0.72796
    time= 0.12370
168 Epoch: 0021 Iter: 0151 Edge: 0003
    train_loss= 16.05263 val_roc= 0.75056
    val_auprc= 0.73378 val_apk= 0.87820
    time= 0.22226
169 Epoch: 0021 Iter: 0301 Edge: 0000
    train_loss= 18.20276 val_roc= 0.74182
    val_auprc= 0.70771 val_apk= 0.69561
    time= 0.14457
170 Epoch: 0021 Iter: 0451 Edge: 0003
    train_loss= 17.13076 val_roc= 0.75357
    val_auprc= 0.72821 val_apk= 0.73859
    time= 0.23724
171 Epoch: 0022 Iter: 0001 Edge: 0000
    train_loss= 17.45311 val_roc= 0.74899
```

```
171 val_auprc= 0.71440 val_apk= 0.67557
    time= 0.12968
172 Epoch: 0022 Iter: 0151 Edge: 0003
    train_loss= 19.16883 val_roc= 0.75419
    val_auprc= 0.73895 val_apk= 0.82911
    time= 0.21906
173 Epoch: 0022 Iter: 0301 Edge: 0000
    train_loss= 18.79305 val_roc= 0.74805
    val_auprc= 0.71309 val_apk= 0.71759
    time= 0.12235
174 Epoch: 0022 Iter: 0451 Edge: 0003
    train_loss= 20.57680 val_roc= 0.75345
    val_auprc= 0.73376 val_apk= 0.79378
    time= 0.22568
175 Epoch: 0023 Iter: 0001 Edge: 0000
    train_loss= 18.42475 val_roc= 0.75287
    val_auprc= 0.71702 val_apk= 0.68799
    time= 0.13223
176 Epoch: 0023 Iter: 0151 Edge: 0003
    train_loss= 17.21917 val_roc= 0.75501
    val_auprc= 0.73996 val_apk= 0.78457
    time= 0.22696
177 Epoch: 0023 Iter: 0301 Edge: 0000
    train_loss= 20.57359 val_roc= 0.76047
    val_auprc= 0.72853 val_apk= 0.67631
    time= 0.12397
178 Epoch: 0023 Iter: 0451 Edge: 0003
    train_loss= 18.32564 val_roc= 0.76142
    val_auprc= 0.74698 val_apk= 0.87731
    time= 0.23928
179 Epoch: 0024 Iter: 0001 Edge: 0000
    train_loss= 19.02138 val_roc= 0.75440
    val_auprc= 0.72743 val_apk= 0.71662
    time= 0.13833
180 Epoch: 0024 Iter: 0151 Edge: 0003
```

```
180 train_loss= 16.83247 val_roc= 0.74987
    val_auprc= 0.72956 val_apk= 0.82848
    time= 0.25209
181 Epoch: 0024 Iter: 0301 Edge: 0000
    train_loss= 19.81212 val_roc= 0.75050
    val_auprc= 0.72102 val_apk= 0.78466
    time= 0.12571
182 Epoch: 0024 Iter: 0451 Edge: 0003
    train_loss= 16.22250 val_roc= 0.75527
    val_auprc= 0.73721 val_apk= 0.81196
    time= 0.25675
183 Epoch: 0025 Iter: 0001 Edge: 0000
    train_loss= 18.18472 val_roc= 0.75185
    val_auprc= 0.72090 val_apk= 0.71826
    time= 0.13281
184 Epoch: 0025 Iter: 0151 Edge: 0003
    train_loss= 17.94744 val_roc= 0.75201
    val_auprc= 0.72586 val_apk= 0.70017
    time= 0.22907
185 Epoch: 0025 Iter: 0301 Edge: 0000
    train_loss= 18.53283 val_roc= 0.75023
    val_auprc= 0.72535 val_apk= 0.74631
    time= 0.12224
186 Epoch: 0025 Iter: 0451 Edge: 0003
    train_loss= 16.16425 val_roc= 0.75799
    val_auprc= 0.73390 val_apk= 0.73562
    time= 0.22251
187 Epoch: 0026 Iter: 0001 Edge: 0000
    train_loss= 17.02361 val_roc= 0.75283
    val_auprc= 0.71681 val_apk= 0.66883
    time= 0.12361
188 Epoch: 0026 Iter: 0151 Edge: 0003
    train_loss= 16.51657 val_roc= 0.75691
    val_auprc= 0.73881 val_apk= 0.79872
    time= 0.23718
```

```
189 Epoch: 0026 Iter: 0301 Edge: 0000
    train_loss= 20.47817 val_roc= 0.75055
    val_auprc= 0.72042 val_apk= 0.71350
    time= 0.12280
190 Epoch: 0026 Iter: 0451 Edge: 0003
    train_loss= 14.97702 val_roc= 0.75650
    val_auprc= 0.74446 val_apk= 0.82490
    time= 0.22646
191 Epoch: 0027 Iter: 0001 Edge: 0000
    train_loss= 17.31198 val_roc= 0.75193
    val_auprc= 0.72087 val_apk= 0.64995
    time= 0.12634
192 Epoch: 0027 Iter: 0151 Edge: 0003
    train_loss= 17.50457 val_roc= 0.76579
    val_auprc= 0.75071 val_apk= 0.87814
    time= 0.22301
193 Epoch: 0027 Iter: 0301 Edge: 0000
    train_loss= 15.78346 val_roc= 0.75634
    val_auprc= 0.73165 val_apk= 0.78891
    time= 0.12683
194 Epoch: 0027 Iter: 0451 Edge: 0003
    train_loss= 17.17855 val_roc= 0.75961
    val_auprc= 0.74311 val_apk= 0.87657
    time= 0.25109
195 Epoch: 0028 Iter: 0001 Edge: 0000
    train_loss= 16.63789 val_roc= 0.75323
    val_auprc= 0.73157 val_apk= 0.72983
    time= 0.12343
196 Epoch: 0028 Iter: 0151 Edge: 0003
    train_loss= 14.57963 val_roc= 0.76014
    val_auprc= 0.74030 val_apk= 0.89709
    time= 0.21965
197 Epoch: 0028 Iter: 0301 Edge: 0000
    train_loss= 15.64856 val_roc= 0.75842
    val_auprc= 0.72612 val_apk= 0.70182
```

```
197 time= 0.12354
198 Epoch: 0028 Iter: 0451 Edge: 0003
    train_loss= 17.92356 val_roc= 0.74452
    val_auprc= 0.72656 val_apk= 0.81319
    time= 0.26184
199 Epoch: 0029 Iter: 0001 Edge: 0000
    train_loss= 16.86940 val_roc= 0.75253
    val_auprc= 0.72138 val_apk= 0.72206
    time= 0.15210
200 Epoch: 0029 Iter: 0151 Edge: 0003
    train_loss= 17.09134 val_roc= 0.75474
    val_auprc= 0.74295 val_apk= 0.91637
    time= 0.22163
201 Epoch: 0029 Iter: 0301 Edge: 0000
    train_loss= 17.27787 val_roc= 0.75752
    val_auprc= 0.72751 val_apk= 0.72100
    time= 0.12589
202 Epoch: 0029 Iter: 0451 Edge: 0003
    train_loss= 14.58351 val_roc= 0.76044
    val_auprc= 0.74340 val_apk= 0.78774
    time= 0.22402
203 Epoch: 0030 Iter: 0001 Edge: 0000
    train_loss= 20.90976 val_roc= 0.74392
    val_auprc= 0.71130 val_apk= 0.66370
    time= 0.12196
204 Epoch: 0030 Iter: 0151 Edge: 0003
    train_loss= 16.21778 val_roc= 0.76217
    val_auprc= 0.74716 val_apk= 0.83188
    time= 0.22716
205 Epoch: 0030 Iter: 0301 Edge: 0000
    train_loss= 15.94725 val_roc= 0.76403
    val_auprc= 0.73030 val_apk= 0.67380
    time= 0.12279
206 Epoch: 0030 Iter: 0451 Edge: 0003
    train_loss= 14.10252 val_roc= 0.75980
```

```
206 val_auprc= 0.74829 val_apk= 0.87412
    time= 0.22413
207 Epoch: 0031 Iter: 0001 Edge: 0000
    train_loss= 16.67354 val_roc= 0.75609
    val_auprc= 0.71770 val_apk= 0.64010
    time= 0.12286
208 Epoch: 0031 Iter: 0151 Edge: 0003
    train_loss= 16.43205 val_roc= 0.75792
    val_auprc= 0.74596 val_apk= 0.89492
    time= 0.21857
209 Epoch: 0031 Iter: 0301 Edge: 0000
    train_loss= 18.84009 val_roc= 0.75088
    val_auprc= 0.71345 val_apk= 0.64237
    time= 0.12210
210 Epoch: 0031 Iter: 0451 Edge: 0003
    train_loss= 17.14567 val_roc= 0.76448
    val_auprc= 0.75093 val_apk= 0.87903
    time= 0.25757
211 Epoch: 0032 Iter: 0001 Edge: 0000
    train_loss= 15.96738 val_roc= 0.75117
    val_auprc= 0.71867 val_apk= 0.65640
    time= 0.13182
212 Epoch: 0032 Iter: 0151 Edge: 0003
    train_loss= 19.14755 val_roc= 0.75068
    val_auprc= 0.73614 val_apk= 0.82502
    time= 0.24974
213 Epoch: 0032 Iter: 0301 Edge: 0000
    train_loss= 16.63149 val_roc= 0.76000
    val_auprc= 0.71973 val_apk= 0.61671
    time= 0.13284
214 Epoch: 0032 Iter: 0451 Edge: 0003
    train_loss= 16.36894 val_roc= 0.75851
    val_auprc= 0.74779 val_apk= 0.88489
    time= 0.26207
215 Epoch: 0033 Iter: 0001 Edge: 0000
```

```
215 train_loss= 16.49907 val_roc= 0.75102
    val_auprc= 0.71369 val_apk= 0.60344
    time= 0.12301
216 Epoch: 0033 Iter: 0151 Edge: 0003
    train_loss= 16.75507 val_roc= 0.75502
    val_auprc= 0.74071 val_apk= 0.86791
    time= 0.22432
217 Epoch: 0033 Iter: 0301 Edge: 0000
    train_loss= 16.47973 val_roc= 0.75811
    val_auprc= 0.71649 val_apk= 0.64629
    time= 0.12165
218 Epoch: 0033 Iter: 0451 Edge: 0003
    train_loss= 17.55165 val_roc= 0.75657
    val_auprc= 0.74459 val_apk= 0.89374
    time= 0.22532
219 Epoch: 0034 Iter: 0001 Edge: 0000
    train_loss= 17.55733 val_roc= 0.75875
    val_auprc= 0.71732 val_apk= 0.64073
    time= 0.12277
220 Epoch: 0034 Iter: 0151 Edge: 0003
    train_loss= 17.06271 val_roc= 0.76217
    val_auprc= 0.75016 val_apk= 0.87928
    time= 0.21634
221 Epoch: 0034 Iter: 0301 Edge: 0000
    train_loss= 20.16830 val_roc= 0.75777
    val_auprc= 0.71939 val_apk= 0.70027
    time= 0.12377
222 Epoch: 0034 Iter: 0451 Edge: 0003
    train_loss= 16.74607 val_roc= 0.76894
    val_auprc= 0.75076 val_apk= 0.83759
    time= 0.22622
223 Epoch: 0035 Iter: 0001 Edge: 0000
    train_loss= 15.91215 val_roc= 0.76100
    val_auprc= 0.72619 val_apk= 0.70353
    time= 0.12428
```

```
224 Epoch: 0035 Iter: 0151 Edge: 0003
    train_loss= 19.55093 val_roc= 0.76072
    val_auprc= 0.74680 val_apk= 0.88495
    time= 0.24805
225 Epoch: 0035 Iter: 0301 Edge: 0000
    train_loss= 17.82602 val_roc= 0.74473
    val_auprc= 0.71015 val_apk= 0.64325
    time= 0.12061
226 Epoch: 0035 Iter: 0451 Edge: 0003
    train_loss= 16.56314 val_roc= 0.76889
    val_auprc= 0.74968 val_apk= 0.83463
    time= 0.22323
227 Epoch: 0036 Iter: 0001 Edge: 0000
    train_loss= 17.95997 val_roc= 0.76229
    val_auprc= 0.72358 val_apk= 0.63439
    time= 0.12811
228 Epoch: 0036 Iter: 0151 Edge: 0003
    train_loss= 16.35826 val_roc= 0.76287
    val_auprc= 0.74914 val_apk= 0.88138
    time= 0.22415
229 Epoch: 0036 Iter: 0301 Edge: 0000
    train_loss= 17.09265 val_roc= 0.75880
    val_auprc= 0.72095 val_apk= 0.60203
    time= 0.12280
230 Epoch: 0036 Iter: 0451 Edge: 0003
    train_loss= 17.36746 val_roc= 0.76706
    val_auprc= 0.74808 val_apk= 0.89153
    time= 0.24441
231 Epoch: 0037 Iter: 0001 Edge: 0000
    train_loss= 17.24405 val_roc= 0.75981
    val_auprc= 0.72095 val_apk= 0.64647
    time= 0.17193
232 Epoch: 0037 Iter: 0151 Edge: 0003
    train_loss= 17.28633 val_roc= 0.75676
    val_auprc= 0.74091 val_apk= 0.86148
```

```
232 time= 0.22053
233 Epoch: 0037 Iter: 0301 Edge: 0000
    train_loss= 18.82067 val_roc= 0.75639
    val_auprc= 0.71607 val_apk= 0.59915
    time= 0.12261
234 Epoch: 0037 Iter: 0451 Edge: 0003
    train_loss= 16.79793 val_roc= 0.76548
    val_auprc= 0.74430 val_apk= 0.89277
    time= 0.22090
235 Epoch: 0038 Iter: 0001 Edge: 0000
    train_loss= 17.45049 val_roc= 0.76386
    val_auprc= 0.71790 val_apk= 0.63705
    time= 0.12940
236 Epoch: 0038 Iter: 0151 Edge: 0003
    train_loss= 15.38800 val_roc= 0.75639
    val_auprc= 0.74295 val_apk= 0.83390
    time= 0.25121
237 Epoch: 0038 Iter: 0301 Edge: 0000
    train_loss= 16.97641 val_roc= 0.76353
    val_auprc= 0.72393 val_apk= 0.66165
    time= 0.12969
238 Epoch: 0038 Iter: 0451 Edge: 0003
    train_loss= 16.64208 val_roc= 0.75014
    val_auprc= 0.73113 val_apk= 0.84320
    time= 0.24539
239 Epoch: 0039 Iter: 0001 Edge: 0000
    train_loss= 16.45825 val_roc= 0.76023
    val_auprc= 0.72255 val_apk= 0.65006
    time= 0.13405
240 Epoch: 0039 Iter: 0151 Edge: 0003
    train_loss= 18.43720 val_roc= 0.76344
    val_auprc= 0.74341 val_apk= 0.78245
    time= 0.22864
241 Epoch: 0039 Iter: 0301 Edge: 0000
    train_loss= 19.84047 val_roc= 0.76191
```

```
241 val_auprc= 0.71864 val_apk= 0.62306
    time= 0.13038
242 Epoch: 0039 Iter: 0451 Edge: 0003
    train_loss= 18.87383 val_roc= 0.76575
    val_auprc= 0.74304 val_apk= 0.87698
    time= 0.22692
243 Epoch: 0040 Iter: 0001 Edge: 0000
    train_loss= 18.74756 val_roc= 0.75898
    val_auprc= 0.72522 val_apk= 0.73119
    time= 0.12591
244 Epoch: 0040 Iter: 0151 Edge: 0003
    train_loss= 16.06570 val_roc= 0.77306
    val_auprc= 0.75531 val_apk= 0.84744
    time= 0.21786
245 Epoch: 0040 Iter: 0301 Edge: 0000
    train_loss= 17.71606 val_roc= 0.76262
    val_auprc= 0.72453 val_apk= 0.65577
    time= 0.12306
246 Epoch: 0040 Iter: 0451 Edge: 0003
    train_loss= 17.91516 val_roc= 0.76933
    val_auprc= 0.74774 val_apk= 0.86744
    time= 0.24716
247 Epoch: 0041 Iter: 0001 Edge: 0000
    train_loss= 17.59721 val_roc= 0.76402
    val_auprc= 0.72639 val_apk= 0.62756
    time= 0.13445
248 Epoch: 0041 Iter: 0151 Edge: 0003
    train_loss= 16.29511 val_roc= 0.76514
    val_auprc= 0.74389 val_apk= 0.81529
    time= 0.23691
249 Epoch: 0041 Iter: 0301 Edge: 0000
    train_loss= 16.28036 val_roc= 0.75940
    val_auprc= 0.72396 val_apk= 0.62578
    time= 0.12535
250 Epoch: 0041 Iter: 0451 Edge: 0003
```

```
250 train_loss= 15.88265 val_roc= 0.76323
    val_auprc= 0.74335 val_apk= 0.84729
    time= 0.23346
251 Epoch: 0042 Iter: 0001 Edge: 0000
    train_loss= 15.84714 val_roc= 0.76801
    val_auprc= 0.73502 val_apk= 0.68118
    time= 0.12195
252 Epoch: 0042 Iter: 0151 Edge: 0003
    train_loss= 17.75226 val_roc= 0.76780
    val_auprc= 0.74718 val_apk= 0.82427
    time= 0.24306
253 Epoch: 0042 Iter: 0301 Edge: 0000
    train_loss= 18.51889 val_roc= 0.76432
    val_auprc= 0.72203 val_apk= 0.58980
    time= 0.12140
254 Epoch: 0042 Iter: 0451 Edge: 0003
    train_loss= 15.60986 val_roc= 0.76778
    val_auprc= 0.74824 val_apk= 0.85813
    time= 0.22578
255 Epoch: 0043 Iter: 0001 Edge: 0000
    train_loss= 16.26251 val_roc= 0.76834
    val_auprc= 0.72859 val_apk= 0.60061
    time= 0.13114
256 Epoch: 0043 Iter: 0151 Edge: 0003
    train_loss= 15.38209 val_roc= 0.77242
    val_auprc= 0.75084 val_apk= 0.85994
    time= 0.24013
257 Epoch: 0043 Iter: 0301 Edge: 0000
    train_loss= 16.20117 val_roc= 0.76975
    val_auprc= 0.72869 val_apk= 0.63486
    time= 0.13032
258 Epoch: 0043 Iter: 0451 Edge: 0003
    train_loss= 15.47073 val_roc= 0.76956
    val_auprc= 0.75035 val_apk= 0.86362
    time= 0.27181
```

