

Sorting_Runtimes

February 22, 2021

```
[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]
```

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

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

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

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

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

```
[252, 198, 262, 474, 400, 676, 580, 582, 592, 847]  
[198, 252, 262, 400, 474, 580, 582, 592, 676, 847]
```

```
[6]: import time  
def time_sort(x):  
    # if len(x) < 100:  
    #     print(x)  
    start = time.time()
```

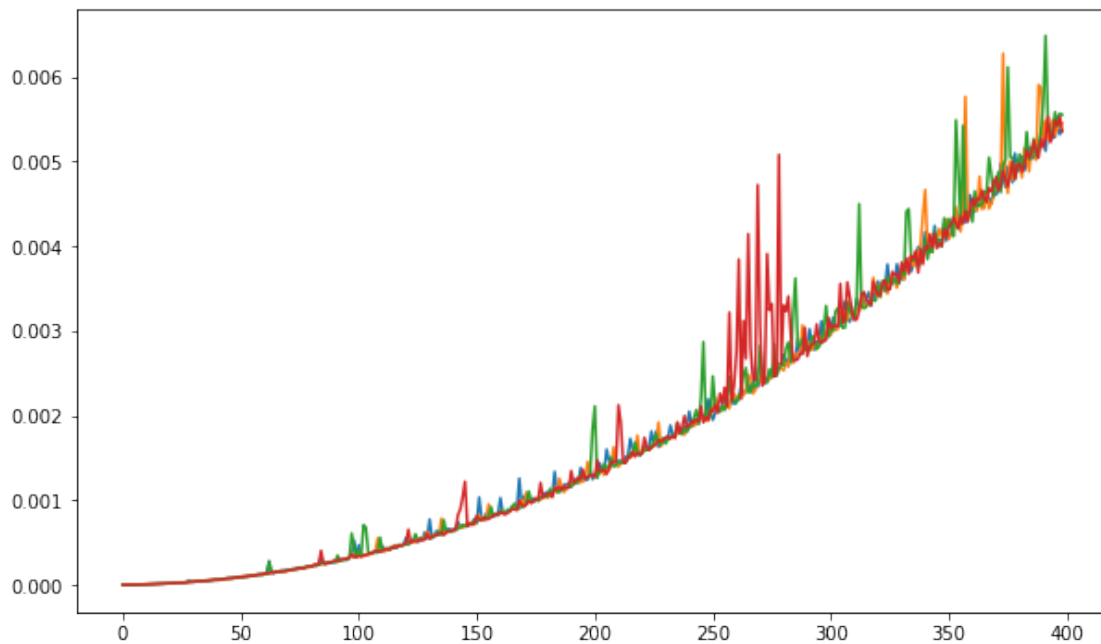
```
sort(x)
end = time.time();
check(x) # sanity
return end - start
```

```
[7]: n = 5000
print(time_sort(make_random(n)))
print(time_sort([i for i in range(0,n)]))
print(time_sort([i for i in range(n,0,-1)]))
```

0.8926224708557129
0.652362585067749
1.1459667682647705

```
[8]: 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()
```

```
[9]: show_time(400,4)
```



[]: