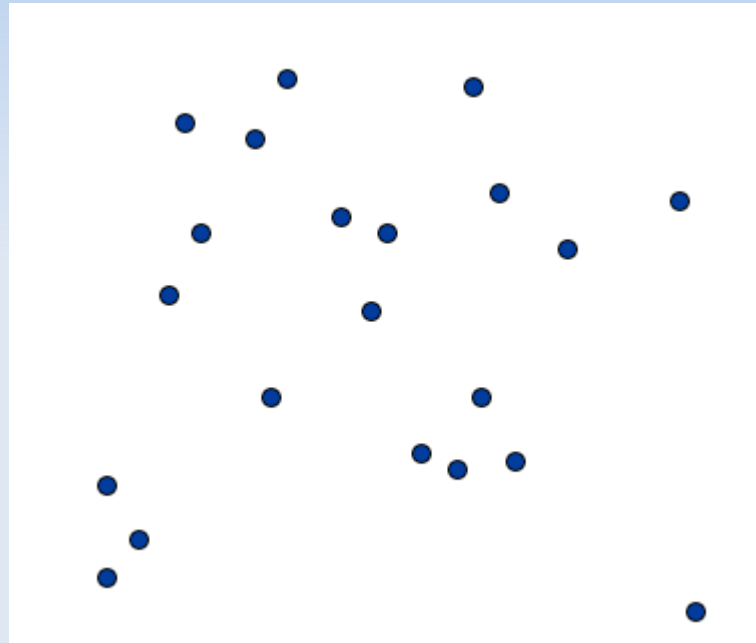


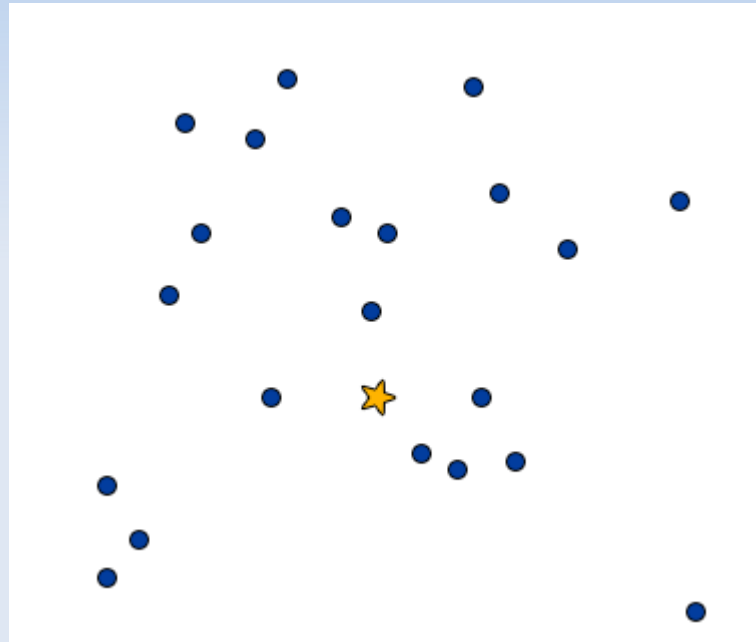
Exact Nearest Neighbour in CGAL

george kastrinis
grad1054@di.uoa.gr

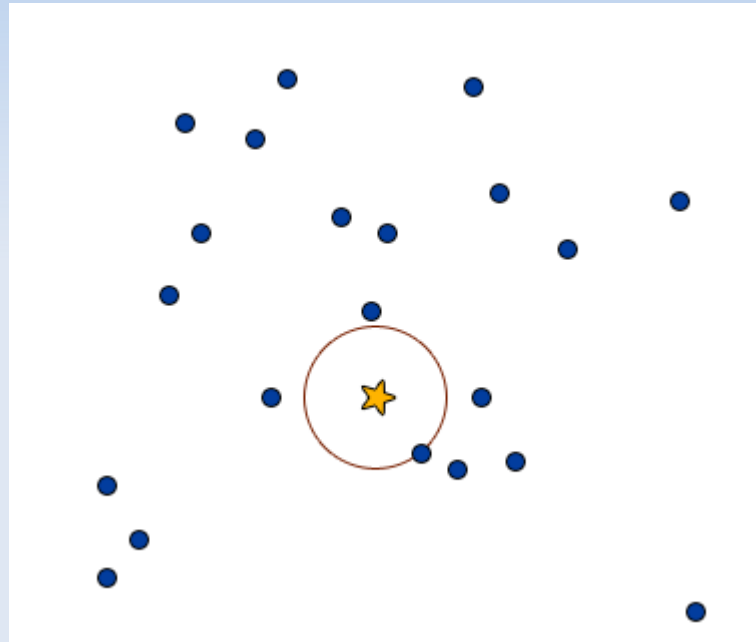
Exact Nearest Neighbour in CGAL



Exact Nearest Neighbour in CGAL

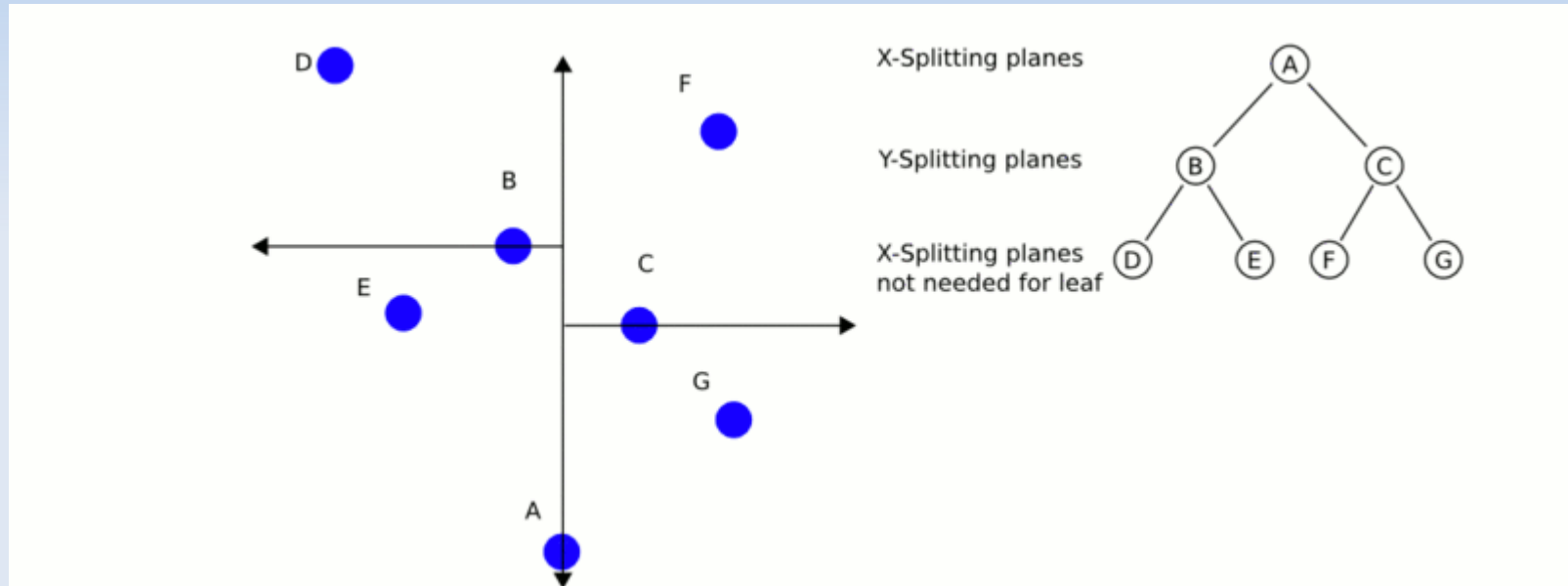


