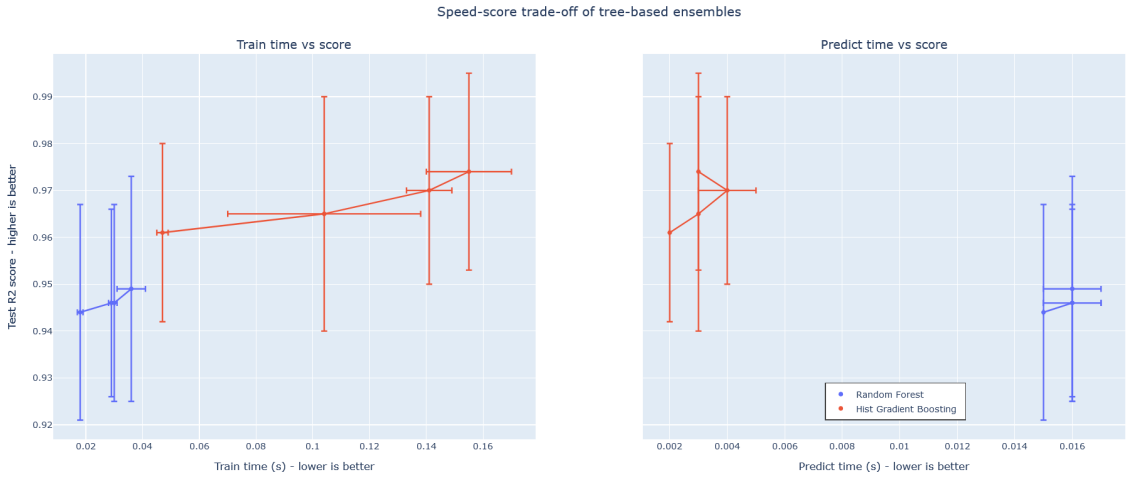
Using Breast Cancer Dataset

Estimators	Gini	Entropy
10	0.957	0.954
25	0.947	0.959
50	0.956	0.957



Part 4:

1)

Sandy Terrain 3 km/h
Smooth Terrain 5 km/h
Rocky Terrain 2 km/h

Route 1 5 km long. 20% sandy 30% smooth 50% rocky
Route 2 7 km long. 40% sandy 20% smooth 40% rocky
Route 3 6 km long. 50% sandy. 40% smooth. 10% rocky

Route 1 30% wall is damaged 70% wall is not damaged
Route 3 60% bridge is damaged

Sandy 3 km/hr = 20 min/km
Smooth 5mh/hr =12 min/km
Rocky 2 km/hr = 30 min/km

Conversions

Sandy 3 km/hr = 20 min/km
1hr/3km * 60 min/1hr = 60 min / 3km = 20 min / km

Smooth 5mh/hr = 12 min/km
1hr/5km * 60 min/1hr = 60 min / 5km = 12 min / km

Rocky 2 km/hr = 0.033km/min
1hr/2km * 60 min/1hr = 60 min/ 2 km = 30 min / km

Expected Utilities
Route 1: 5 km long
(0.20 * 20 min/km) + (0.30 * 12 min/km) + (0.50 * 30 min/km) = 4 + 3.6 + 15 = 22.6 min / km (5 km) = **113 minutes**

Route 2: 7 km long
(0.40 * 20 min/km) + (0.20 * 12 min/km) + (0.40 * 30 min/km) = 8 + 2.4 + 12 = 22.4 min / km (7 km) = **156.8 minutes**

Route 3: 6 km long
(0.50 * 20 min/km) + (0.40 * 12 min/km) + (0.10 * 30 min/km) = 10 + 4.8 + 3 = 17.8 min / km (6 km) = **106.8 minutes**

Conclusion

1) **Route 3 is the best because it is the fastest**

2)
Route 1: Wall Damaged
Wall not damaged
(0.70) * 20 minutes = Save 14 minutes
Wall damaged:
(0.30) * 15 minutes = Costs 4.5 minutes

Route 3 Bridge Damaged:
(0.40 * 0) + (0.60) * 40 = 24 minutes

New times ->
Route 1**:** 113 - 14 + 4.5 = **103.5 minutes**
Route 3**:** 106.8 minutes + 24 minutes = **130.8 minutes**

Conclusion

2) **Route 1 is now the fastest route**

3) Not rocky
60% not rocky 40% rocky

40/60 = Sandy

20/60 = Smooth
⅔ chance for Sandy
⅓ change for Smooth

Not Rocky for Route 2
Sandy:
(0.66 * 20 min / km) = 13.2 min / km * (7 km) = 92.4 minutes (1hr and 32 minutes)

(0.33 * 12 min /km) = 3.96 min / km * (7 km) = 27.72 minutes

92.4 minutes + 27.72 minutes = **120.12** minutes given that it is not rocky

Time it would take if route 2 was not rocky
If route 2 was not rocky, it would take **120.12 minutes.** Route 1 is still the best route.

Conclusion
Therefore, **Route 1 is still the fastest route if it is rocky**

3a) If the satellite said route 2 was not rocky, it would take 103.5 minutes because route 1 is the fastest. Route 2 would take 120.12 minutes if it was not rocky
3b) There is a 60% that the satellite will tell us it is not rocky

Probability it is not rocky
The probability the satellite will tell us this is **60%** when it is not rocky.

What to do if route 2 was rocky

3c) If route 2 was rocky, there would be a probability of 40%. We would choose Route 1 because it is the fastest route. This would take (103.5 * 0.4) = 41.4 minutes

60 % not rocky
0.60 * 120.12 = 72.072 minutes

40 % rocky
Route 3 = 106.8 minutes
Route 2 = 2

Weighted Averages
(103.5 * 0.4) + (103.5 * 0.6)
= 41.4 + 62.1 = 103.5

103.5 - 103.5 = 0 minutes

We will wait no time for satellite as it does not improve the EU

3d) We should not wait at all because the time does not improve.