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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 13:12:16.877418: 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 13:12:16.880281: 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 13:12:29.554774: 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 13:12:29.602483: I tensorflow/compiler/xla
/service/service.cc:168] XLA service 0x208ba077f70
initialized for platform Host (this does not
guarantee that XLA will be used). Devices:
24 2022-04-19 13:12:29.603052: I tensorflow/compiler/xla
/service/service.cc:176] StreamExecutor device (0
): Host, Default Version
25 2022-04-19 13:12:29.608764: 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 13:12:29.609157: W tensorflow/
stream_executor/cuda/cuda_driver.cc:312] failed call
to cuInit: UNKNOWN ERROR (303)
27 2022-04-19 13:12:29.610651: I tensorflow/
stream_executor/cuda/cuda_diagnostics.cc:169]
retrieving CUDA diagnostic information for host:
LAPTOP-FJQ3PEHG
28 2022-04-19 13:12:29.611129: 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): 3.8477064251899717 minutes
36 =====A2C Validation from: 20151002 to 20160104
37 A2C Sharpe Ratio: -0.08134772985524016
38 =====Trading from: 20160104 to 20160405
39 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208BB6E01F0>
40 previous_total_asset:1000000
41 end_total_asset:1041167.7393452862
42 total_reward:41167.73934528616
43 total_cost: 3670.259776654782
44 total trades: 1282
45 Sharpe: 0.14802673836697552
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): 3.8382203539212543 minutes
55 =====A2C Validation from: 20160104 to 20160405
56 A2C Sharpe Ratio: 0.1689935581134524
57 =====Trading from: 20160405 to 20160705
58 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C57856D0>
59 previous_total_asset:1041167.7393452862
60 end_total_asset:1081994.5097559358
61 total_reward:40826.770410649595
62 total_cost: 3036.8176223012197
63 total trades: 1370
64 Sharpe: 0.15379823999061498
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): 5.741044290860494 minutes
74 =====A2C Validation from: 20160405 to 20160705
75 A2C Sharpe Ratio: 0.00030108313856268645
76 =====Trading from: 20160705 to 20161003
77 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C3E78820>
78 previous_total_asset:1081994.5097559358
79 end_total_asset:1069333.7665227565
80 total_reward:-12660.743233179208
81 total_cost: 2336.481986483003
82 total trades: 1264
83 Sharpe: -0.044368274580631396
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): 3.5789461692174274 minutes
93 =====A2C Validation from: 20160705 to 20161003
94 A2C Sharpe Ratio: 0.0016797409487373132
95 =====Trading from: 20161003 to 20170103
96 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C52C0A00>
97 previous_total_asset:1069333.7665227565
98 end_total_asset:1131277.2494615219
99 total_reward:61943.482938765315
100 total_cost: 2799.985529619119
101 total trades: 1236
102 Sharpe: 0.3109944527974406
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): 3.7358666102091473 minutes
112 =====A2C Validation from: 20161003 to 20170103
113 A2C Sharpe Ratio: 0.5506783106957096
114 =====Trading from: 20170103 to 20170404
115 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C57FFDF0>
116 previous_total_asset:1131277.2494615219
117 end_total_asset:1099217.7911732765
118 total_reward:-32059.45828824537
119 total_cost: 5164.465388957495
120 total trades: 1545
121 Sharpe: -0.15239691890432355
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): 3.790616925557454 minutes
131 =====A2C Validation from: 20170103 to 20170404
132 A2C Sharpe Ratio: 0.33547600005272343
133 =====Trading from: 20170404 to 20170705
134 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C62D5AC0>
135 previous_total_asset:1099217.7911732765
136 end_total_asset:1104923.1685160326
137 total_reward:5705.377342756139
138 total_cost: 5834.012699516386
139 total trades: 1242
140 Sharpe: 0.0445210878848739
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): 4.067909073829651 minutes
150 =====A2C Validation from: 20170404 to 20170705
151 A2C Sharpe Ratio: 0.10632347463943721
152 =====Trading from: 20170705 to 20171003
153 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C0B9FC70>
154 previous_total_asset:1104923.1685160326
155 end_total_asset:1151942.5679662712
156 total_reward:47019.39945023856
157 total_cost: 7225.280347096254
158 total trades: 1524
159 Sharpe: 0.31943666590585157
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): 3.7899237513542174 minutes
169 =====A2C Validation from: 20170705 to 20171003
170 A2C Sharpe Ratio: 0.32170220600392174
171 =====Trading from: 20171003 to 20180103
172 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C0B6A790>
173 previous_total_asset:1151942.5679662712
174 end_total_asset:1264942.753497306
175 total_reward:113000.18553103483
176 total_cost: 5631.993270937973
177 total trades: 1439
178 Sharpe: 0.677037783650107
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): 4.113696853319804 minutes
188 =====A2C Validation from: 20171003 to 20180103
189 A2C Sharpe Ratio: 0.4350950201232581
