

## Plots & tables

Thursday, 9 January 2025 10:46

Memory kneedle (50 runs) in MB:

- **Mean (Average):** 7.658415
- **Standard Deviation:** 0.000467
- **Variance:** 2.18e-07 (square of the standard deviation).

Memory gradient (50 runs) in MB:

- **Mean:** 7.6494
- **Standard Deviation:** 0.0004
- **Variance:** 1.7522 × 10<sup>-7</sup>

0.00041859 std

Runtime Variation:

Kneedle:

```
average total time: 14.269513340000001
average algo time: 5.96061378
average plot time: 6.005544140000005
average render time: 2.30335538
variance total time: 3.7505337940794248
variance algo time: 0.7613565742627317
variance plot time: 0.8696089770326404
variance render time: 0.10585426800215558
std total time: 1.9366294932380392
std algo time: 0.8725574905200985
std plot time: 0.9325282714388022
std render time: 0.3253525288086072
```

Gradient:

```
average total time: 15.811540800000003
average algo time: 6.779449719999999
average plot time: 6.45294488
average render time: 2.579146159999996
variance total time: 7.191393216151
variance algo time: 2.8600306022154416
variance plot time: 0.7832110585171855
variance render time: 0.20196290302197437
std total time: 2.6816773139494243
std algo time: 1.6911625002392412
std plot time: 0.8849921234209859
std render time: 0.4494028293435349
```

Runtime Comparison different datasets:

Kneedle:

50 samples:

```
Table size: 50 samples; algorithm: kneedle
df_list size: (1000, 3)
Rows reads per sample df: 50
Rows combined df: 1000
Current memory usage: 5.7606 MB
Peak memory usage: 12.7840 MB
Total runtime: 36.0417 seconds
Algorithm time: 27.1930 seconds
Plotting time: 6.5587 seconds
Rendering time: 2.2900 seconds
```

without table adjusting time

```
Table size: 50 samples; algorithm: kneedle
df_list size: (1000, 3)
Knee point: 6709
Rows reads per sample df: 50
Rows combined df: 1000
Current memory usage: 5.7624 MB
Peak memory usage: 12.7841 MB
Total runtime: 26.1885 seconds
Algorithm time: 20.4411 seconds
Plotting time: 4.1130 seconds
Rendering time: 1.6344 seconds
```

```
100:
Table size: 100 samples; algorithm: kneedle
Rows reads per sample: 100
Rows reads per sample df: 100
Rows combined df: 2000
Current memory usage: 7.4631 MB
Peak memory usage: 24.3968 MB
Total runtime: 69.4024 seconds
Algorithm time: 61.2303 seconds
Plotting time: 5.6133 seconds
Rendering time: 2.5588 seconds
```

```
Table size: 100 samples; algorithm: kneedle
df_list size: (2000, 3)
Knee point: 6282
Rows reads per sample df: 100
Rows combined df: 2000
Current memory usage: 7.4637 MB
Peak memory usage: 24.3968 MB
Total runtime: 54.4153 seconds
Algorithm time: 48.9870 seconds
Plotting time: 3.8727 seconds
Rendering time: 1.5556 seconds
```

```
300:
Table size: 300 samples; algorithm: kneedle
df_list size: (6000, 3)
Rows reads per sample df: 300
Rows combined df: 6000
Current memory usage: 17.2388 MB
Peak memory usage: 70.8474 MB
Total runtime: 310.1204 seconds
Algorithm time: 300.8633 seconds
Plotting time: 6.6817 seconds
Rendering time: 2.5754 seconds
```

```
Table size: 50 samples; algorithm: gradient
df_list size: (1000, 3)
Knee point: 35005
Rows reads per sample df: 50
Rows combined df: 1000
```