Exact Nearest Neighbour in CGAL



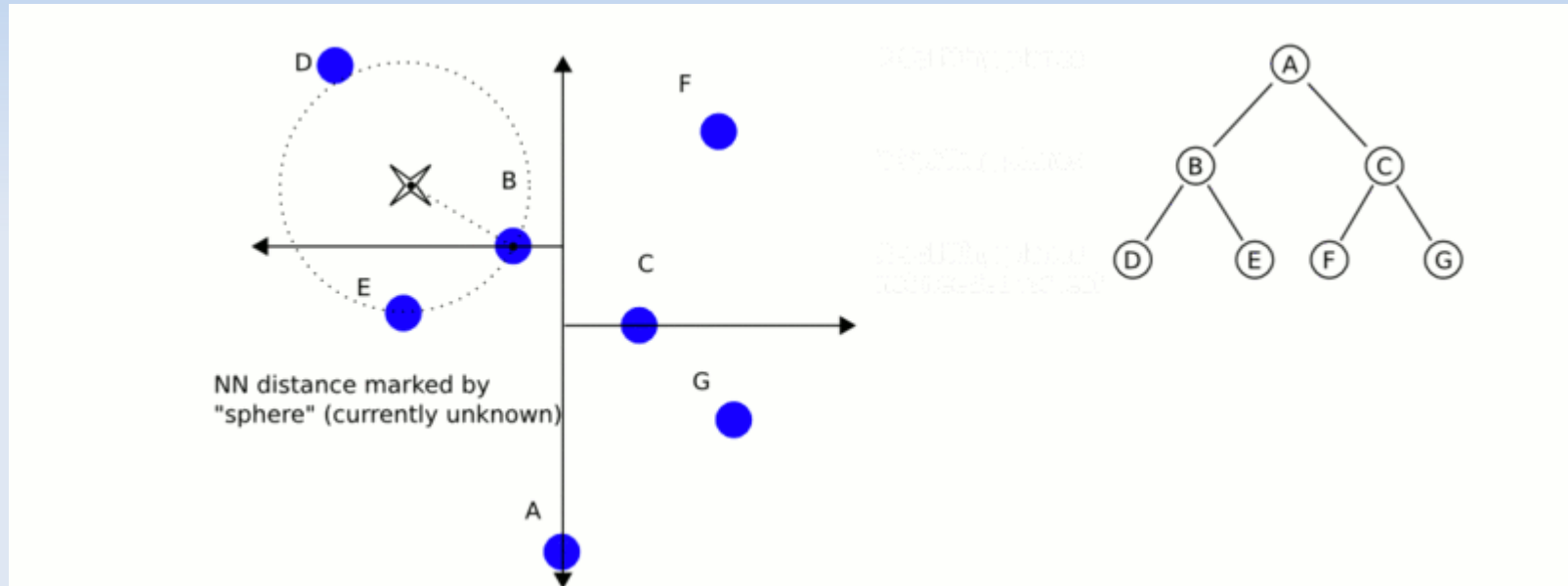
Exact Nearest Neighbour in CGAL

with KD-trees



Exact Nearest Neighbour in CGAL

with KD-trees



Exact Nearest Neighbour in CGAL

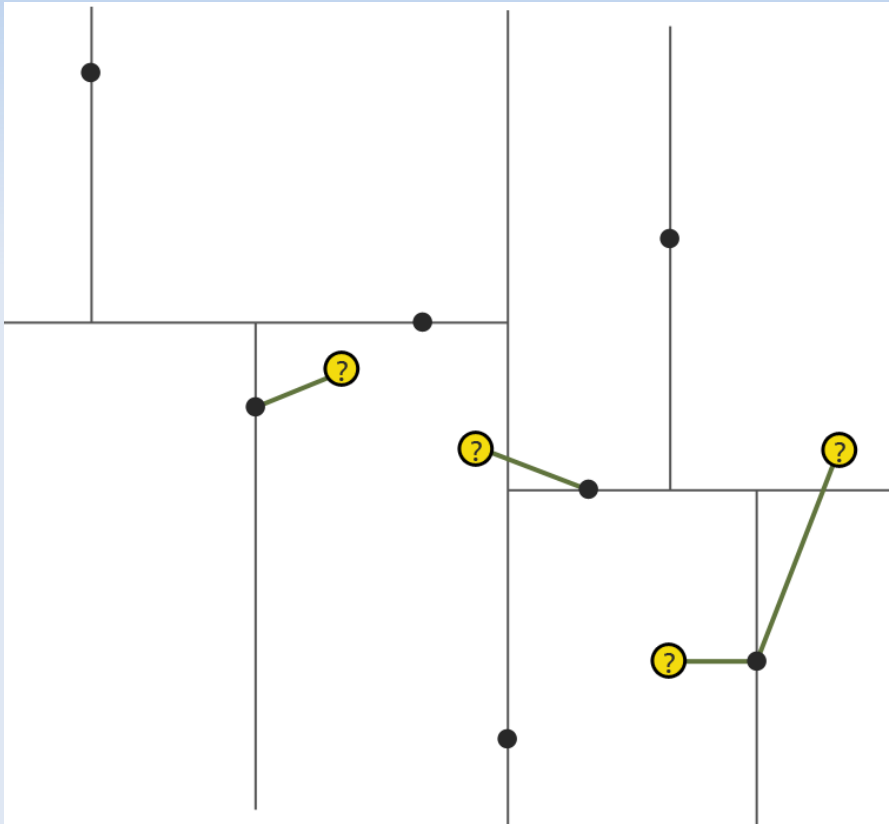


Algorithm described here

http://en.wikipedia.org/wiki/K-d_tree#Nearest_neighbour_search
(Read the text; the image is wrong!)

Exact Nearest Neighbour in CGAL

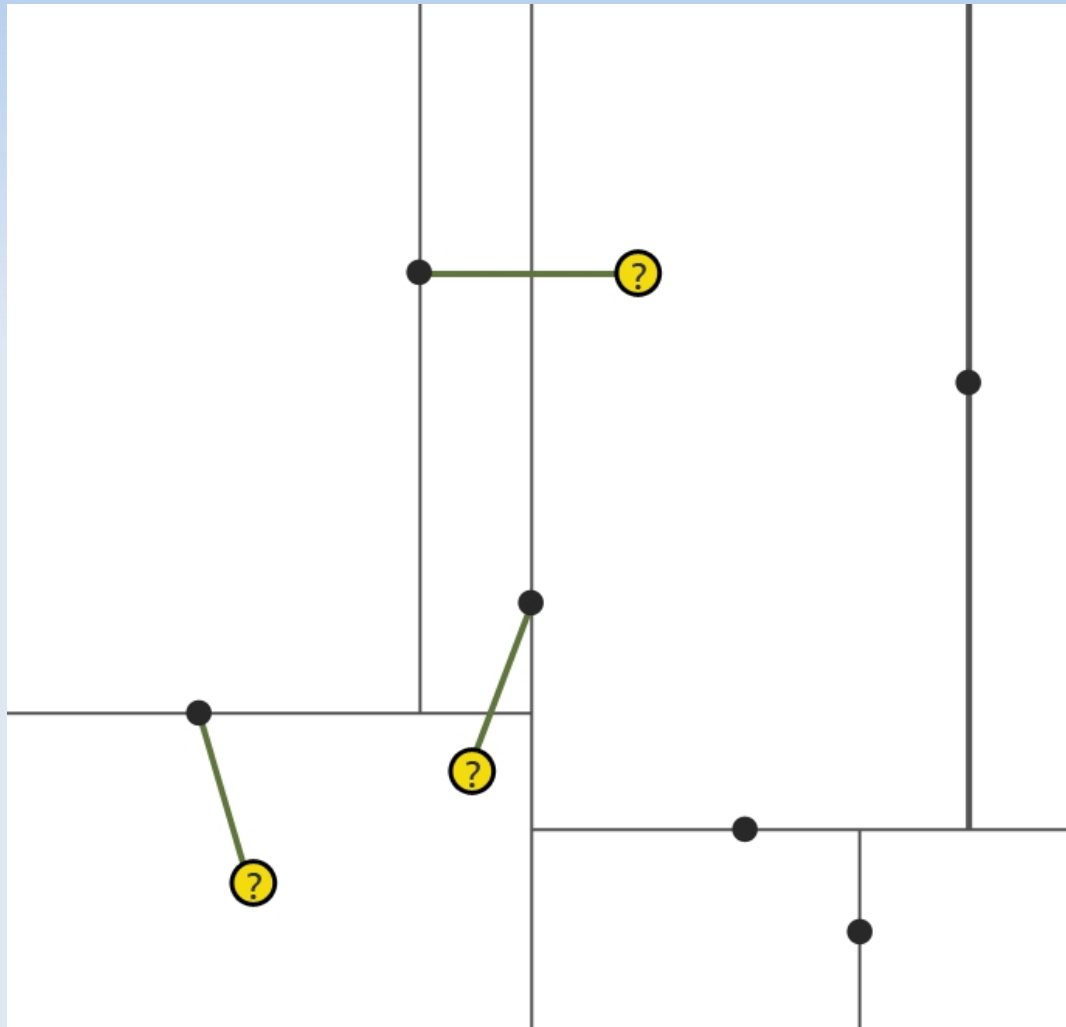
with KD-trees



```
Query for point: 20 14.5  
Neares Neighbour: 19 14  
Query time: 0 seconds and 1 microseconds  
  
Query for point: 21.6 13.5  
Neares Neighbour: 23 13  
Query time: 0 seconds and 1 microseconds  
  
Query for point: 24 11  
Neares Neighbour: 25 11  
Query time: 0 seconds and 0 microseconds  
  
Query for point: 26 13.5  
Neares Neighbour: 25 11  
Query time: 0 seconds and 1 microseconds
```