190 =====Trading from: 20180103 to 20180405
191 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C57A4FD0>
192 previous_total_asset:1264942.753497306
193 end_total_asset:1295839.722291391
194 total_reward:30896.968794085085
195 total_cost: 2124.7538911247443
196 total trades: 358
197 Sharpe: 0.1752355124939473
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): 4.705793603261312 minutes
207 =====A2C Validation from: 20180103 to 20180405
208 A2C Sharpe Ratio: -0.020577780955852186
209 =====Trading from: 20180405 to 20180705
210 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C5305F70>
211 previous_total_asset:1295839.722291391
212 end_total_asset:1287320.882746216
213 total_reward:-8518.8395451752
214 total_cost: 6145.202135137363
215 total trades: 1050
216 Sharpe: -0.035428992224715856
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): 4.224974203109741 minutes
226 =====A2C Validation from: 20180405 to 20180705
227 A2C Sharpe Ratio: 0.02876759338997142
228 =====Trading from: 20180705 to 20181003
229 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000000208C58AEFA0>
230 previous_total_asset:1287320.882746216
231 end_total_asset:1300865.9011649422
232 total_reward:13545.018418726278
233 total_cost: 6731.803145931454
234 total trades: 958
235 Sharpe: 0.1320193650219466
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): 4.214099514484405 minutes
245 =====A2C Validation from: 20180705 to 20181003
246 A2C Sharpe Ratio: -0.06979753481383574
247 =====Trading from: 20181003 to 20190104
248 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000000208C82E0220>
249 previous_total_asset:1300865.9011649422
250 end_total_asset:1307456.0479965527
251 total_reward:6590.146831610473
252 total_cost: 580.9301786985326
253 total trades: 138
254 Sharpe: 0.22270649339531992
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): 4.718171469370524 minutes
264 =====A2C Validation from: 20181003 to 20190104
265 A2C Sharpe Ratio: -0.36391491604858456
266 =====Trading from: 20190104 to 20190405
267 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C581D6A0>
268 previous_total_asset:1307456.0479965527
269 end_total_asset:1357178.3968528758
270 total_reward:49722.348856323166
271 total_cost: 5909.988545461669
272 total trades: 1400
273 Sharpe: 0.16527724227931959
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): 4.521083680788676 minutes
283 =====A2C Validation from: 20190104 to 20190405
284 A2C Sharpe Ratio: -0.1432178338744459
285 =====Trading from: 20190405 to 20190708
286 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C33415B0>
287 previous_total_asset:1357178.3968528758
288 end_total_asset:1361747.8564307047
289 total_reward:4569.4595778288785
290 total_cost: 874.4389054075245
291 total trades: 144
292 Sharpe: 0.4351187608191908
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): 4.194713262716929 minutes
302 =====A2C Validation from: 20190405 to 20190708
303 A2C Sharpe Ratio: 0.07862357556516082
304 =====Trading from: 20190708 to 20191004
305 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C52D16A0>
306 previous_total_asset:1361747.8564307047
307 end_total_asset:1368344.7608089356
308 total_reward:6596.904378230916
309 total_cost: 1968.8431967610536
310 total trades: 335
311 Sharpe: 0.11641667428112741
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): 4.248911468187968 minutes
321 =====A2C Validation from: 20190708 to 20191004
322 A2C Sharpe Ratio: -0.017468106433980488
323 =====Trading from: 20191004 to 20200106
324 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208BAD10130>
325 previous_total_asset:1368344.7608089356
326 end_total_asset:1367119.7369435956
327 total_reward:-1225.0238653400447
328 total_cost: 287.20108991956766
329 total trades: 56
330 Sharpe: -0.3339807707448224

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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): 4.552824099858602 minutes
340 =====A2C Validation from: 20191004 to 20200106
341 A2C Sharpe Ratio: -0.17951548735755618
342 =====Trading from: 20200106 to 20200406
343 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208C5C005B0>
344 previous_total_asset:1367119.7369435956
345 end_total_asset:1348779.4569972917
346 total_reward:-18340.279946303926
347 total_cost: 837.5146871204329
348 total trades: 161
349 Sharpe: -0.4487481221190307
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): 4.605997327963511 minutes
359 =====A2C Validation from: 20200106 to 20200406
360 A2C Sharpe Ratio: -0.37787286614478244
361 =====Trading from: 20200406 to 20200707
362 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x00000208BF87E340>
363 previous_total_asset:1348779.4569972917
364 end_total_asset:1352086.4411172974
365 total_reward:3306.9841200057417
366 total_cost: 474.04174703077786
367 total trades: 115
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368 Sharpe: 0.23291091079759493
369 =====Trading Done=====
370 A2C Intrinsic Strategy took: 77.05097229878108
    minutes
371
372 Process finished with exit code 0
373
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