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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 09:26:10.047621: 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 09:26:10.049468: 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 09:26:18.019487: 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 09:26:18.061871: I tensorflow/compiler/xla
/service/service.cc:168] XLA service 0x1a92e77a720
initialized for platform Host (this does not
guarantee that XLA will be used). Devices:
24 2022-04-19 09:26:18.062250: I tensorflow/compiler/xla
/service/service.cc:176] StreamExecutor device (0
): Host, Default Version
25 2022-04-19 09:26:18.066154: 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 09:26:18.066428: W tensorflow/
stream_executor/cuda/cuda_driver.cc:312] failed call
to cuInit: UNKNOWN ERROR (303)
27 2022-04-19 09:26:18.068348: I tensorflow/
stream_executor/cuda/cuda_diagnostics.cc:169]
retrieving CUDA diagnostic information for host:
LAPTOP-FJQ3PEHG
28 2022-04-19 09:26:18.070575: 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): 5.315074026584625 minutes
36 =====A2C Validation from: 20151002 to 20160104
37 A2C Sharpe Ratio: 0.11365238827481029
38 =====Trading from: 20160104 to 20160405
39 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A92FED0220>
40 previous_total_asset:1000000
41 end_total_asset:1073582.630842143
42 total_reward:73582.63084214297
43 total_cost: 4657.488670773472
44 total trades: 1310
45 Sharpe: 0.2948245660989578
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): 5.160049625237783 minutes
55 =====A2C Validation from: 20160104 to 20160405
56 A2C Sharpe Ratio: 0.11732108033146928
57 =====Trading from: 20160405 to 20160705
58 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A93A126CA0>
59 previous_total_asset:1073582.630842143
60 end_total_asset:1090325.2196437838
61 total_reward:16742.588801640784
62 total_cost: 4939.365339699133
63 total trades: 1369
64 Sharpe: 0.0679601731035572
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): 6.44493293762207 minutes
74 =====A2C Validation from: 20160405 to 20160705
75 A2C Sharpe Ratio: -0.020830266708372965
76 =====Trading from: 20160705 to 20161003
77 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A9377D91C0>
78 previous_total_asset:1090325.2196437838
79 end_total_asset:1104565.2188601173
80 total_reward:14239.999216333497
81 total_cost: 2360.256867300735
82 total trades: 1284
83 Sharpe: 0.07944098937518138
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): 5.850296795368195 minutes
93 =====A2C Validation from: 20160705 to 20161003
94 A2C Sharpe Ratio: -0.0018295617671214594
95 =====Trading from: 20161003 to 20170103
96 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A93CE68580>
97 previous_total_asset:1104565.2188601173
98 end_total_asset:1153106.8266691843
99 total_reward:48541.607809067005
100 total_cost: 3887.4814352816097
101 total trades: 1451
102 Sharpe: 0.3042719934386097
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): 19.10915168126424 minutes
112 =====A2C Validation from: 20161003 to 20170103
113 A2C Sharpe Ratio: 0.5029665647820794
114 =====Trading from: 20170103 to 20170404
115 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A9377D9FA0>
116 previous_total_asset:1153106.8266691843
117 end_total_asset:1231340.9225539702
118 total_reward:78234.09588478599
119 total_cost: 2958.9165966286896
120 total trades: 1274
121 Sharpe: 0.41078548534670295
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): 2.9014301776885985 minutes
131 =====A2C Validation from: 20170103 to 20170404
132 A2C Sharpe Ratio: 0.5398238284612118
133 =====Trading from: 20170404 to 20170705
134 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A93CDCC5B0>
135 previous_total_asset:1231340.9225539702
136 end_total_asset:1249466.4555004165
137 total_reward:18125.532946446212
138 total_cost: 5719.408356875543
139 total trades: 1208
140 Sharpe: 0.1421554708177782
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): 3.1740084727605185 minutes
150 =====A2C Validation from: 20170404 to 20170705
151 A2C Sharpe Ratio: 0.024009024126252814
152 =====Trading from: 20170705 to 20171003
153 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A93FE34280>
154 previous_total_asset:1249466.4555004165
155 end_total_asset:1288067.707281454
156 total_reward:38601.25178103754
157 total_cost: 6777.432145182856
158 total trades: 1422
159 Sharpe: 0.22464220082727965
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): 3.5713988105456034 minutes
169 =====A2C Validation from: 20170705 to 20171003
170 A2C Sharpe Ratio: 0.019120303462919857
171 =====Trading from: 20171003 to 20180103
172 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A9351C7310>
173 previous_total_asset:1288067.707281454
174 end_total_asset:1405678.7170737933
175 total_reward:117611.00979233929
176 total_cost: 8631.383734015908
177 total trades: 1502
178 Sharpe: 0.5996441179963689
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): 4.38713405529658 minutes
188 =====A2C Validation from: 20171003 to 20180103
189 A2C Sharpe Ratio: 0.3356044769739061
190 =====Trading from: 20180103 to 20180405
191 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A937E6EBE0>
192 previous_total_asset:1405678.7170737933
193 end_total_asset:1423956.4383794256
194 total_reward:18277.721305632265
195 total_cost: 1446.4545360669454
196 total trades: 291
197 Sharpe: 0.1569320583930116
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): 4.02103541692098 minutes
207 =====A2C Validation from: 20180103 to 20180405
208 A2C Sharpe Ratio: 0.003272182706837098
209 =====Trading from: 20180405 to 20180705
210 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A93CCFAAF0>
211 previous_total_asset:1423956.4383794256
212 end_total_asset:1412376.337198919
213 total_reward:-11580.101180506637
214 total_cost: 6287.082894254039
215 total trades: 1104
216 Sharpe: -0.0565536561029324
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):  4.187756085395813  minutes
226 =====A2C Validation from:  20180405 to  20180705
227 A2C Sharpe Ratio:  -0.029126691538734456
228 =====Trading from:  20180705 to  20181003
229 Used Model:  <stable_baselines.a2c.a2c.A2C object at
    0x0000001A9353CC940>
230 previous_total_asset:1412376.337198919
231 end_total_asset:1409897.6700143095
232 total_reward:-2478.667184609454
233 total_cost:  6932.852026713764
234 total trades:  1010
235 Sharpe:  -0.019936730775669886
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):  4.65365149974823  minutes
245 =====A2C Validation from:  20180705 to  20181003
246 A2C Sharpe Ratio:  0.03023413509982225
247 =====Trading from:  20181003 to  20190104
248 Used Model:  <stable_baselines.a2c.a2c.A2C object at
    0x0000001A937978550>
249 previous_total_asset:1409897.6700143095
250 end_total_asset:1417414.3753988997
251 total_reward:7516.705384590197
252 total_cost:  666.4140258512733
253 total trades:  155
254 Sharpe:  0.2902424263104969
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): 4.328145265579224 minutes
264 =====A2C Validation from: 20181003 to 20190104
265 A2C Sharpe Ratio: -0.35975370435847376
266 =====Trading from: 20190104 to 20190405
267 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A9380B3250>
268 previous_total_asset:1417414.3753988997
269 end_total_asset:1408042.288074513
270 total_reward:-9372.087324386695
271 total_cost: 9096.099502233763
272 total trades: 1550
273 Sharpe: -0.009385788010324192
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): 3.804291371504466 minutes
283 =====A2C Validation from: 20190104 to 20190405
284 A2C Sharpe Ratio: -0.032200639607659454
285 =====Trading from: 20190405 to 20190708
286 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A93A624940>
287 previous_total_asset:1408042.288074513
288 end_total_asset:1413371.2017079764
289 total_reward:5328.913633463439
290 total_cost: 1144.722922499086
291 total trades: 156
292 Sharpe: 0.24297345901117776
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): 3.5405264218648274 minutes
302 =====A2C Validation from: 20190405 to 20190708
303 A2C Sharpe Ratio: 0.2047419052911235
304 =====Trading from: 20190708 to 20191004
305 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A93A376F10>
306 previous_total_asset:1413371.2017079764
307 end_total_asset:1410894.400463614
308 total_reward:-2476.8012443624903
309 total_cost: 1852.1312838061683
310 total trades: 348
311 Sharpe: -0.055934231129211184
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): 3.515880771478017 minutes
321 =====A2C Validation from: 20190708 to 20191004
322 A2C Sharpe Ratio: -0.2171164378690269
323 =====Trading from: 20191004 to 20200106
324 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A935159BE0>
325 previous_total_asset:1410894.400463614
326 end_total_asset:1409820.393913291
327 total_reward:-1074.0065503229853
328 total_cost: 278.4849930273056
329 total trades: 64
330 Sharpe: -0.3827156072500481

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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): 3.693636910120646 minutes
340 =====A2C Validation from: 20191004 to 20200106
341 A2C Sharpe Ratio: -0.36787981897086086
342 =====Trading from: 20200106 to 20200406
343 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A93FAEEF40>
344 previous_total_asset:1409820.393913291
345 end_total_asset:1389692.2345770388
346 total_reward:-20128.159336252138
347 total_cost: 737.7355150649738
348 total trades: 137
349 Sharpe: -0.4067436082478129
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): 4.582375423113505 minutes
359 =====A2C Validation from: 20200106 to 20200406
360 A2C Sharpe Ratio: -0.4564467980789859
361 =====Trading from: 20200406 to 20200707
362 Used Model: <stable_baselines.a2c.a2c.A2C object at
    0x000001A93CB6B580>
363 previous_total_asset:1389692.2345770388
364 end_total_asset:1391487.981610107
365 total_reward:1795.7470330682117
366 total_cost: 562.6284197126407
367 total trades: 121

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368 Sharpe: 0.1369244622789528
369 =====Trading Done=====
370 A2C Intrinsic Strategy took: 92.71346559524537
    minutes
371
372 Process finished with exit code 0
373
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