```
259 Epoch: 0044 Iter: 0001 Edge: 0000
    train_loss= 15.71396 val_roc= 0.76809
    val_auprc= 0.73115 val_apk= 0.66508
    time= 0.12291
260 Epoch: 0044 Iter: 0151 Edge: 0003
    train_loss= 15.22305 val_roc= 0.76983
    val_auprc= 0.75350 val_apk= 0.86691
    time= 0.22014
261 Epoch: 0044 Iter: 0301 Edge: 0000
    train_loss= 16.61978 val_roc= 0.76583
    val_auprc= 0.72514 val_apk= 0.56768
    time= 0.15762
262 Epoch: 0044 Iter: 0451 Edge: 0003
    train_loss= 17.38066 val_roc= 0.77168
    val_auprc= 0.75176 val_apk= 0.84315
    time= 0.22723
263 Epoch: 0045 Iter: 0001 Edge: 0000
    train_loss= 18.15703 val_roc= 0.77160
    val_auprc= 0.73705 val_apk= 0.59349
    time= 0.12965
264 Epoch: 0045 Iter: 0151 Edge: 0003
    train_loss= 16.95663 val_roc= 0.75893
    val_auprc= 0.73667 val_apk= 0.90621
    time= 0.23481
265 Epoch: 0045 Iter: 0301 Edge: 0000
    train_loss= 17.99993 val_roc= 0.76337
    val_auprc= 0.72236 val_apk= 0.60860
    time= 0.12941
266 Epoch: 0045 Iter: 0451 Edge: 0003
    train_loss= 15.91537 val_roc= 0.76801
    val_auprc= 0.74544 val_apk= 0.85511
    time= 0.22219
267 Epoch: 0046 Iter: 0001 Edge: 0000
    train_loss= 17.82695 val_roc= 0.76925
    val_auprc= 0.72882 val_apk= 0.60602
```

```
267 time= 0.13002
268 Epoch: 0046 Iter: 0151 Edge: 0003
    train_loss= 15.25766 val_roc= 0.77049
    val_auprc= 0.74687 val_apk= 0.87811
    time= 0.22011
269 Epoch: 0046 Iter: 0301 Edge: 0000
    train_loss= 18.77606 val_roc= 0.76561
    val_auprc= 0.72213 val_apk= 0.57907
    time= 0.12331
270 Epoch: 0046 Iter: 0451 Edge: 0003
    train_loss= 15.26943 val_roc= 0.77716
    val_auprc= 0.75388 val_apk= 0.87916
    time= 0.22049
271 Epoch: 0047 Iter: 0001 Edge: 0000
    train_loss= 19.93233 val_roc= 0.77016
    val_auprc= 0.72725 val_apk= 0.60181
    time= 0.12185
272 Epoch: 0047 Iter: 0151 Edge: 0003
    train_loss= 17.06655 val_roc= 0.77325
    val_auprc= 0.75228 val_apk= 0.81421
    time= 0.25463
273 Epoch: 0047 Iter: 0301 Edge: 0000
    train_loss= 17.65113 val_roc= 0.76675
    val_auprc= 0.72128 val_apk= 0.59811
    time= 0.14195
274 Epoch: 0047 Iter: 0451 Edge: 0003
    train_loss= 15.26904 val_roc= 0.77272
    val_auprc= 0.75421 val_apk= 0.85566
    time= 0.22162
275 Epoch: 0048 Iter: 0001 Edge: 0000
    train_loss= 17.36125 val_roc= 0.76791
    val_auprc= 0.72902 val_apk= 0.54044
    time= 0.12445
276 Epoch: 0048 Iter: 0151 Edge: 0003
    train_loss= 16.30464 val_roc= 0.76570
```

