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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-ICAI-2020-
  master/run_DRL.py"
2 2022-04-17 02:19:12.023486: 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 2022-04-17 02:19:12.024169: 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 2022-04-17 02:19:19.757551: 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 2022-04-17 02:19:19.800174: I tensorflow/compiler/xla
/service/service.cc:168] XLA service 0x28c30ea96f0
initialized for platform Host (this does not
guarantee that XLA will be used). Devices:
24 2022-04-17 02:19:19.800757: I tensorflow/compiler/xla
/service/service.cc:176] StreamExecutor device (0
): Host, Default Version
25 2022-04-17 02:19:19.804789: W tensorflow/
stream_executor/platform/default/dso_loader.cc:59]
Could not load dynamic library 'nvcuda.dll'; dlerror
: nvcuda.dll not found
26 2022-04-17 02:19:19.805052: W tensorflow/
stream_executor/cuda/cuda_driver.cc:312] failed call
to cuInit: UNKNOWN ERROR (303)
27 2022-04-17 02:19:19.806032: I tensorflow/
stream_executor/cuda/cuda_diagnostics.cc:169]
retrieving CUDA diagnostic information for host:
LAPTOP-FJQ3PEHG
28 2022-04-17 02:19:19.807059: 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: 1000000
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34 total_timesteps: 1000000
35 Training time (A2C): 95.59398066997528 minutes
36 =====A2C Validation from: 20151002 to 20160104
37 A2C Sharpe Ratio: -0.06977146864696165
38 =====Trading from: 20160104 to 20160405
39 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C326FE220>
40 previous_total_asset:1000000
41 end_total_asset:1073579.0609475607
42 total_reward:73579.0609475607
43 total_cost: 1374.9978113816715
44 total trades: 1195
45 Sharpe: 0.22917985094915092
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: 1000000
53 total_timesteps: 1000000
54 Training time (A2C): 92.65965599616369 minutes
55 =====A2C Validation from: 20160104 to 20160405
56 A2C Sharpe Ratio: 0.22507217815806843
57 =====Trading from: 20160405 to 20160705
58 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C3C8859A0>
59 previous_total_asset:1073579.0609475607
60 end_total_asset:1082389.9963004224
61 total_reward:8810.935352861648
62 total_cost: 349.4078238433074
63 total trades: 1435
64 Sharpe: 0.038005673416262944
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: 1000000
72 total_timesteps: 1000000
73 Training time (A2C): 93.64868541558583 minutes
74 =====A2C Validation from: 20160405 to 20160705
75 A2C Sharpe Ratio: 0.11904399071262337
76 =====Trading from: 20160705 to 20161003
77 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C3EF2E700>
78 previous_total_asset:1082389.9963004224
79 end_total_asset:1093431.994377766
80 total_reward:11041.998077343684
81 total_cost: 1029.4958140753365
82 total trades: 1066
83 Sharpe: 0.05609115406993237
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: 1000000
91 total_timesteps: 1000000
92 Training time (A2C): 92.93977341651916 minutes
93 =====A2C Validation from: 20160705 to 20161003
94 A2C Sharpe Ratio: 0.10264277382020201
95 =====Trading from: 20161003 to 20170103
96 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C3EF2E820>
97 previous_total_asset:1093431.994377766
98 end_total_asset:1167015.5434750177
99 total_reward:73583.54909725161
100 total_cost: 1432.0975575660427
101 total trades: 970
102 Sharpe: 0.36334231092173574
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: 1000000
110 total_timesteps: 1000000
111 Training time (A2C): 88.07400707006454 minutes
112 =====A2C Validation from: 20161003 to 20170103
113 A2C Sharpe Ratio: 0.4495798566803015
114 =====Trading from: 20170103 to 20170404
115 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C3A727F70>
116 previous_total_asset:1167015.5434750177
117 end_total_asset:1275684.079926322
118 total_reward:108668.53645130433
119 total_cost: 1038.9563385812419
120 total trades: 911
121 Sharpe: 0.6427846873895747
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: 1000000
129 total_timesteps: 1000000
130 Training time (A2C): 101.15159196456274 minutes
131 =====A2C Validation from: 20170103 to 20170404
132 A2C Sharpe Ratio: 0.07997409749861413
133 =====Trading from: 20170404 to 20170705
134 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C4166CD00>
135 previous_total_asset:1275684.079926322
136 end_total_asset:1312473.4854206752
137 total_reward:36789.40549435327
138 total_cost: 3526.268229697417
139 total trades: 1116
140 Sharpe: 0.2385017609232352
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: 1000000
148 total_timesteps: 1000000
149 Training time (A2C): 101.60054272810618 minutes
150 =====A2C Validation from: 20170404 to 20170705
151 A2C Sharpe Ratio: 0.24459823570616562
152 =====Trading from: 20170705 to 20171003
153 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C3C3C5D90>
154 previous_total_asset:1312473.4854206752
155 end_total_asset:1335620.005843386
156 total_reward:23146.520422710804
157 total_cost: 4334.2937818465025
158 total trades: 1022
159 Sharpe: 0.10725831038604229
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: 1000000
167 total_timesteps: 1000000
168 Training time (A2C): 117.79145121177038 minutes
169 =====A2C Validation from: 20170705 to 20171003
170 A2C Sharpe Ratio: 0.14941169883840094
171 =====Trading from: 20171003 to 20180103
172 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C3E913190>
173 previous_total_asset:1335620.005843386
174 end_total_asset:1459528.7396956596
175 total_reward:123908.73385227355
176 total_cost: 1471.5234824903323
177 total trades: 1109
178 Sharpe: 0.5687436101228464
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: 1000000
186 total_timesteps: 1000000
187 Training time (A2C): 112.13254454533259 minutes