...

```
Total runtime: 310.1204 seconds
Algorithm time: 300.8633 seconds
Plotting time: 6.6817 seconds
Rendering time: 2.5754 seconds
```

```
500:
Table size: 500 samples; algorithm: kneedle
df_list size: (10000, 3)
Rows reads per sample df: 500
Rows combined df: 10000
Current memory usage: 29.9391 MB
Peak memory usage: 117.2979 MB
Total runtime: 699.6122 seconds
Algorithm time: 688.6857 seconds
Plotting time: 7.8913 seconds
Rendering time: 3.0352 seconds
```

```
1000:
Table size: 1000 samples; algorithm: kneedle
df_list size: (20000, 3)
Knee point: 6388
Rows reads per sample df: 1000
Rows combined df: 20000
Current memory usage: 71.4801 MB
Peak memory usage: 233.4245 MB
Total runtime: 1245.8938 seconds
Algorithm time: 1236.7636 seconds
Plotting time: 6.6538 seconds
Rendering time: 2.4765 seconds
```

```
Gradient:
50:
Table size: 50 samples; algorithm: gradient
df_list size: (1000, 3)
Rows reads per sample df: 50
Rows combined df: 1000
Current memory usage: 5.7511 MB
Peak memory usage: 12.7840 MB
Total runtime: 41.7693 seconds
Algorithm time: 33.0610 seconds
Plotting time: 6.6233 seconds
Rendering time: 2.0851 seconds
```

```
100:
Table size: 100 samples; algorithm: gradient
df_list size: (2000, 3)
Rows reads per sample df: 100
Rows combined df: 2000
Current memory usage: 7.4524 MB
Peak memory usage: 24.3968 MB
Total runtime: 84.9672 seconds
Algorithm time: 77.3266 seconds
Plotting time: 5.5543 seconds
Rendering time: 2.0863 seconds
```

```
300:
Table size: 300 samples; algorithm: gradient
df_list size: (6000, 3)
Rows reads per sample df: 300
Rows combined df: 6000
Current memory usage: 17.2285 MB
Peak memory usage: 70.8474 MB
Total runtime: 328.0171 seconds
Algorithm time: 319.3031 seconds
Plotting time: 6.3999 seconds
Rendering time: 2.3142 seconds
```

```
500:
Table size: 500 samples; algorithm: gradient
df_list size: (10000, 3)
Rows reads per sample df: 500
Rows combined df: 10000
Current memory usage: 29.9295 MB
Peak memory usage: 117.2980 MB
Total runtime: 658.8486 seconds
Algorithm time: 645.7675 seconds
Plotting time: 9.3399 seconds
Rendering time: 3.7412 seconds
```

```
1000:
Table size: 1000 samples; algorithm: gradient
df_list size: (20000, 3)
Knee point: 31851
Rows reads per sample df: 1000
Rows combined df: 20000
Current memory usage: 71.4725 MB
Peak memory usage: 233.4244 MB
Total runtime: 1249.4438 seconds
Algorithm time: 1240.5144 seconds
Plotting time: 6.3939 seconds
Rendering time: 2.5354 seconds
```

```
Table size: 50 samples; algorithm: gradient
df_list size: (1000, 3)
Knee point: 35005
Rows reads per sample df: 50
Rows combined df: 1000
Current memory usage: 5.7519 MB
Peak memory usage: 12.7840 MB
Total runtime: 23.7275 seconds
Algorithm time: 18.7645 seconds
Plotting time: 3.4682 seconds
Rendering time: 1.4948 seconds
```

```
Table size: 100 samples; algorithm: gradient
df_list size: (2000, 3)
