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1 C:\Users\Alex\Anaconda3\python.exe "C:/Users/Zihang
  Guan/Desktop/Deep-Reinforcement-Learning-for-
  Automated-Stock-Trading-Ensemble-Strategy-ICAIF-2020-
  master/run_DRL.py"
2 2022-04-19 15:42:05.953434: W tensorflow/
  stream_executor/platform/default/dso_loader.cc:59]
  Could not load dynamic library 'cudart64_101.dll';
  dlerror: cudart64_101.dll not found
3 2022-04-19 15:42:05.956347: I tensorflow/
  stream_executor/cuda/cudart_stub.cc:29] Ignore above
  cudart dlerror if you do not have a GPU set up on
  your machine.
4 C:\Users\Alex\Anaconda3\lib\site-packages\
  stable_baselines\__init__.py:33: UserWarning: stable-
  baselines is in maintenance mode, please use [Stable-
  Baselines3 (SB3)](https://github.com/DLR-RM/stable-
  baselines3) for an up-to-date version. You can find a
  [migration guide](https://stable-baselines3.
  readthedocs.io/en/master/guide/migration.html) in SB3
  documentation.
5 warnings.warn(
6   datadate    tic      adjcp      open    ...    rsi
      cci      adx  turbulence
7 0  20090102  AAPL  12.964286  12.268571  ...  100.0
  66.666667  100.0      0.0
8 1  20090102   AXP  19.330000  18.570000  ...  100.0
  66.666667  100.0      0.0
9 2  20090102   BA   45.250000  42.800000  ...  100.0
  66.666667  100.0      0.0
10 3  20090102  CAT  46.910000  44.910000  ...    0.0
   66.666667  100.0      0.0
11 4  20090102  CSC0  16.960000  16.410000  ...  100.0
   66.666667  100.0      0.0
12
13 [5 rows x 12 columns]
14 1053360
15 [20151002 20151005 20151006 ... 20200702 20200706
   20200707]
16 =====Start Ensemble Strategy=====
17 =====
18 turbulence_threshold: 171.0940715631016

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19 =====Model training from: 20090000 to 20151002
20 =====A2C Training=====
21 2022-04-19 15:42:16.642780: 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
22 To enable them in other operations, rebuild
TensorFlow with the appropriate compiler flags.
23 2022-04-19 15:42:16.697201: I tensorflow/compiler/xla
/service/service.cc:168] XLA service 0x22310263980
initialized for platform Host (this does not
guarantee that XLA will be used). Devices:
24 2022-04-19 15:42:16.697773: I tensorflow/compiler/xla
/service/service.cc:176] StreamExecutor device (0
): Host, Default Version
25 2022-04-19 15:42:16.703084: W tensorflow/
stream_executor/platform/default/dso_loader.cc:59]
Could not load dynamic library 'nvcuda.dll'; dlerror
: nvcuda.dll not found
26 2022-04-19 15:42:16.703493: W tensorflow/
stream_executor/cuda/cuda_driver.cc:312] failed call
to cuInit: UNKNOWN ERROR (303)
27 2022-04-19 15:42:16.704673: I tensorflow/
stream_executor/cuda/cuda_diagnostics.cc:169]
retrieving CUDA diagnostic information for host:
LAPTOP-FJQ3PEHG
28 2022-04-19 15:42:16.705755: I tensorflow/
stream_executor/cuda/cuda_diagnostics.cc:176]
hostname: LAPTOP-FJQ3PEHG
29 WARNING:tensorflow:From C:\Users\Alex\Anaconda3\lib\
site-packages\tensorflow\python\training\rmsprop.py:
123: calling Ones.__init__ (from tensorflow.python.
ops.init_ops) with dtype is deprecated and will be
removed in a future version.
30 Instructions for updating:
31 Call initializer instance with the dtype argument
instead of passing it to the constructor
32 save intrinsic loss: Tensor("add_35:0", shape=(),
dtype=float32)
33 timesteps: 30000
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34 total_timesteps: 30000
35 Training time (A2C): 4.397499028841654 minutes
36 =====A2C Validation from: 20151002 to 20160104
37 A2C Sharpe Ratio: -0.002368839573430349
38 =====Trading from: 20160104 to 20160405
39 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000223111301F0>
40 previous_total_asset:1000000
41 end_total_asset:1057906.066694739
42 total_reward:57906.06669473904
43 total_cost: 3887.780697915364
44 total trades: 1488
45 Sharpe: 0.1796995986447538
46 =====Trading Done=====
47 =====
48 turbulence_threshold: 96.08032158358223
49 =====Model training from: 20090000 to 20160104
50 =====A2C Training=====
51 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
52 timesteps: 30000
53 total_timesteps: 30000
54 Training time (A2C): 3.606535545984904 minutes
55 =====A2C Validation from: 20160104 to 20160405
56 A2C Sharpe Ratio: 0.1607359681751664
57 =====Trading from: 20160405 to 20160705
58 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000223109DDD90>
59 previous_total_asset:1057906.066694739
60 end_total_asset:1082265.422093954
61 total_reward:24359.355399214895
62 total_cost: 3576.224750867773
63 total trades: 1269
64 Sharpe: 0.0909153090857277
65 =====Trading Done=====
66 =====
67 turbulence_threshold: 171.0940715631016
68 =====Model training from: 20090000 to 20160405
69 =====A2C Training=====
70 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)

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71 timesteps: 30000
72 total_timesteps: 30000
73 Training time (A2C): 3.461374994119008 minutes
74 =====A2C Validation from: 20160405 to 20160705
75 A2C Sharpe Ratio: 0.05731878306926517
76 =====Trading from: 20160705 to 20161003
77 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000022318C1A700>
78 previous_total_asset:1082265.422093954
79 end_total_asset:1102131.0183271656
80 total_reward:19865.59623321169
81 total_cost: 2943.584869423475
82 total trades: 1433
83 Sharpe: 0.09415256234066949
84 =====Trading Done=====
85 =====
86 turbulence_threshold: 171.0940715631016
87 =====Model training from: 20090000 to 20160705
88 =====A2C Training=====
89 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
90 timesteps: 30000
91 total_timesteps: 30000
92 Training time (A2C): 3.2104588905970255 minutes
93 =====A2C Validation from: 20160705 to 20161003
94 A2C Sharpe Ratio: 0.010227994829873873
95 =====Trading from: 20161003 to 20170103
96 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000022318A65A60>
97 previous_total_asset:1102131.0183271656
98 end_total_asset:1139502.0949676686
99 total_reward:37371.076640503015
100 total_cost: 10363.0821431476
101 total trades: 1704
102 Sharpe: 0.2073566479390461
103 =====Trading Done=====
104 =====
105 turbulence_threshold: 171.0940715631016
106 =====Model training from: 20090000 to 20161003
107 =====A2C Training=====
108 save intrinsic loss: Tensor("add_35:0", shape=(),
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108 dtype=float32)
109 timesteps: 30000
110 total_timesteps: 30000
111 Training time (A2C): 3.355273660024007 minutes
112 =====A2C Validation from: 20161003 to 20170103
113 A2C Sharpe Ratio: 0.670607410568507
114 =====Trading from: 20170103 to 20170404
115 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000002231E3E6F10>
116 previous_total_asset:1139502.0949676686
117 end_total_asset:1159122.0954387398
118 total_reward:19620.000471071107
119 total_cost: 8187.501241456083
120 total trades: 1691
121 Sharpe: 0.11161895788043667
122 =====Trading Done=====
123 =====
124 turbulence_threshold: 96.08032158358223
125 =====Model training from: 20090000 to 20170103
126 =====A2C Training=====
127 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
128 timesteps: 30000
129 total_timesteps: 30000
130 Training time (A2C): 4.027705725034078 minutes
131 =====A2C Validation from: 20170103 to 20170404
132 A2C Sharpe Ratio: 0.3342119841756993
133 =====Trading from: 20170404 to 20170705
134 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000002231E0E5130>
135 previous_total_asset:1159122.0954387398
136 end_total_asset:1173098.2391000057
137 total_reward:13976.14366126596
138 total_cost: 5644.458767998202
139 total trades: 1409
140 Sharpe: 0.08246899897186824
141 =====Trading Done=====
142 =====
143 turbulence_threshold: 171.0940715631016
144 =====Model training from: 20090000 to 20170404
145 =====A2C Training=====
