

Assignment 4

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Problem:

We mentioned two alternatives for implementing Union-Find:

1. For weighted quick union, store the depth rather than the size;
2. For weighted quick union with path compression, do two loops, so that all intermediate nodes point to the root, not just the alternates.

For both of these, code the alternative and benchmark it against the implementation in the repository. You have all of that available from a previous assignment.

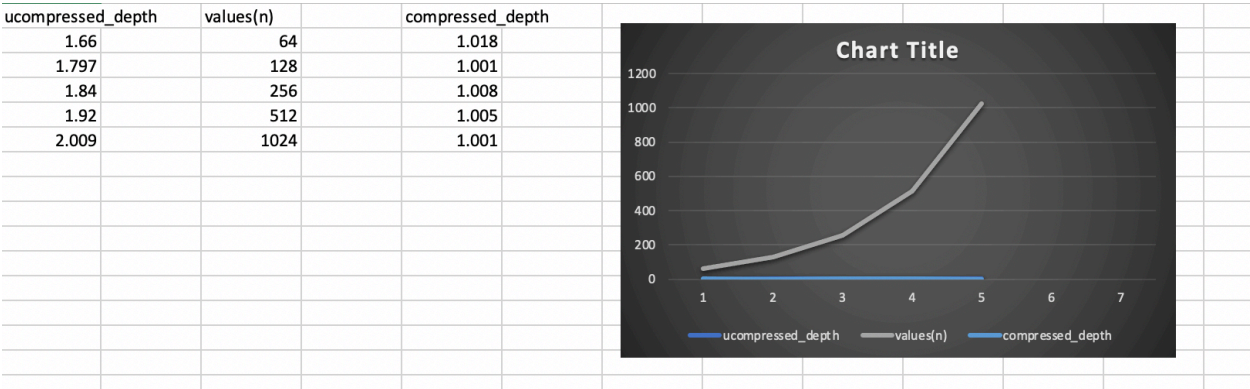
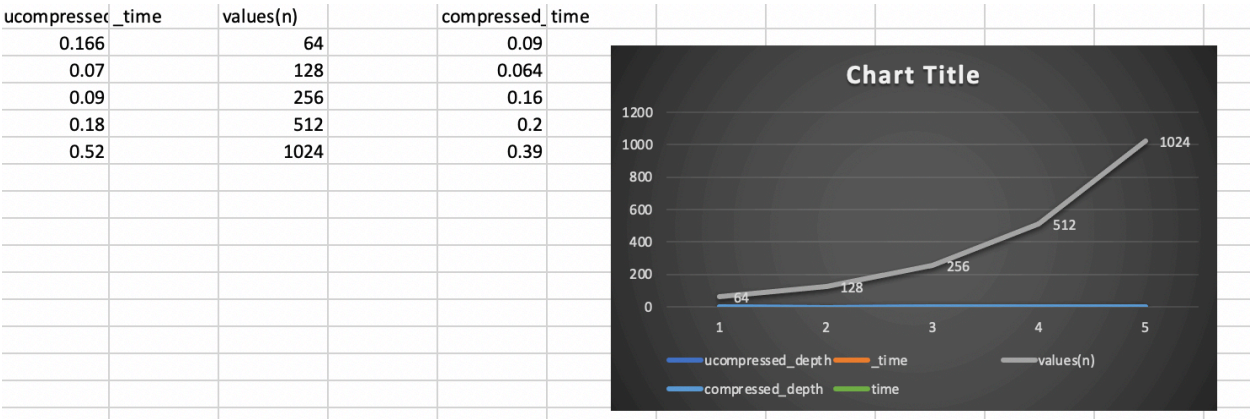
Conclusions:

- 1.The average distance from root is approximately 2 times more compared to uncompressed in compressed.
- 2.The average distance from root is approximately 1.5 times more compared to uncompressed in compressed.

Assignment4_data

uncompressed_time	uncompressed_depth	uncompressed_pair	pathhalved_time	pathhalved_depth	pathhalved_pairs	compressed_time	compressed_depth
0.1604818	1.6640625	171.2	0.0449711	1.0375	150.2	0.0964909	1.01875
0.07458780000000001	1.79765625	311.6	0.060655499999999994	1.01953125	351.2	0.0644505	1.0109375
0.0956345	1.848046875	798.5	0.1158932	1.003515625	794.3	0.1646678	1.00859375
0.1892981	1.922265625	1693.7	0.2369351	1.0056640625	1785.8	0.206604	1.00546875
0.5117599	2.00908203125	3625.5	0.4107228	1.00234375	3836.6	0.39152939999999997	1.00283203125
0.8777855000000001	2.028857421875	8407.7	0.6910238	1.00048828125	8618.8	0.9983409999999999	1.00126953125
1.0776833	2.0353759765625	17945.7	0.9406674	1.0003173828125	18407.9	0.9748474	1.0003173828125
3.2287133	2.05787353515625	40951.6	2.0146582	1.00032958984375	39042.1	1.7789806	1.00025634765625
5.2802765	2.117279052734375	85821.5	4.2414782	1.00037841796875	82765.2	3.8424427000000003	1.0000732421875
10.867680799999999	2.14053955078125	173301	9.2709908	1.0000946044921875	171807.8	8.8248298	1.00001220703125
30.327149900000002	2.1499069213867186	391409.1	22.4568661	1.0000259399414062	397737.3	20.761651399999998	1.0000152587890625
67.4412865	2.1246131896972655	791659.5	52.7528286	1.0000160217285157	816862.1	50.8927205	1.0000022888183593
150.6978193	2.1264484405517576	1754793.3	100.6556951	1.0000064849853516	1751542.9	98.49669	1.0000106811523437
412.9186686	2.1489267349243164	3591322.7	276.1403533	1.0000049591064453	3504506.1	241.78811209999998	1.0000032424926757
869.3504442999999	2.1425873756408693	7571968.7	754.3807534	1.0000024795532227	7262414.3	703.8917575	1.0000008583068847

Graph comparing compressed and uncompressed path to support the conclusion



Test Case:

