

# CS409 : UG Software Lab Assignment #4

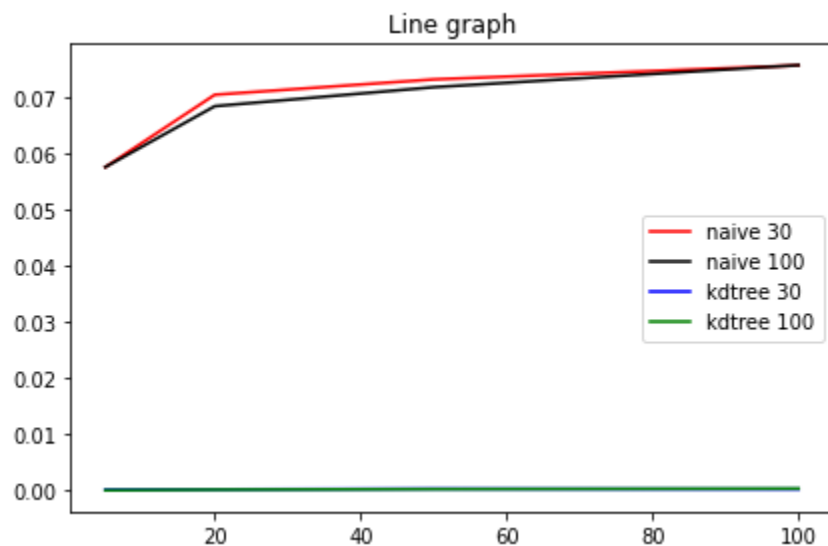
## ★ Time complexity plot

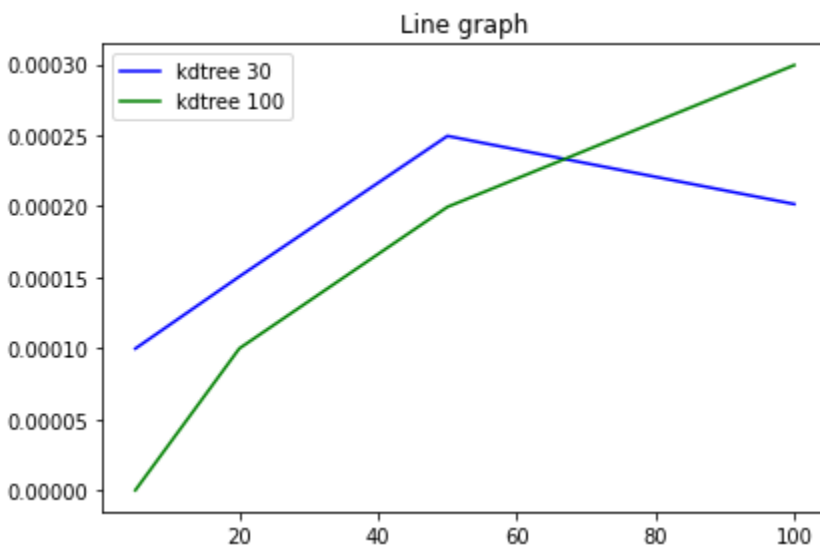
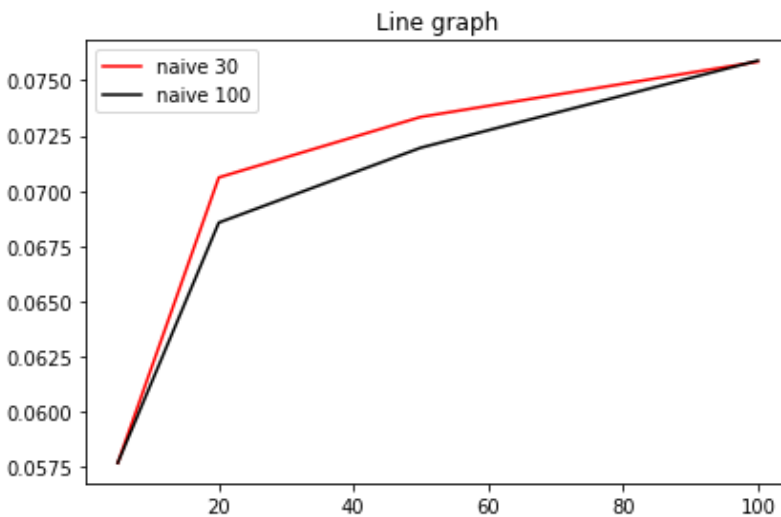
```
naive_exp1 = np.array([0.05769215822219849, 0.07061001062393188,  
0.07334978580474853, 0.07584681510925292])
```

```
kd_exp1 = np.array([9.97304916381836e-05, 0.00015048980712890626,  
0.00024944543838500977, 0.00020147562026977538])
```

```
naive_exp2 = np.array([0.057695651054382326, 0.06856646537780761,  
0.07195711135864258, 0.07589678764343262])
```

```
kd_exp2 = np.array([0.0, 9.984970092773438e-05, 0.00019948482513427735,  
0.0002993106842041016])
```





## ★ Observations

Time taken by KDTree KNN is significantly less for big datasets since many branches get pruned. In the naive KNN algorithm, we traverse each point in the dataset so no matter what is the alpha or k value, naive execution time will always be more compared to KDTree algorithm.

In case of KDTree KNN, execution time is less when  $\alpha > K$  whereas it is more time consuming for  $\alpha < K$  as in this case we need to traverse more leaves.