188 =====A2C Validation from: 20171003 to 20180103
189 A2C Sharpe Ratio: 0.30159782482386277
190 =====Trading from: 20180103 to 20180405
191 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C374627C0>
192 previous_total_asset:1459528.7396956596
193 end_total_asset:1491336.822496474
194 total_reward:31808.082800814416
195 total_cost: 2108.0385541551227
196 total trades: 243
197 Sharpe: 0.16181848475248065
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: 1000000
205 total_timesteps: 1000000
206 Training time (A2C): 105.88511748313904 minutes
207 =====A2C Validation from: 20180103 to 20180405
208 A2C Sharpe Ratio: -0.07021004051026189
209 =====Trading from: 20180405 to 20180705
210 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C39C3A7F0>
211 previous_total_asset:1491336.822496474
212 end_total_asset:1479259.7490418423
213 total_reward:-12077.073454631725
214 total_cost: 5739.877829705575
215 total trades: 860
216 Sharpe: -0.032462215208500365
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: 1000000
224 total_timesteps: 1000000
225 Training time (A2C):  107.46172297795614  minutes
226 =====A2C Validation from:  20180405 to  20180705
227 A2C Sharpe Ratio:  0.08189306532550945
228 =====Trading from:  20180705 to  20181003
229 Used Model:  <stable_baselines.a2c.a2c.A2C object at
    0x00000028C3768EA30>
230 previous_total_asset:1479259.7490418423
231 end_total_asset:1499172.3121928927
232 total_reward:19912.56315105036
233 total_cost:  4293.036122569142
234 total trades:  507
235 Sharpe:  0.24574677096083364
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: 1000000
243 total_timesteps: 1000000
244 Training time (A2C):  127.42963324387868  minutes
245 =====A2C Validation from:  20180705 to  20181003
246 A2C Sharpe Ratio:  0.19900288775896346
247 =====Trading from:  20181003 to  20190104
248 Used Model:  <stable_baselines.a2c.a2c.A2C object at
    0x00000028C377400A0>
249 previous_total_asset:1499172.3121928927
250 end_total_asset:1509109.4092432114
251 total_reward:9937.097050318727
252 total_cost:  1089.4810470443415
253 total trades:  145
254 Sharpe:  0.1679499687244171
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: 1000000
262 total_timesteps: 1000000
263 Training time (A2C): 95.96414744853973 minutes
264 =====A2C Validation from: 20181003 to 20190104
265 A2C Sharpe Ratio: -0.3503398556480107
266 =====Trading from: 20190104 to 20190405
267 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C3C77B070>
268 previous_total_asset:1509109.4092432114
269 end_total_asset:1579834.63543668
270 total_reward:70725.22619346855
271 total_cost: 1623.1805595834671
272 total trades: 1086
273 Sharpe: 0.1786489977410602
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: 1000000
281 total_timesteps: 1000000
282 Training time (A2C): 81.14528482755026 minutes
283 =====A2C Validation from: 20190104 to 20190405
284 A2C Sharpe Ratio: -0.010640593055026222
285 =====Trading from: 20190405 to 20190708
286 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C3E931340>
287 previous_total_asset:1579834.63543668
288 end_total_asset:1582642.2282026368
289 total_reward:2807.5927659568843
290 total_cost: 1442.6468984568346
291 total trades: 144
292 Sharpe: 0.13737570282841027
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: 1000000
300 total_timesteps: 1000000
301 Training time (A2C): 80.12566910584768 minutes
302 =====A2C Validation from: 20190405 to 20190708
303 A2C Sharpe Ratio: 0.2583073868832024
304 =====Trading from: 20190708 to 20191004
305 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C37762E50>
306 previous_total_asset:1582642.2282026368
307 end_total_asset:1579417.9896771132
308 total_reward:-3224.2385255235713
309 total_cost: 2618.078646687813
310 total trades: 264
311 Sharpe: -0.03692284068686806
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: 1000000
319 total_timesteps: 1000000
320 Training time (A2C): 80.90399186611175 minutes
321 =====A2C Validation from: 20190708 to 20191004
322 A2C Sharpe Ratio: -0.08101857127397687
323 =====Trading from: 20191004 to 20200106
324 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C363980A0>
325 previous_total_asset:1579417.9896771132
326 end_total_asset:1578678.9934171143
327 total_reward:-738.9962599989958
328 total_cost: 379.0884203602981
329 total trades: 62
330 Sharpe: -0.18382902880793853

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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: 1000000
338 total_timesteps: 1000000
339 Training time (A2C): 84.54830103715261 minutes
340 =====A2C Validation from: 20191004 to 20200106
341 A2C Sharpe Ratio: -0.06118981347958895
342 =====Trading from: 20200106 to 20200406
343 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C3D254A90>
344 previous_total_asset:1578678.9934171143
345 end_total_asset:1555982.286624524
346 total_reward:-22696.70679259021
347 total_cost: 1274.7937807442993
348 total trades: 202
349 Sharpe: -0.4411848640651584
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: 1000000
357 total_timesteps: 1000000
358 Training time (A2C): 137.71043026049932 minutes
359 =====A2C Validation from: 20200106 to 20200406
360 A2C Sharpe Ratio: -0.350548571683824
361 =====Trading from: 20200406 to 20200707
362 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x0000028C416537C0>
363 previous_total_asset:1555982.286624524
364 end_total_asset:1558554.6355355976
365 total_reward:2572.3489110735245
366 total_cost: 559.0219677742766
367 total trades: 70

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368 Sharpe: 0.17242253557406667
369 =====Trading Done=====
370 A2C Intrinsic Strategy took: 1797.2414866646131
    minutes
371
372 Process finished with exit code 0
373
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