Knee point: 32956
Rows reads per sample df: 100
Rows combined df: 2000
Current memory usage: 7.4519 MB
Peak memory usage: 24.3968 MB
Total runtime: 49.9018 seconds
Algorithm time: 44.5159 seconds
Plotting time: 3.7352 seconds
Rendering time: 1.6506 seconds
```

```
Knee point comparison:  
Kneedle:  
cmi 100 samples:  
Table size: 100 samples; algorithm: kneedle  
df_list size: (2000, 3)  
Knee point: 6282  
Rows reads per sample df: 100  
Rows combined df: 2000  
Current memory usage: 7.4620 MB  
Peak memory usage: 24.3968 MB  
Total runtime: 81.3442 seconds  
Algorithm time: 72.6300 seconds  
Plotting time: 6.5202 seconds  
Rendering time: 2.1940 seconds
```

```
moving pictures:  
Table size: 34 samples; algorithm: kneedle  
df_list size: (680, 3)  
Knee point: 694  
Rows reads per sample df: 34  
Rows combined df: 680  
Current memory usage: 4.1742 MB  
Peak memory usage: 7.6280 MB  
Total runtime: 13.6528 seconds  
Algorithm time: 5.2899 seconds  
Plotting time: 6.0703 seconds  
Rendering time: 2.2926 seconds
```

```
atacama soil:  
Table size: 54 samples; algorithm: kneedle  
df_list size: (1080, 3)  
Knee point: 185  
Rows reads per sample df: 54  
Rows combined df: 1080  
Current memory usage: 4.3334 MB  
Peak memory usage: 8.0378 MB  
Total runtime: 22.3482 seconds  
Algorithm time: 14.0892 seconds  
Plotting time: 5.7809 seconds  
Rendering time: 2.4781 seconds
```

```
parkinson mouse:  
Table size: 48 samples; algorithm: kneedle  
df_list size: (960, 3)  
Knee point: 602  
Rows reads per sample df: 48  
Rows combined df: 960  
Current memory usage: 4.2999 MB  
Peak memory usage: 8.0253 MB  
Total runtime: 14.7760 seconds  
Algorithm time: 5.7640 seconds  
Plotting time: 6.7180 seconds  
Rendering time: 2.2941 seconds
```

```
Gradient:  
cmi 100 samples:  
Table size: 100 samples; algorithm: gradient  
df_list size: (2000, 3)  
Knee point: 32956  
Rows reads per sample df: 100  
Rows combined df: 2000  
Current memory usage: 7.4521 MB  
Peak memory usage: 24.3968 MB  
Total runtime: 70.3547 seconds  
Algorithm time: 62.6809 seconds  
Plotting time: 5.7018 seconds  
Rendering time: 1.9720 seconds
```

```
moving pictures:  
Table size: 34 samples; algorithm: gradient  
df_list size: (680, 3)  
Knee point: 2375  
Rows reads per sample df: 34  
Rows combined df: 680  
Current memory usage: 4.1644 MB  
Peak memory usage: 7.6193 MB  
Total runtime: 12.0254 seconds  
Algorithm time: 4.3104 seconds  
Plotting time: 5.5830 seconds  
Rendering time: 2.1320 seconds
```

```
atacama soil:
```

```

Table size: 54 samples; algorithm: gradient
df_list size: (1080, 3)
Knee point: 668
Rows reads per sample df: 54
Rows combined df: 1080
Current memory usage: 4.3232 MB
Peak memory usage: 8.0268 MB
Total runtime: 22.1843 seconds
Algorithm time: 14.1327 seconds
Plotting time: 5.9513 seconds
Rendering time: 2.1003 seconds