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146 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
147 timesteps: 30000
148 total_timesteps: 30000
149 Training time (A2C): 4.267494463920594 minutes
150 =====A2C Validation from: 20170404 to 20170705
151 A2C Sharpe Ratio: -0.03361466197341177
152 =====Trading from: 20170705 to 20171003
153 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000002231AE82DF0>
154 previous_total_asset:1173098.2391000057
155 end_total_asset:1211042.8839152637
156 total_reward:37944.64481525798
157 total_cost: 6805.068137002993
158 total trades: 1578
159 Sharpe: 0.23482783882367922
160 =====Trading Done=====
161 =====
162 turbulence_threshold: 171.0940715631016
163 =====Model training from: 20090000 to 20170705
164 =====A2C Training=====
165 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
166 timesteps: 30000
167 total_timesteps: 30000
168 Training time (A2C): 3.606330382823944 minutes
169 =====A2C Validation from: 20170705 to 20171003
170 A2C Sharpe Ratio: 0.11439446868282072
171 =====Trading from: 20171003 to 20180103
172 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000022318973130>
173 previous_total_asset:1211042.8839152637
174 end_total_asset:1279750.4933365856
175 total_reward:68707.60942132189
176 total_cost: 5704.7396923606675
177 total trades: 1486
178 Sharpe: 0.3844753658808723
179 =====Trading Done=====
180 =====
181 turbulence_threshold: 96.08032158358223
182 =====Model training from: 20090000 to 20171003
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183 =====A2C Training=====
184 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
185 timesteps: 30000
186 total_timesteps: 30000
187 Training time (A2C):  5.082638541857402  minutes
188 =====A2C Validation from:  20171003 to  20180103
189 A2C Sharpe Ratio:  0.4037583572357913
190 =====Trading from:  20180103 to  20180405
191 Used Model:  <stable_baselines.a2c.a2c.A2C object at
    0x000002231AA18490>
192 previous_total_asset:1279750.4933365856
193 end_total_asset:1289224.2393201378
194 total_reward:9473.745983552188
195 total_cost:  2648.1923067384882
196 total trades:  392
197 Sharpe:  0.048620744420080846
198 =====Trading Done=====
199 =====
200 turbulence_threshold:  96.08032158358223
201 =====Model training from:  20090000 to  20180103
202 =====A2C Training=====
203 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
204 timesteps: 30000
205 total_timesteps: 30000
206 Training time (A2C):  4.393943214416504  minutes
207 =====A2C Validation from:  20180103 to  20180405
208 A2C Sharpe Ratio:  -0.3384831912734689
209 =====Trading from:  20180405 to  20180705
210 Used Model:  <stable_baselines.a2c.a2c.A2C object at
    0x0000022318F6C040>
211 previous_total_asset:1289224.2393201378
212 end_total_asset:1287179.2949249994
213 total_reward:-2044.9443951384164
214 total_cost:  1277.9083916646407
215 total trades:  221
216 Sharpe:  -0.024694515842103575
217 =====Trading Done=====
218 =====
219 turbulence_threshold:  96.08032158358223
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220 =====Model training from:  20090000 to  20180405
221 =====A2C Training=====
222 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
223 timesteps: 30000
224 total_timesteps: 30000
225 Training time (A2C):  4.750454592704773  minutes
226 =====A2C Validation from:  20180405 to  20180705
227 A2C Sharpe Ratio:  -0.12213210986229982
228 =====Trading from:  20180705 to  20181003
229 Used Model:  <stable_baselines.a2c.a2c.A2C object at
    0x0000002231638A220>
230 previous_total_asset:1287179.2949249994
231 end_total_asset:1312408.0858549378
232 total_reward:25228.790929938434
233 total_cost:  6858.362040839204
234 total trades:  1052
235 Sharpe:  0.2228556253832358
236 =====Trading Done=====
237 =====
238 turbulence_threshold:  96.08032158358223
239 =====Model training from:  20090000 to  20180705
240 =====A2C Training=====
241 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
242 timesteps: 30000
243 total_timesteps: 30000
244 Training time (A2C):  3.7622246026992796  minutes
245 =====A2C Validation from:  20180705 to  20181003
246 A2C Sharpe Ratio:  0.12485759182623252
247 =====Trading from:  20181003 to  20190104
248 Used Model:  <stable_baselines.a2c.a2c.A2C object at
    0x0000002231DE87D60>
249 previous_total_asset:1312408.0858549378
250 end_total_asset:1324819.2172162218
251 total_reward:12411.13136128406
252 total_cost:  1173.1723243112688
253 total trades:  204
254 Sharpe:  0.2258933268248278
255 =====Trading Done=====
256 =====

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257 turbulence_threshold: 171.0940715631016
258 =====Model training from: 20090000 to 20181003