```
276 val_auprc= 0.74629 val_apk= 0.88671
    time= 0.22311
277 Epoch: 0048 Iter: 0301 Edge: 0000
    train_loss= 17.40732 val_roc= 0.77264
    val_auprc= 0.73331 val_apk= 0.66327
    time= 0.12297
278 Epoch: 0048 Iter: 0451 Edge: 0003
    train_loss= 15.96777 val_roc= 0.77318
    val_auprc= 0.75068 val_apk= 0.87340
    time= 0.24295
279 Epoch: 0049 Iter: 0001 Edge: 0000
    train_loss= 18.21424 val_roc= 0.77152
    val_auprc= 0.73344 val_apk= 0.60201
    time= 0.13373
280 Epoch: 0049 Iter: 0151 Edge: 0003
    train_loss= 18.50896 val_roc= 0.76332
    val_auprc= 0.74261 val_apk= 0.89327
    time= 0.22153
281 Epoch: 0049 Iter: 0301 Edge: 0000
    train_loss= 17.04161 val_roc= 0.77267
    val_auprc= 0.72566 val_apk= 0.51279
    time= 0.12483
282 Epoch: 0049 Iter: 0451 Edge: 0003
    train_loss= 16.70065 val_roc= 0.76871
    val_auprc= 0.74528 val_apk= 0.88208
    time= 0.22409
283 Epoch: 0050 Iter: 0001 Edge: 0000
    train_loss= 17.46783 val_roc= 0.77435
    val_auprc= 0.73561 val_apk= 0.59693
    time= 0.12408
284 Epoch: 0050 Iter: 0151 Edge: 0003
    train_loss= 14.47009 val_roc= 0.76687
    val_auprc= 0.74337 val_apk= 0.90536
    time= 0.22578
285 Epoch: 0050 Iter: 0301 Edge: 0000
```

```
285 train_loss= 17.51435 val_roc= 0.77141
    val_auprc= 0.72544 val_apk= 0.52928
    time= 0.12206
286 Epoch: 0050 Iter: 0451 Edge: 0003
    train_loss= 17.00002 val_roc= 0.76976
    val_auprc= 0.74554 val_apk= 0.85521
    time= 0.23807
287 Optimization finished!
288 Edge type= [00, 00, 00]
289 Edge type: 0000 Test AUROC score 0.
    78550
290 Edge type: 0000 Test AUPRC score 0.
    76274
291 Edge type: 0000 Test AP@k score 0.88082
292
293 Edge type= [00, 00, 01]
294 Edge type: 0001 Test AUROC score 0.
    82976
295 Edge type: 0001 Test AUPRC score 0.
    78272
296 Edge type: 0001 Test AP@k score 0.75734
297
298 Edge type= [00, 01, 00]
299 Edge type: 0002 Test AUROC score 0.
    79653
300 Edge type: 0002 Test AUPRC score 0.
    76353
301 Edge type: 0002 Test AP@k score 0.76966
302
303 Edge type= [01, 00, 00]
304 Edge type: 0003 Test AUROC score 0.
    78678
305 Edge type: 0003 Test AUPRC score 0.
    76297
306 Edge type: 0003 Test AP@k score 0.81063
```

```
307
308 Edge type= [01, 01, 00]
309 Edge type: 0004 Test AUROC score 0.
    71618
310 Edge type: 0004 Test AUPRC score 0.
    66353
311 Edge type: 0004 Test AP@k score 0.47624
312
313 Edge type= [01, 01, 01]
314 Edge type: 0005 Test AUROC score 0.
    75430
315 Edge type: 0005 Test AUPRC score 0.
    69402
316 Edge type: 0005 Test AP@k score 0.54695
317
318 Edge type= [01, 01, 02]
319 Edge type: 0006 Test AUROC score 0.
    78720
320 Edge type: 0006 Test AUPRC score 0.
    72321
321 Edge type: 0006 Test AP@k score 0.56379
322
323 Edge type= [01, 01, 03]
324 Edge type: 0007 Test AUROC score 0.
    73383
325 Edge type: 0007 Test AUPRC score 0.
    68762
326 Edge type: 0007 Test AP@k score 0.46872
327
328 Edge type= [01, 01, 04]
329 Edge type: 0008 Test AUROC score 0.
    77540
330 Edge type: 0008 Test AUPRC score 0.
    74343
331 Edge type: 0008 Test AP@k score 0.76102
```

```
332
333 Edge type= [01, 01, 05]
334 Edge type: 0009 Test AUROC score 0.
            83294
335 Edge type: 0009 Test AUPRC score 0.
            79117
336 Edge type: 0009 Test AP@k score 0.74128
337
338
339 Process finished with exit code -1
340
```