Exact Nearest Neighbour in CGAL

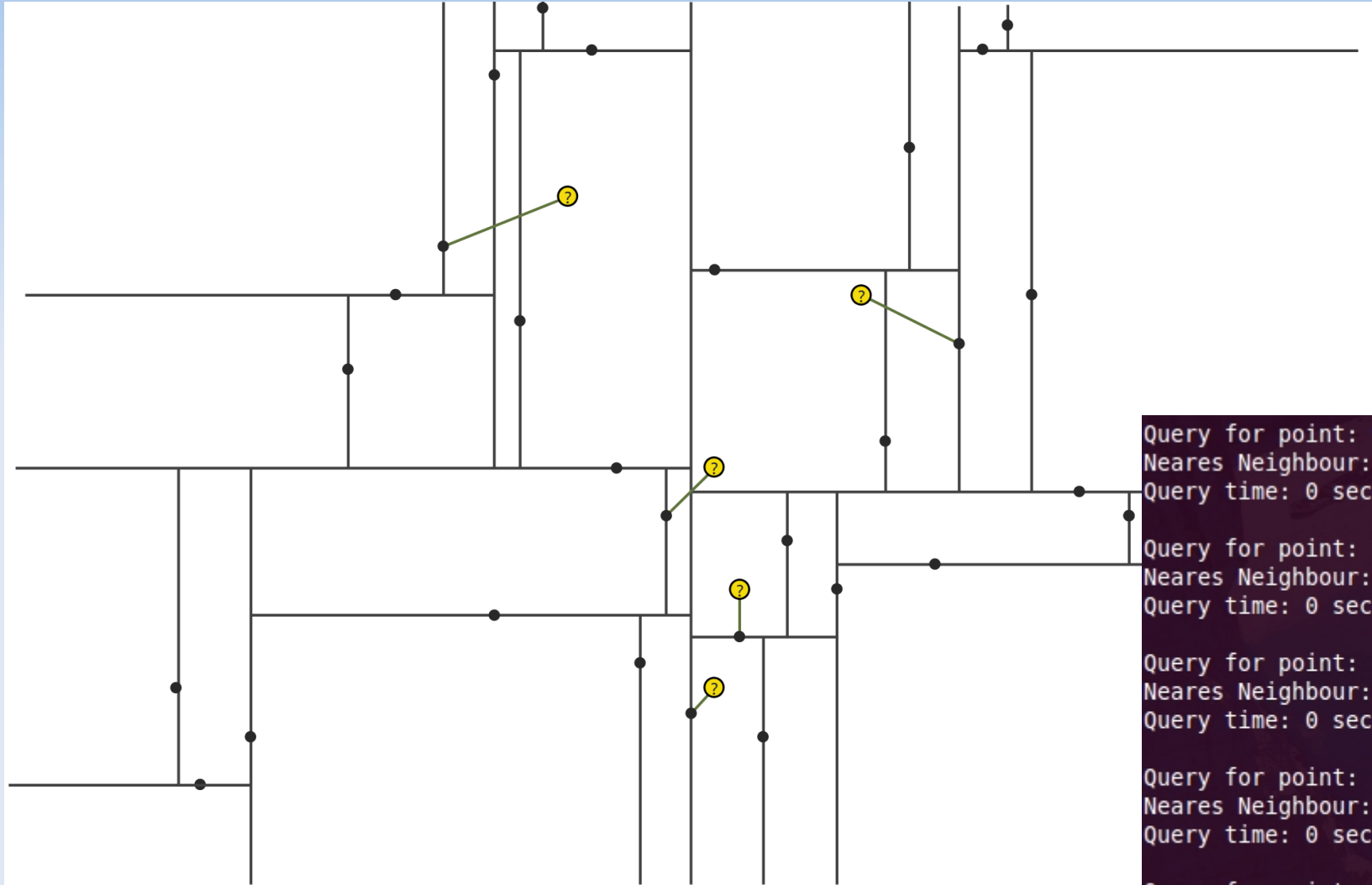
with KD-trees



```
Query for point: 2.5 1.5  
Neares Neighbour: 2 3  
Query time: 0 seconds and 2 microseconds  
  
Query for point: 4.5 2.5  
Neares Neighbour: 5 4  
Query time: 0 seconds and 2 microseconds  
  
Query for point: 6 7  
Neares Neighbour: 4 7  
Query time: 0 seconds and 1 microseconds
```

