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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 11:53:00.322565: 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 11:53:00.324289: 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 11:53:07.917046: 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 11:53:07.965436: I tensorflow/compiler/xla
/service/service.cc:168] XLA service 0x21d507dbfa0
initialized for platform Host (this does not
guarantee that XLA will be used). Devices:
24 2022-04-19 11:53:07.965755: I tensorflow/compiler/xla
/service/service.cc:176] StreamExecutor device (0
): Host, Default Version
25 2022-04-19 11:53:07.971449: 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 11:53:07.972089: W tensorflow/
stream_executor/cuda/cuda_driver.cc:312] failed call
to cuInit: UNKNOWN ERROR (303)
27 2022-04-19 11:53:07.973462: I tensorflow/
stream_executor/cuda/cuda_diagnostics.cc:169]
retrieving CUDA diagnostic information for host:
LAPTOP-FJQ3PEHG
28 2022-04-19 11:53:07.974359: 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): 3.559092644850413 minutes
36 =====A2C Validation from: 20151002 to 20160104
37 A2C Sharpe Ratio: 0.07522604947343098
38 =====Trading from: 20160104 to 20160405
39 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D51CA0220>
40 previous_total_asset:1000000
41 end_total_asset:1093173.1123836047
42 total_reward:93173.11238360475
43 total_cost: 5769.0751026494645
44 total trades: 1409
45 Sharpe: 0.33821180578473675
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): 3.5193806966145833 minutes
55 =====A2C Validation from: 20160104 to 20160405
56 A2C Sharpe Ratio: 0.05588163018969352
57 =====Trading from: 20160405 to 20160705
58 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D51CA00D0>
59 previous_total_asset:1093173.1123836047
60 end_total_asset:1081448.1911481037
61 total_reward:-11724.921235501068
62 total_cost: 5302.883373805276
63 total trades: 1436
64 Sharpe: -0.03388422326193354
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): 3.199160122871399 minutes
74 =====A2C Validation from: 20160405 to 20160705
75 A2C Sharpe Ratio: 0.0343552616270859
76 =====Trading from: 20160705 to 20161003
77 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D5B869130>
78 previous_total_asset:1081448.1911481037
79 end_total_asset:1087928.2334565974
80 total_reward:6480.04230849375
81 total_cost: 2861.0778313109804
82 total trades: 1484
83 Sharpe: 0.03778290395732298
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): 2.8966959913571677 minutes
93 =====A2C Validation from: 20160705 to 20161003
94 A2C Sharpe Ratio: -0.007514308589204252
95 =====Trading from: 20161003 to 20170103
96 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D5931A5B0>
97 previous_total_asset:1087928.2334565974
98 end_total_asset:1146948.9526361972
99 total_reward:59020.71917959978
100 total_cost: 6698.970340314431
101 total trades: 1564
102 Sharpe: 0.33135868045115363
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): 3.303703471024831 minutes
112 =====A2C Validation from: 20161003 to 20170103
113 A2C Sharpe Ratio: 0.441266958576079
114 =====Trading from: 20170103 to 20170404
115 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D5BF6C1F0>
116 previous_total_asset:1146948.9526361972
117 end_total_asset:1192424.064682725
118 total_reward:45475.112046527676
119 total_cost: 3202.4001673021953
120 total trades: 1243
121 Sharpe: 0.3322485555747569
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): 2.891493777434031 minutes
131 =====A2C Validation from: 20170103 to 20170404
132 A2C Sharpe Ratio: 0.05146130446921559
133 =====Trading from: 20170404 to 20170705
134 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D596CDE80>
135 previous_total_asset:1192424.064682725
136 end_total_asset:1234451.0114208502
137 total_reward:42026.94673812529
138 total_cost: 5671.203342862072
139 total trades: 1249
140 Sharpe: 0.28133734094654894
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): 2.9034578641255697 minutes
150 =====A2C Validation from: 20170404 to 20170705
151 A2C Sharpe Ratio: 0.26293397883021885
152 =====Trading from: 20170705 to 20171003
153 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D55DEE310>
154 previous_total_asset:1234451.0114208502
155 end_total_asset:1259728.9371744597
156 total_reward:25277.92575360951
157 total_cost: 6609.173855854731
158 total trades: 1433
159 Sharpe: 0.1796642298387438
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): 2.924254294236501 minutes
169 =====A2C Validation from: 20170705 to 20171003
170 A2C Sharpe Ratio: 0.11947237356689079
171 =====Trading from: 20171003 to 20180103
172 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D5C8B4DC0>
173 previous_total_asset:1259728.9371744597
174 end_total_asset:1344077.6194190015
175 total_reward:84348.68224454182
176 total_cost: 6717.074192451888
177 total trades: 1551
178 Sharpe: 0.5270641189266051
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): 3.2866164604822794 minutes
188 =====A2C Validation from: 20171003 to 20180103
189 A2C Sharpe Ratio: 0.44588595465101133