259 =====A2C Training=====
260 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
261 timesteps: 30000
262 total_timesteps: 30000
263 Training time (A2C): 3.7745963176091513 minutes
264 =====A2C Validation from: 20181003 to 20190104
265 A2C Sharpe Ratio: -0.3365339073677333
266 =====Trading from: 20190104 to 20190405
267 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000002231DE97A90>
268 previous_total_asset:1324819.2172162218
269 end_total_asset:1321070.550934777
270 total_reward:-3748.666281444952
271 total_cost: 2851.1702796152604
272 total trades: 797
273 Sharpe: -0.13825791451681704
274 =====Trading Done=====
275 =====
276 turbulence_threshold: 96.08032158358223
277 =====Model training from: 20090000 to 20190104
278 =====A2C Training=====
279 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
280 timesteps: 30000
281 total_timesteps: 30000
282 Training time (A2C): 3.7772799531618753 minutes
283 =====A2C Validation from: 20190104 to 20190405
284 A2C Sharpe Ratio: -0.19515794472794185
285 =====Trading from: 20190405 to 20190708
286 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000002231B7E11C0>
287 previous_total_asset:1321070.550934777
288 end_total_asset:1321486.9022769204
289 total_reward:416.3513421434909
290 total_cost: 204.65907945208073
291 total trades: 55
292 Sharpe: 0.1988502812951451
293 =====Trading Done=====
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294 =====
295 turbulence_threshold: 96.08032158358223
296 =====Model training from: 20090000 to 20190405
297 =====A2C Training=====
298 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
299 timesteps: 30000
300 total_timesteps: 30000
301 Training time (A2C): 3.7979099710782367 minutes
302 =====A2C Validation from: 20190405 to 20190708
303 A2C Sharpe Ratio: 0.2395954131406036
304 =====Trading from: 20190708 to 20191004
305 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000022318F9A130>
306 previous_total_asset:1321486.9022769204
307 end_total_asset:1320543.9097438052
308 total_reward:-942.9925331152044
309 total_cost: 603.7847335304522
310 total trades: 157
311 Sharpe: -0.094090094530225
312 =====Trading Done=====
313 =====
314 turbulence_threshold: 96.08032158358223
315 =====Model training from: 20090000 to 20190708
316 =====A2C Training=====
317 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
318 timesteps: 30000
319 total_timesteps: 30000
320 Training time (A2C): 4.702212091286977 minutes
321 =====A2C Validation from: 20190708 to 20191004
322 A2C Sharpe Ratio: 0.2154389287336018
323 =====Trading from: 20191004 to 20200106
324 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000002231E3D7FA0>
325 previous_total_asset:1320543.9097438052
326 end_total_asset:1319839.835105627
327 total_reward:-704.0746381781064
328 total_cost: 160.61121876684905
329 total trades: 46
330 Sharpe: -0.42457236397949455

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331 =====Trading Done=====
332 =====
333 turbulence_threshold: 96.08032158358223
334 =====Model training from: 20090000 to 20191004
335 =====A2C Training=====
336 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
337 timesteps: 30000
338 total_timesteps: 30000
339 Training time (A2C): 4.740816116333008 minutes
340 =====A2C Validation from: 20191004 to 20200106
341 A2C Sharpe Ratio: -0.1325212579313608
342 =====Trading from: 20200106 to 20200406
343 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000002231E2693D0>
344 previous_total_asset:1319839.835105627
345 end_total_asset:1307043.1200327505
346 total_reward:-12796.715072876541
347 total_cost: 809.8795874554538
348 total trades: 154
349 Sharpe: -0.390780542066067
350 =====Trading Done=====
351 =====
352 turbulence_threshold: 96.08032158358223
353 =====Model training from: 20090000 to 20200106
354 =====A2C Training=====
355 save intrinsic loss: Tensor("add_35:0", shape=(),
    dtype=float32)
356 timesteps: 30000
357 total_timesteps: 30000
358 Training time (A2C): 4.823402512073517 minutes
359 =====A2C Validation from: 20200106 to 20200406
360 A2C Sharpe Ratio: -0.4213371796697055
361 =====Trading from: 20200406 to 20200707
362 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000022318980AC0>
363 previous_total_asset:1307043.1200327505
364 end_total_asset:1311326.1425684015
365 total_reward:4283.022535650991
366 total_cost: 567.8772360290196
367 total trades: 134

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368 Sharpe: 0.19630743975430134
369 =====Trading Done=====
370 A2C Intrinsic Strategy took: 74.09155917962393
    minutes
371
372 Process finished with exit code 0
373
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