CS583 Project Report

After analyzing data from all the algorithms and viewing the graphs, the state-based algorithms perform the best. Among Static Optimal Binary Search Tree and Dynamic Monotone. I feel that Dynamic Monotone is the optimal algorithm to use for a search problem because we do not need to give in the probability distribution to the algorithm prior to the accessing it even though its cost/competitive ratio is more than OBST.

Instructions to run.

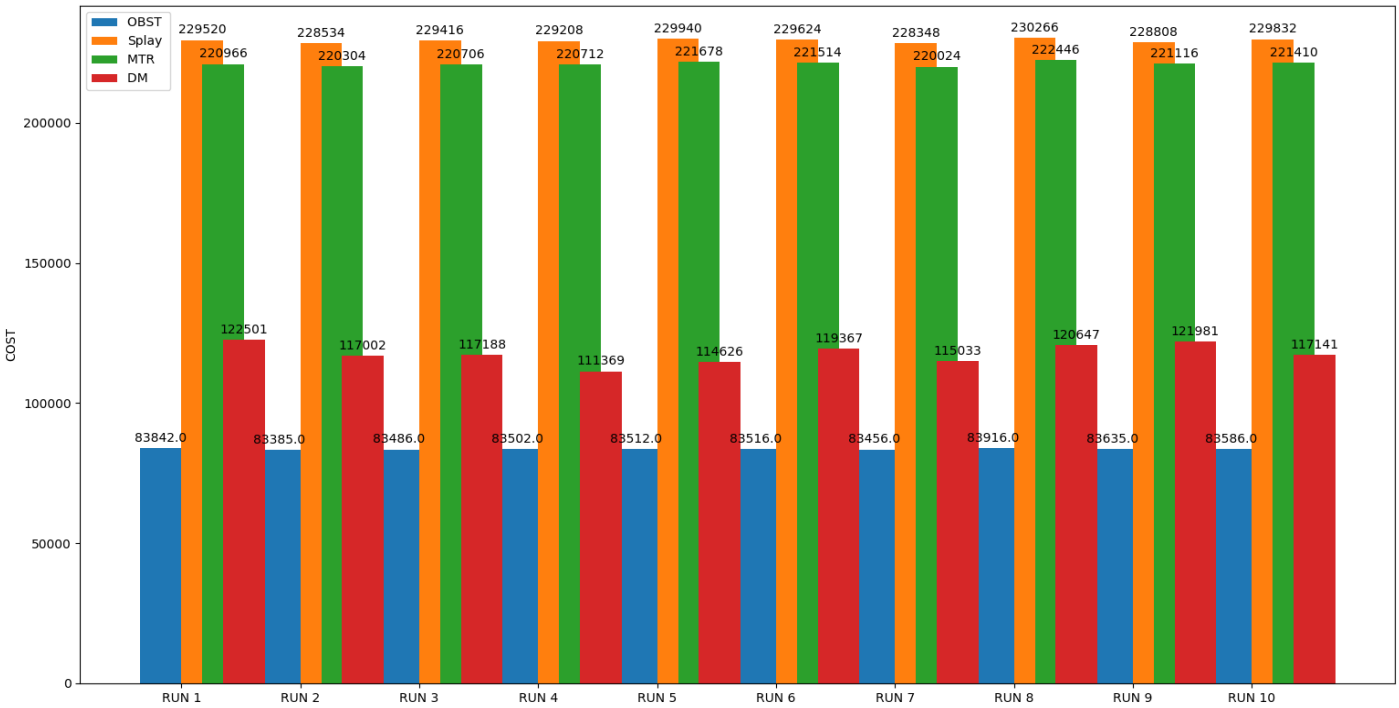
1. Use python 3
2. Install tqdm, numpy, pandas
3. Run source.py

Run	OBST	Splay	MTR	DM
Run 1	83440	228866	220706	115287
Run 2	83443	230200	221284	116191
Run 3	83654	229812	221580	120611
Run 4	83476	229574	221510	119455
Run 5	83845	230788	222358	118416
Run 6	83620	230688	222018	115999
Run 7	83645	229526	220828	118834
Run 8	83782	228748	220678	114520
Run 9	83370	228932	220618	114243
Run 10	83218	227782	219522	114529
Average	83549.3	229491.6	221110.2	116808.5

Table. 1 - Cost

Run	Splay	MTR	DM
Run 1	2.74288111217641	2.64508628954938	1.38167545541707
Run 2	2.75876945939144	2.65191807581223	1.39245952326738
Run 3	2.74717287876252	2.64876754249647	1.44178401510986
Run 4	2.75017969236667	2.65357707604581	1.4310101106905
Run 5	2.75255531039418	2.65201264237581	1.41232035303238
Run 6	2.75876584549151	2.65508251614446	1.38721597703899
Run 7	2.74404925578337	2.64006216749357	1.42069460218782
Run 8	2.73027619297701	2.63395478742451	1.36688071423456
Run 9	2.74597577066091	2.64625164927432	1.37031306225261
Run 10	2.737172246389	2.63791487418587	1.37625273378356
Average	2.7467797764393	2.64646276208024	1.39806065470147

Table. 2 – Competitive ratio


OBST
Splay
MTR
DM
COST
0
50000
100000
150000
200000
RUN 1
RUN 2
RUN 3
RUN 4
RUN 5
RUN 6
RUN 7
RUN 8
RUN 9
RUN 10
83842.0
229520
220966
122501
83385.0
228534
220304
117002
83486.0
229416
220706
117188
83502.0
229208
220712
111369
83512.0
229940
221678
114626
83516.0
229624
221514
119367
83456.0
228348
220024
115033
83916.0
230266
222446
120647
83635.0
228808
221116
121981
83586.0
229832
221410
117141