

Fluid Simulation in Computer Graphics

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Exercise 1

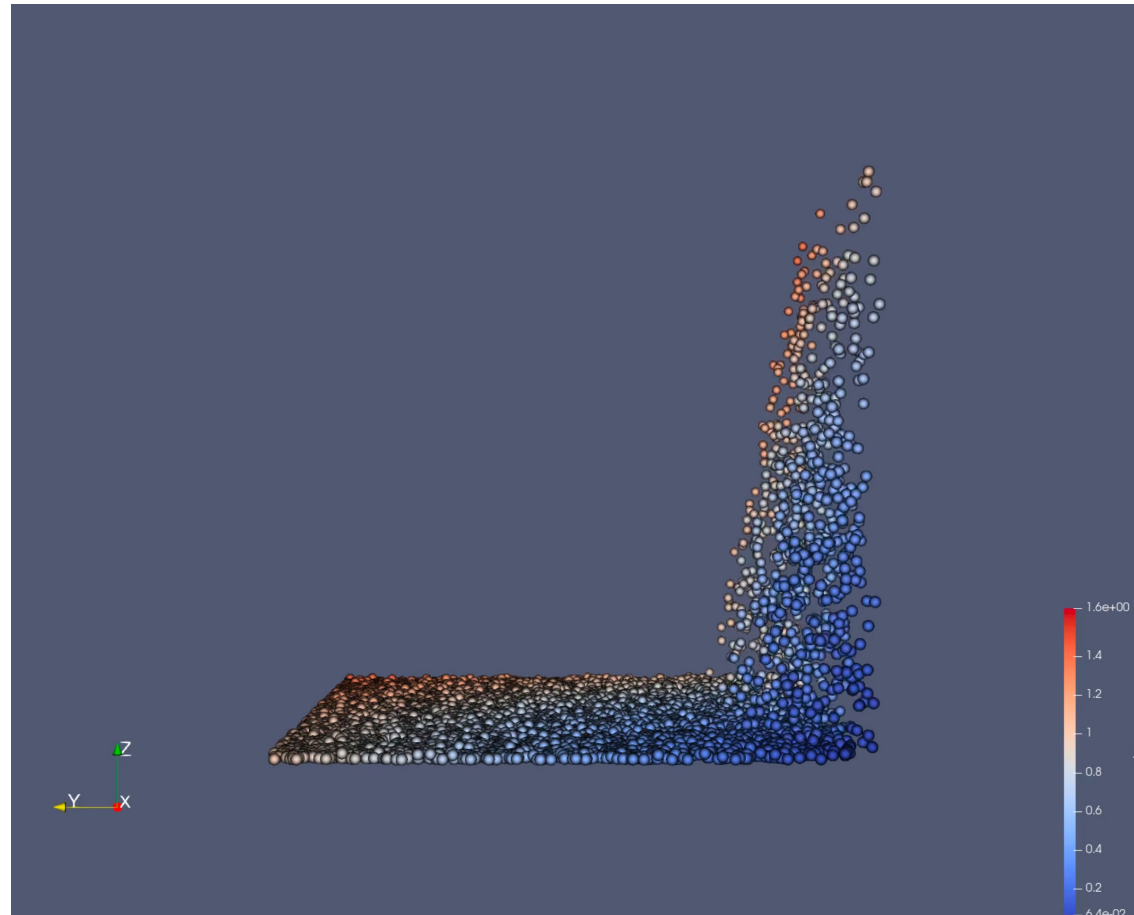
Assignment 2

- Generally: Each unit test uses multiple values for h
- Testing the implemented cubic spline function and its gradient
 - Symmetrie
 - Delta property
 - Non-negativity
 - Compactness
- Unity has not been tested, since we did not know how to test the integral correctly
- Testing using hard coded values computed by calculator
 - Coverage of different cases, including all 3 branches

