CS11212 Joydeep Das
14116032 Minor
Date

(1), (2), (3) → Github link updated.

(4) Compare Graham scan and Gift_Wrap Algorithm along with Quick_Hull for finding Convex Hull of n random input points taken.

(a) For n=5! →

Time for clock_per_sec in c++ = 1000;

range of random	n	Gift_Wrap $O(n^2)$	Graham_scan $O(n\log n)$	Quickhull $O(n\log n)$
for all test cases the range is between $0 \le x \le 10^9$	100	1/1000 = 0.001	1/1000 = 0.001	1/1000 = 0.001
	1000	3/1000 = 0.003	1/1000 = 0.001	1/1000
	2000	7/1000 = 0.007	1/1000 = 0.001	1/1000
	5000	17/1000 = 0.017	4/1000 = 0.004	4/1000
	10000	21/1000 = 0.021	6/1000 = 0.006	4/1000 = 0.004

$O(n\log n)$ for worst case, actually $O(n\log h)$ where Quickhull is best for avg cases though $O(n\log n)$.

(b) For Quick_Hull :→ 3 diff^n n's. $n = 10^5$
$n = 10^6$
$n = 10^7$

n	Time
10^5	4/1000 = 0.004
10^6	40/1000 = 0.040
10^7	520/1000 = 0.520

* All the codes for these three random inputs of size 'n' were stored as
Gift_wrap_time.csv
Graham_scan_time.csv
Quick_hull_time.csv

14116032 Joydeep Das

CSN212 Assignment

Date

4) (B) Comparison for diff^n number of points in the Hull (h) with total input points (n)

Note !→ Time complexity for Gift wrap is O(nh) & Graham-Scan is O(nlogn)

	n	h	Gift wrap	Graham scan	
10^4 ←	10^4	29	3/1000=0.003	14/1000=0.014	→ almost same
all points ←	10^4	10^4	29/1000=0.029	17/1000=0.017	
	10^5	107	17/1000	21/1000	

The comparison for $n=10^4$ for Gift Wrap & Graham scan shows that if h=n then Gift Wrap time complexity increases quite evidently.