Exact Nearest Neighbour in CGAL

with KD-trees



```
Query for point: 9 14
Neares Neighbour: 7 13
Query time: 0 seconds and 2 microseconds

Query for point: 12.5 8.5
Neares Neighbour: 11 7.5
Query time: 0 seconds and 2 microseconds

Query for point: 13 6
Neares Neighbour: 13 5
Query time: 0 seconds and 0 microseconds

Query for point: 12.5 4
Neares Neighbour: 12 3.5
Query time: 0 seconds and 1 microseconds

Query for point: 15.5 12.5
Neares Neighbour: 17.5 11
Query time: 0 seconds and 1 microseconds
```

Exact Nearest Neighbour in CGAL

with KD-trees

Trying for 10 dimensions, 100000 random points and performing 10 queries

Tree built time: 0 seconds and 503430 microseconds

Query time: 0 seconds and 1341 microseconds
Query time: 0 seconds and 290 microseconds
Query time: 0 seconds and 327 microseconds
Query time: 0 seconds and 1264 microseconds
Query time: 0 seconds and 477 microseconds
Query time: 0 seconds and 2411 microseconds
Query time: 0 seconds and 880 microseconds
Query time: 0 seconds and 1483 microseconds
Query time: 0 seconds and 2622 microseconds
Query time: 0 seconds and 430 microseconds

Trying for 100 dimensions, 100000 random points and performing 10 queries

Tree built time: 0 seconds and 493748 microseconds

Query time: 0 seconds and 91680 microseconds
Query time: 0 seconds and 92980 microseconds
Query time: 0 seconds and 92816 microseconds
Query time: 0 seconds and 94302 microseconds
Query time: 0 seconds and 90233 microseconds
Query time: 0 seconds and 97040 microseconds
Query time: 0 seconds and 91841 microseconds
Query time: 0 seconds and 94713 microseconds
Query time: 0 seconds and 111349 microseconds
Query time: 0 seconds and 94702 microseconds

Trying for 500 dimensions, 500000 random points and performing 10 queries

Tree built time: 5 seconds and 717995 microseconds

Query time: 1 seconds and 431378 microseconds
Query time: 1 seconds and 433990 microseconds
Query time: 1 seconds and 486543 microseconds
Query time: 1 seconds and 478979 microseconds
Query time: 1 seconds and 456865 microseconds
Query time: 1 seconds and 454414 microseconds
Query time: 1 seconds and 466430 microseconds
Query time: 1 seconds and 433681 microseconds
Query time: 1 seconds and 361708 microseconds
Query time: 1 seconds and 306491 microseconds

Trying for 100 dimensions, 1000000 random points and performing 10 queries

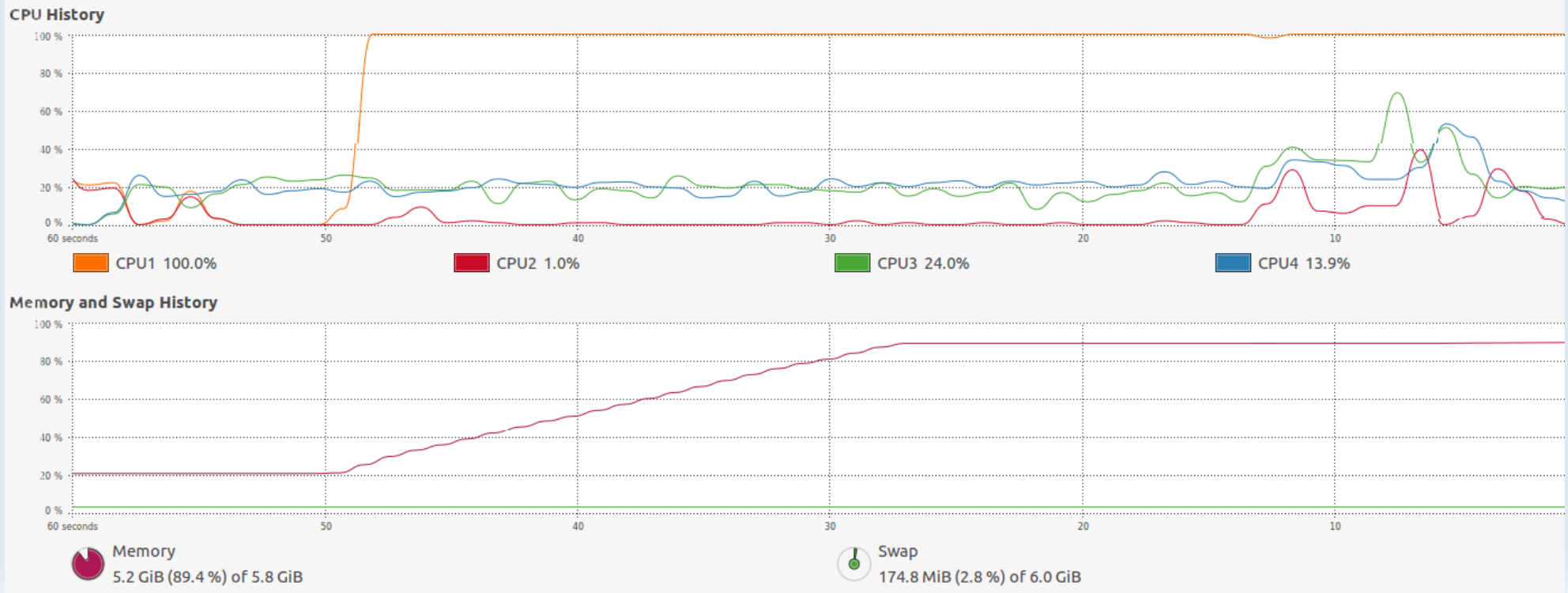
Tree built time: 12 seconds and 306759 microseconds

Query time: 1 seconds and 68213 microseconds
Query time: 1 seconds and 79885 microseconds
Query time: 1 seconds and 62645 microseconds
Query time: 1 seconds and 41306 microseconds
Query time: 1 seconds and 15163 microseconds
Query time: 1 seconds and 66886 microseconds
Query time: 1 seconds and 54004 microseconds
Query time: 1 seconds and 121673 microseconds
Query time: 1 seconds and 60780 microseconds
Query time: 1 seconds and 69636 microseconds

Exact Nearest Neighbour in CGAL

with KD-trees

```
Trying for 100 dimensions, 5000000 random points and performing 10 queries  
Tree built time: 95 seconds and 898452 microseconds  
  
Query time: 5 seconds and 68582 microseconds  
Query time: 5 seconds and 315928 microseconds  
Query time: 5 seconds and 231987 microseconds  
Query time: 5 seconds and 325480 microseconds  
Query time: 5 seconds and 463406 microseconds  
Query time: 5 seconds and 156482 microseconds  
Query time: 5 seconds and 101653 microseconds  
Query time: 5 seconds and 570468 microseconds  
Query time: 5 seconds and 356583 microseconds  
Query time: 5 seconds and 576165 microseconds
```



Exact Nearest Neighbour in CGAL

with KD-trees