190 =====Trading from: 20180103 to 20180405
191 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000021D5BA9C6A0>
192 previous_total_asset:1344077.6194190015
193 end_total_asset:1359631.5304101938
194 total_reward:15553.91099119233
195 total_cost: 2088.4745104205194
196 total trades: 320
197 Sharpe: 0.13123630709759349
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): 3.3454962213834127 minutes
207 =====A2C Validation from: 20180103 to 20180405
208 A2C Sharpe Ratio: 0.017941819464143374
209 =====Trading from: 20180405 to 20180705
210 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000021D5BAE8370>
211 previous_total_asset:1359631.5304101938
212 end_total_asset:1347169.0007834428
213 total_reward:-12462.529626751086
214 total_cost: 6523.943876896306
215 total trades: 1020
216 Sharpe: -0.05894121000311984
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): 3.2883945027987163 minutes
226 =====A2C Validation from: 20180405 to 20180705
227 A2C Sharpe Ratio: -0.1723883441762724
228 =====Trading from: 20180705 to 20181003
229 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000021D5BBF37C0>
230 previous_total_asset:1347169.0007834428
231 end_total_asset:1355588.231800821
232 total_reward:8419.231017378159
233 total_cost: 5895.560769859336
234 total trades: 978
235 Sharpe: 0.08721386849819494
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): 3.341449817021688 minutes
245 =====A2C Validation from: 20180705 to 20181003
246 A2C Sharpe Ratio: 0.07799335312573084
247 =====Trading from: 20181003 to 20190104
248 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000021D5C004EB0>
249 previous_total_asset:1355588.231800821
250 end_total_asset:1361837.7939141719
251 total_reward:6249.562113350956
252 total_cost: 1051.4729541772629
253 total trades: 173
254 Sharpe: 0.15103961303755586
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): 3.324513280391693 minutes
264 =====A2C Validation from: 20181003 to 20190104
265 A2C Sharpe Ratio: -0.3861403916953399
266 =====Trading from: 20190104 to 20190405
267 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D5BE6D640>
268 previous_total_asset:1361837.7939141719
269 end_total_asset:1482193.198062383
270 total_reward:120355.40414821124
271 total_cost: 8300.391274243726
272 total trades: 1454
273 Sharpe: 0.4576247479366557
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): 3.3825860102971395 minutes
283 =====A2C Validation from: 20190104 to 20190405
284 A2C Sharpe Ratio: -0.0010278179077283381
285 =====Trading from: 20190405 to 20190708
286 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D5E8CC0A0>
287 previous_total_asset:1482193.198062383
288 end_total_asset:1489482.2299993522
289 total_reward:7289.031936969142
290 total_cost: 1208.5851677303315
291 total trades: 170
292 Sharpe: 0.2839811646923552
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): 3.3796918392181396 minutes
302 =====A2C Validation from: 20190405 to 20190708
303 A2C Sharpe Ratio: 0.04751159093059492
304 =====Trading from: 20190708 to 20191004
305 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D56FF8760>
306 previous_total_asset:1489482.2299993522
307 end_total_asset:1488416.2298157527
308 total_reward:-1066.0001835995354
309 total_cost: 1723.2484486978747
310 total trades: 324
311 Sharpe: -0.03807736362604747
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): 3.3876439452171327 minutes
321 =====A2C Validation from: 20190708 to 20191004
322 A2C Sharpe Ratio: -0.03794571007542739
323 =====Trading from: 20191004 to 20200106
324 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D5E8CC160>
325 previous_total_asset:1488416.2298157527
326 end_total_asset:1488472.3335816904
327 total_reward:56.10376593773253
328 total_cost: 159.7097662320828
329 total trades: 34
330 Sharpe: 0.032830235366552704

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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): 3.5055071751276654 minutes
340 =====A2C Validation from: 20191004 to 20200106
341 A2C Sharpe Ratio: -0.37680108123671974
342 =====Trading from: 20200106 to 20200406
343 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D570C9850>
344 previous_total_asset:1488472.3335816904
345 end_total_asset:1475503.3498150785
346 total_reward:-12968.983766611898
347 total_cost: 880.1174365172634
348 total trades: 165
349 Sharpe: -0.4456498261104922
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): 4.336580038070679 minutes
359 =====A2C Validation from: 20200106 to 20200406
360 A2C Sharpe Ratio: -0.4508795767967563
361 =====Trading from: 20200406 to 20200707
362 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000021D5EB8DE80>
363 previous_total_asset:1475503.3498150785
364 end_total_asset:1478740.1400489327
365 total_reward:3236.7902338542044
366 total_cost: 532.9992214411021
367 total trades: 131

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368 Sharpe: 0.22082387267022063
369 =====Trading Done=====
370 A2C Intrinsic Strategy took: 60.0720855539449
    minutes
371
372 Process finished with exit code 0
373
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