```

```

parkinson mouse:
Table size: 48 samples; algorithm: gradient
df_list size: (960, 3)
Knee point: 2324
Rows reads per sample df: 48
Rows combined df: 960
Current memory usage: 4.2880 MB
Peak memory usage: 8.0135 MB
Total runtime: 13.5101 seconds
Algorithm time: 4.2711 seconds
Plotting time: 6.4723 seconds
Rendering time: 2.7666 seconds

```

Steps experiment (mp data & 10 iter):

```

Kneedle:
5:
steps: 5
iterations: 10
Table size: 34 samples; algorithm: kneedle
df_list size: (170, 3)
Knee point: 759
Rows reads per sample df: 34
Rows combined df: 170
Current memory usage: 4.0615 MB
Peak memory usage: 7.2581 MB
Total runtime: 5.0935 seconds
Algorithm time: 0.7093 seconds
Plotting time: 3.1214 seconds
Rendering time: 1.2628 seconds

```

```

10:
steps: 10
iterations: 10
Table size: 34 samples; algorithm: kneedle
df_list size: (340, 3)
Knee point: 694
Rows reads per sample df: 34
Rows combined df: 340
Current memory usage: 4.0881 MB
Peak memory usage: 7.2338 MB
Total runtime: 6.6898 seconds
Algorithm time: 1.5585 seconds
Plotting time: 3.7586 seconds
Rendering time: 1.3727 seconds

```

```

20:
steps: 20
iterations: 10
Table size: 34 samples; algorithm: kneedle
df_list size: (680, 3)
Knee point: 694
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1740 MB
Peak memory usage: 7.6281 MB
Total runtime: 7.9924 seconds
Algorithm time: 2.9073 seconds
Plotting time: 3.7029 seconds
Rendering time: 1.3822 seconds

```

```

50:
steps: 50
iterations: 10
Table size: 34 samples; algorithm: kneedle
df_list size: (1700, 3)
Knee point: 798
Rows reads per sample df: 34
Rows combined df: 1700
Current memory usage: 4.2380 MB
Peak memory usage: 8.3582 MB
Total runtime: 12.0668 seconds
Algorithm time: 7.0582 seconds
Plotting time: 3.6036 seconds
Rendering time: 1.4049 seconds

```

```

99:
steps: 99
iterations: 10
Table size: 34 samples; algorithm: kneedle
df_list size: (3366, 3)
Knee point: 788
Rows reads per sample df: 34

```

```

Gradient:
5:
steps: 5
iterations: 10
Table size: 34 samples; algorithm: gradient
df_list size: (170, 3)
Knee point: 3016
Rows reads per sample df: 34
Rows combined df: 170
Current memory usage: 4.0514 MB
Peak memory usage: 7.2493 MB
Total runtime: 5.4109 seconds
Algorithm time: 0.7643 seconds
Plotting time: 3.3011 seconds
Rendering time: 1.3455 seconds

```

```

10:
steps: 10
iterations: 10
Table size: 34 samples; algorithm: gradient
df_list size: (340, 3)
Knee point: 2938
Rows reads per sample df: 34
Rows combined df: 340
Current memory usage: 4.0777 MB
Peak memory usage: 7.2244 MB
Total runtime: 5.9347 seconds
Algorithm time: 1.3951 seconds
Plotting time: 3.2610 seconds
Rendering time: 1.2785 seconds

```

```

20:
steps: 20
iterations: 10
Table size: 34 samples; algorithm: gradient
df_list size: (680, 3)
Knee point: 2375
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1641 MB
Peak memory usage: 7.6195 MB
Total runtime: 7.9394 seconds
Algorithm time: 3.0348 seconds
Plotting time: 3.5100 seconds
Rendering time: 1.3946 seconds

```

```

50:
steps: 50
iterations: 10
Table size: 34 samples; algorithm: gradient
df_list size: (1700, 3)
Knee point: 1239
Rows reads per sample df: 34
Rows combined df: 1700
Current memory usage: 4.3023 MB
Peak memory usage: 8.3474 MB
Total runtime: 12.7155 seconds
Algorithm time: 7.5832 seconds
Plotting time: 3.7042 seconds
Rendering time: 1.4282 seconds

```

```

99:
steps: 99
iterations: 10
Table size: 34 samples; algorithm: gradient
df_list size: (3366, 3)
Knee point: 746
Rows reads per sample df: 34

```

```
steps: 99
iterations: 10
Table size: 34 samples; algorithm: kneedle
df_list size: (3366, 3)
Knee point: 788
Rows reads per sample df: 34
Rows combined df: 3366
Current memory usage: 4.6174 MB
Peak memory usage: 9.3319 MB
Total runtime: 19.9246 seconds
Algorithm time: 14.7396 seconds
Plotting time: 3.6637 seconds
Rendering time: 1.5214 seconds
```

```
iterations: 10
Table size: 34 samples; algorithm: gradient
df_list size: (3366, 3)
Knee point: 746
Rows reads per sample df: 34
Rows combined df: 3366
Current memory usage: 4.6036 MB
Peak memory usage: 9.3213 MB
Total runtime: 20.7542 seconds
Algorithm time: 15.2818 seconds
Plotting time: 3.9343 seconds
Rendering time: 1.5380 seconds
```