- We created a Unit test to check how similar the analytical and finite difference approximation gradient are
- Problem: We cannot just use absolute differences
 - Solution: Usage of relative difference of scalar values a and b
 - Note: Not defined for a = b = 0 (we omit this case explicitly in code)
- $difference = \frac{100 * |a - b|}{\max(|a|, |b|)}$
- We check for less than 1% relative difference

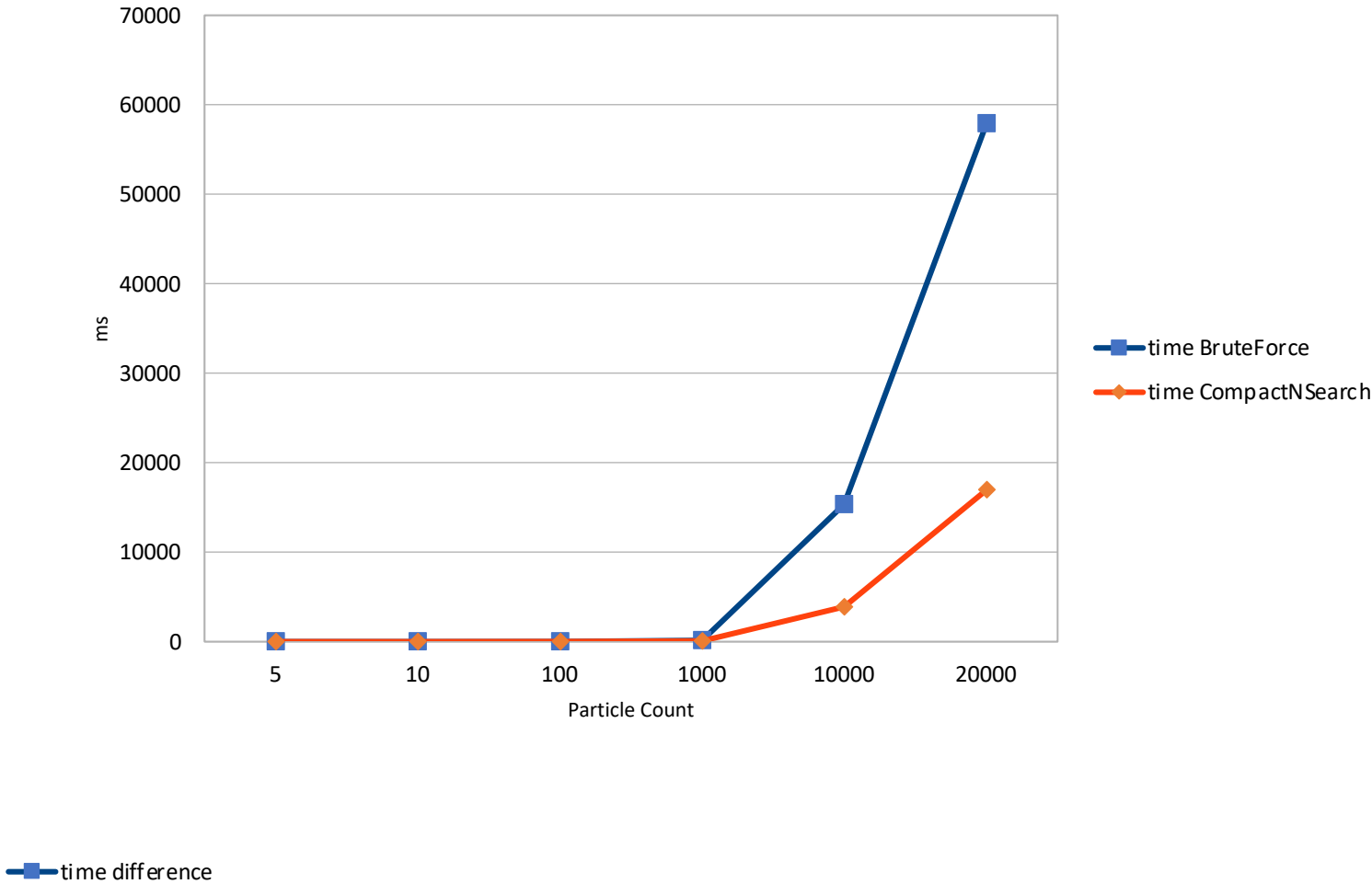
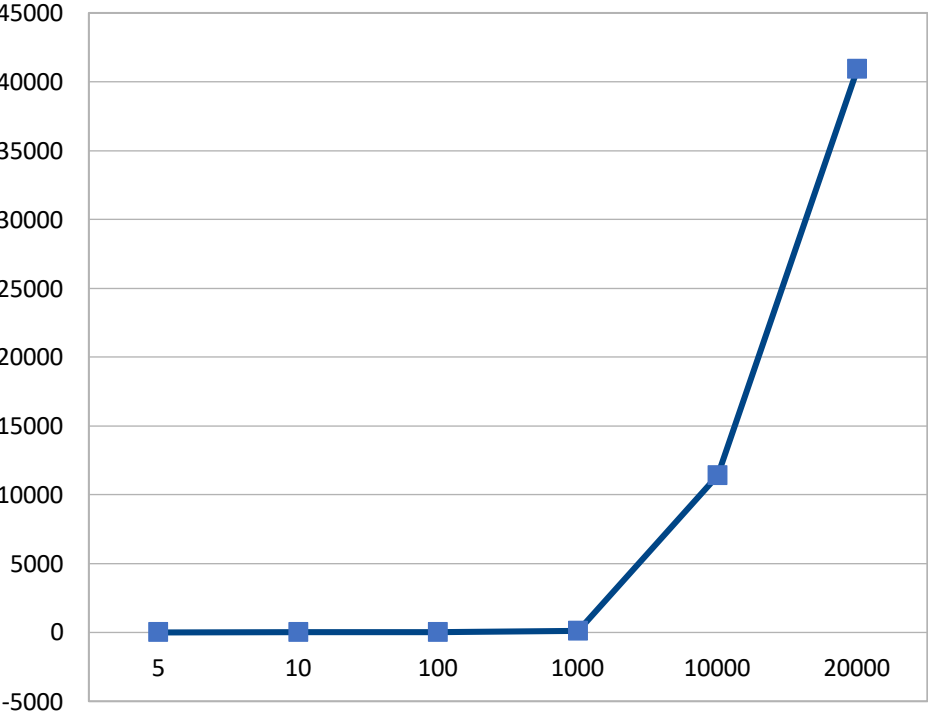
Assignment 3

