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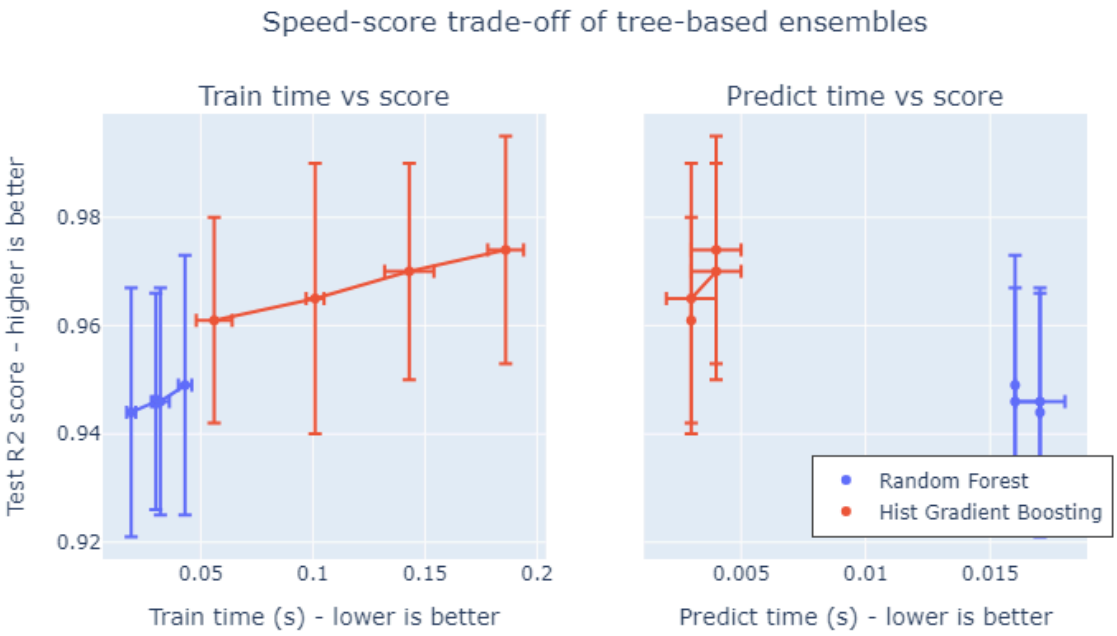
Problem 1:
Random Forest results :

n_estimators	criterion	fold	score
10	gini	0	0.944444
10	gini	1	0.861111
10	gini	2	0.944444
10	gini	3	0.885714
10	gini	4	0.714286
10	entropy	0	0.972222
10	entropy	1	0.888889
10	entropy	2	0.944444
10	entropy	3	0.942857
10	entropy	4	0.685714
25	gini	0	0.916667
25	gini	1	0.972222
25	gini	2	0.944444
25	gini	3	1.000000
25	gini	4	0.885714
25	entropy	0	0.916667
25	entropy	1	0.861111
25	entropy	2	0.944444
25	entropy	3	1.000000
25	entropy	4	0.885714
50	gini	0	0.888889
50	gini	1	0.916667
50	gini	2	0.944444
50	gini	3	1.000000
50	gini	4	0.914286
50	entropy	0	0.916667
50	entropy	1	0.888889
50	entropy	2	0.888889
50	entropy	3	1.000000
50	entropy	4	0.857143



For problem 4, I was pretty confused on how to implement forward and viterbi because I missed a lot of class when I was sick, so I got some assistance from github copilot while I was working on them.

Problem 5:

Question 1:

Expected time=(distance)×(P(sandy)×time per km (sandy)+P(smooth)×time per km (smooth)+P(rocky)×time per km (rocky))

Expected time for each route:
Route 1 = 113 minutes
Route 2 =156.8 minutes
Route 3 =106.8 minutes

We should choose route 3

Question 2:

For this question we just add (0.7* −20)+(0.3*15) to route 1 and (0.6×40) for route 3
Adjusted times are
Route 1 = 103.5
Route 2 = 156.8
Route 3 = 130.5

We should choose route 1

Question 3:
Part 1: if route 2 is not rocky, it is expected to take 121.5 minutes
Part 2: the probability it tells us this is .6
Part 3: if it is rocky, it will take us 210 minutes
Part 4: .6(121.5) + .4(210) = 156.9
We should not take route 2 at all we should stick with route 1