Iteration experiment (mp & 20 steps):  
Kneedle:

5:  
steps: 20
iterations: 5
Table size: 34 samples; algorithm: kneedle
df\_list size: (680, 3)
Knee point: 744
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1739 MB
Peak memory usage: 7.6277 MB
Total runtime: 6.5044 seconds
Algorithm time: 1.5100 seconds
Plotting time: 3.5412 seconds
Rendering time: 1.4532 seconds

Gradient:  
5:  
steps: 20
iterations: 5
Table size: 34 samples; algorithm: gradient
df\_list size: (680, 3)
Knee point: 2115
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1629 MB
Peak memory usage: 7.6176 MB
Total runtime: 6.8178 seconds
Algorithm time: 1.5996 seconds
Plotting time: 3.7000 seconds
Rendering time: 1.5181 seconds

10:  
steps: 20
iterations: 10
Table size: 34 samples; algorithm: kneedle
df\_list size: (680, 3)
Knee point: 694
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1740 MB
Peak memory usage: 7.6281 MB
Total runtime: 7.9924 seconds
Algorithm time: 2.9073 seconds
Plotting time: 3.7029 seconds
Rendering time: 1.3822 seconds

10:  
steps: 20
iterations: 10
Table size: 34 samples; algorithm: gradient
df\_list size: (680, 3)
Knee point: 2375
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1634 MB
Peak memory usage: 7.6183 MB
Total runtime: 8.5147 seconds
Algorithm time: 3.2948 seconds
Plotting time: 3.7105 seconds
Rendering time: 1.5094 seconds

20:  
steps: 20
iterations: 20
Table size: 34 samples; algorithm: kneedle
df\_list size: (680, 3)
Knee point: 708
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1757 MB
Peak memory usage: 7.6313 MB
Total runtime: 9.6004 seconds
Algorithm time: 5.3315 seconds
Plotting time: 3.0490 seconds
Rendering time: 1.2199 seconds

20:  
steps: 20
iterations: 20
Table size: 34 samples; algorithm: gradient
df\_list size: (680, 3)
Knee point: 2437
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1653 MB
Peak memory usage: 7.6215 MB
Total runtime: 11.2501 seconds
Algorithm time: 6.2664 seconds
Plotting time: 3.5276 seconds
Rendering time: 1.4560 seconds

50:  
steps: 20
iterations: 50
Table size: 34 samples; algorithm: kneedle
df\_list size: (680, 3)
Knee point: 709
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1808 MB
Peak memory usage: 7.6366 MB
Total runtime: 19.0692 seconds
Algorithm time: 14.0377 seconds
Plotting time: 3.6794 seconds
Rendering time: 1.3521 seconds

50:  
steps: 20
iterations: 50
Table size: 34 samples; algorithm: gradient
df\_list size: (680, 3)
Knee point: 2793
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1704 MB
Peak memory usage: 7.6275 MB
Total runtime: 20.5176 seconds
Algorithm time: 15.6166 seconds
Plotting time: 3.3739 seconds
Rendering time: 1.5271 seconds

99:  
steps: 20
iterations: 99
Table size: 34 samples; algorithm: kneedle
df\_list size: (680, 3)
Knee point: 690
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1957 MB
Peak memory usage: 7.6816 MB
Total runtime: 37.9146 seconds
Algorithm time: 32.9482 seconds
Plotting time: 3.5319 seconds
Rendering time: 1.4346 seconds

99:  
steps: 20
iterations: 99
Table size: 34 samples; algorithm: gradient
df\_list size: (680, 3)
Knee point: 2860
Rows reads per sample df: 34
Rows combined df: 680
Current memory usage: 4.1852 MB
Peak memory usage: 7.6718 MB
Total runtime: 35.9833 seconds
Algorithm time: 30.8150 seconds
Plotting time: 3.7531 seconds
Rendering time: 1.4152 seconds