Assingment 4

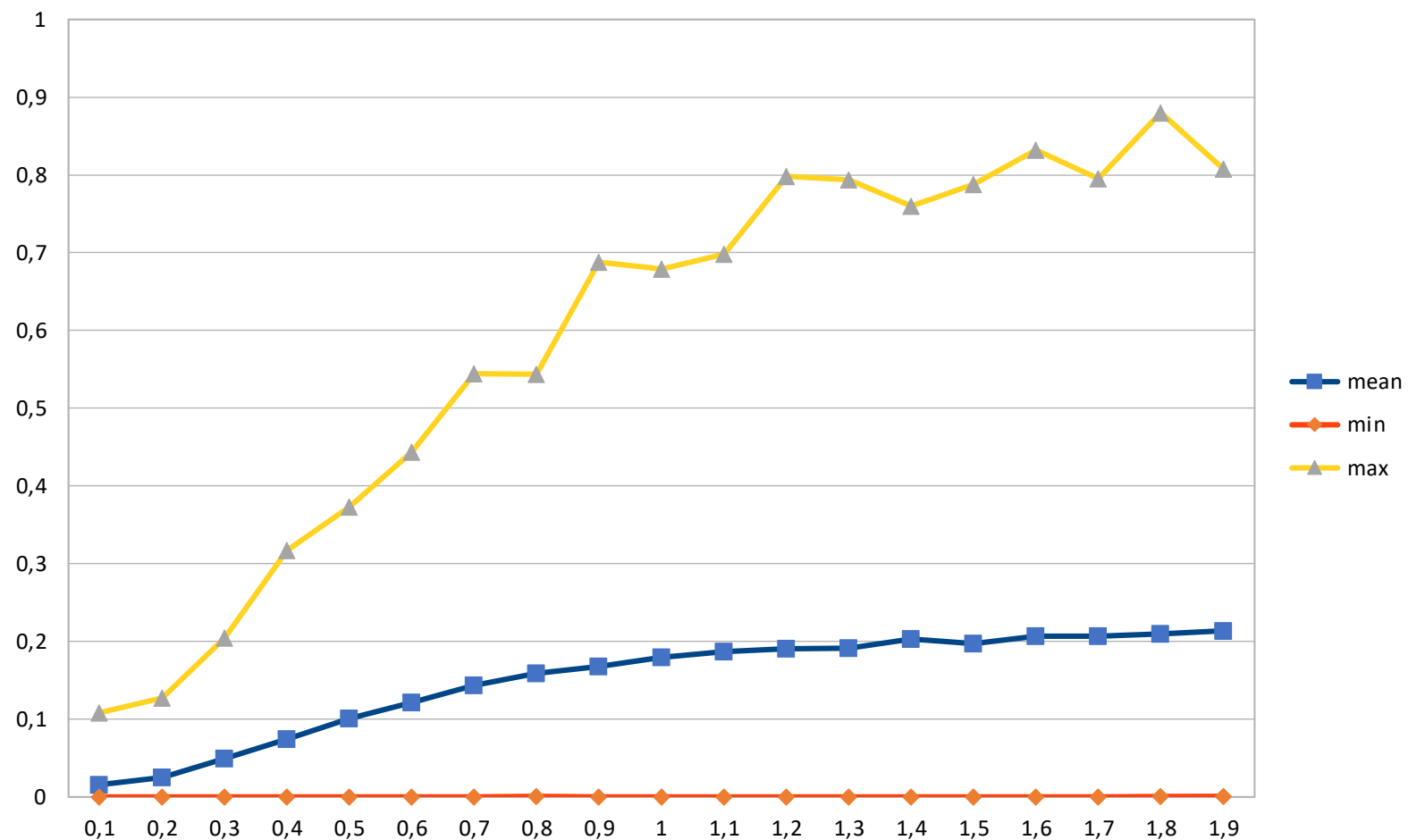


Assignment 5

particle count	time BruteForce	time CompactNSearch	time difference
5	0,015	0,032	-0,017
10	0,027	0,021	0,006
100	2,11	0,497	1,613
1000	173,98	50,62	123,36
10000	15339,8	3923,39	11416,4



h	mean	min	max	runTime
0,1	0,0157654	3,91396E-05	0,108379	0,052
0,2	0,0252206	0,000109617	0,127481	0,371
0,3	0,0497045	0,000132021	0,204638	0,58
0,4	0,0741764	0,000219234	0,316839	0,836
0,5	0,101099	0,000127243	0,372844	2,396
0,6	0,121127	3,80616E-05	0,443571	3,287
0,7	0,143724	0,000238944	0,544424	1,688
0,8	0,159322	0,000502996	0,54402	1,546
0,9	0,167549	5,37033E-05	0,687847	2,816
1	0,179451	0,000369801	0,678992	2,002
1,1	0,186664	1,49405E-05	0,698329	1,866
1,2	0,190638	0,000230179	0,798043	3,403
1,3	0,191508	0,000213769	0,793723	2,162
1,4	0,203066	9,34967E-05	0,759737	2,095
1,5	0,19689	0,000416337	0,787592	4,838
1,6	0,206898	0,000259787	0,832259	4,158
1,7	0,206926	0,000108967	0,795517	2,458
1,8	0,209547	0,000635862	0,880171	3,965
1,9	0,213704	0,00059226	0,807552	5,761



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