

Sorting_Runtimes

March 3, 2020

```
In [1]: def sort (x):  
        n = len(x)  
        for i in range(0,n):  
            for j in range(i,n):  
                if x[i] > x[j]:  
                    x[i],x[j] = x[j],x[i]
```

```
In [2]: x = [3,1,7,9]  
        print(x)  
        sort(x)  
        print(x)
```

```
[3, 1, 7, 9]  
[1, 3, 7, 9]
```

```
In [3]: import random  
        def make_random(n):  
            return [random.randint(1,1000) for i in range(0,n)]
```

```
In [4]: def check(x):  
        n = len(x)  
        for i in range(1,n):  
            assert x[i-1] <= x[i]
```

```
In [5]: x = make_random(10)  
        print(x)  
        sort(x)  
        check(x)  
        print(x)
```

```
[364, 632, 685, 148, 120, 365, 997, 817, 288, 891]  
[120, 148, 288, 364, 365, 632, 685, 817, 891, 997]
```

```
In [6]: import time  
        def time_sort(x):  
            # if len(x) < 100:
```

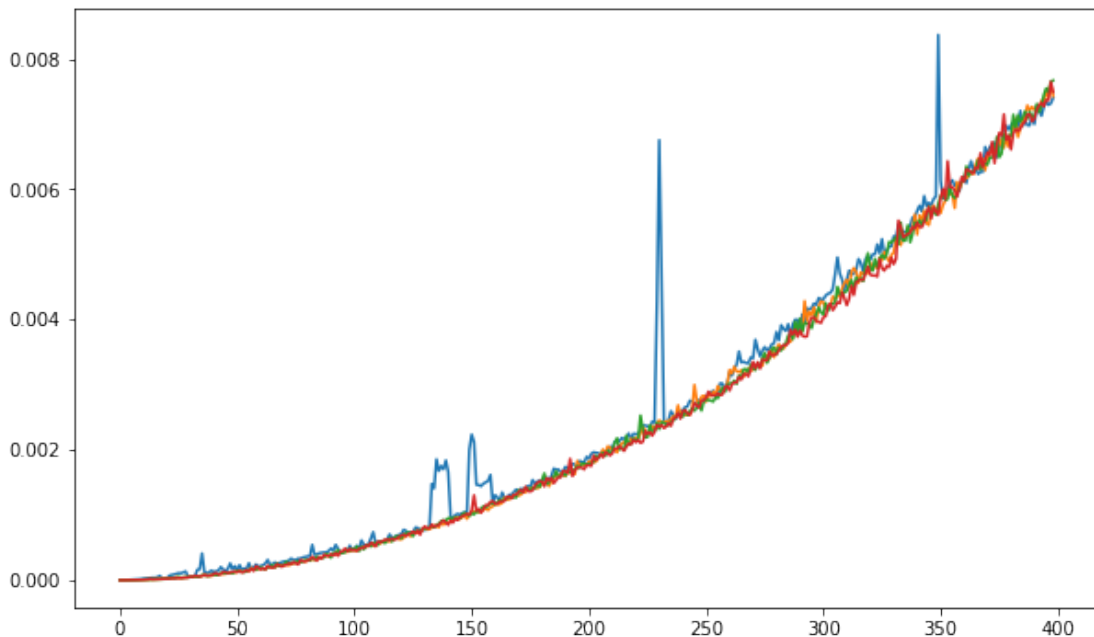
```
# print(x)
start = time.time()
sort(x)
end = time.time();
check(x) # sanity
return end - start
```

```
In [8]: print(time_sort(make_random(4000)))
        print(time_sort([i for i in range(0,4000)]))
        print(time_sort([-i for i in range(0,4000)]))
```

```
0.6660230159759521
0.49580955505371094
1.124185562133789
```

```
In [9]: import matplotlib.pyplot as plt
        def show_time(n,m):
            durations = []
            for i in range(0,m):
                durations.append([time_sort(make_random(i)) for i in range(1,n)])
            plt.figure(figsize=(10,6))
            for i in range(0,m):
                plt.plot(durations[i])
            plt.show()
```

```
In [10]: show_time(400,4)
```



In []: