

CS350 Assignment 5

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Written Part

Problem 1

a) If the scheduler follows SSF, the order the requests will be served is $R1 \rightarrow R3 \rightarrow R2 \rightarrow R6 \rightarrow R5 \rightarrow R4 \rightarrow R7 \rightarrow R9 \rightarrow R8$. It takes 32 seconds for SSF to schedule all request.

b) If lower index has priority, the new order will be $R1 \rightarrow R2 \rightarrow R3 \rightarrow R4 \rightarrow R5 \rightarrow R6 \rightarrow R7 \rightarrow R8 \rightarrow R9$. This takes 50 seconds to schedule all request.

c) Response times: $R5$ in SSF is 5 and $R9$ in SSF is 4

Response times: $R5$ in FIFO is 13 and $R9$ in FIFO is 32

SSF is better than FIFO for both.

d) If it is going up initially: $T=5$ at 15, $T=10$ at 10, $T=18$ at 2, $T=20$ at 0, $T=32$ at 12.

If it is going down initially: $T=10$ at 0, $T=22$ at 12, $T=26$ at 15, $T=38$ at 2.

Going up initially takes 32 seconds while going down take 38 seconds

e) Average response time for C-SCAN up is $\frac{14+6+9+5+1+6+15}{9} = 6.23$

Average response time for C-SCAN down is $\frac{2+10+7+7+12+10+13+6+12}{9} = 8.78$

Average response time for SCAN up is $\frac{2+10+7+9+5+4+3+20+9}{9} = 9.78$

Average response time for SCAN down is $\frac{2+10+7+7+12+10+13+6+12}{9} = 7.12$

Overall on average C-SCAN is better than SCAN

Problem 2

a)

2a					
Year	Profit Percentage	Prediction	Predicted Decision	Actual Decision	Correct?
-1	39				
0	33	36.00	RECRUIT		
1	20	30.67	RECRUIT	NOT RECRUIT	NO
2	15	26.75	RECRUIT	NOT RECRUIT	NO
3	35	28.40	NOT RECRUIT	RECRUIT	NO
4	20	27.00	RECRUIT	NOT RECRUIT	NO
5	15	25.29	RECRUIT	NOT RECRUIT	NO
6	34	26.375	NOT RECRUIT	RECRUIT	NO
7	26	26.33333333	RECRUIT	NOT RECRUIT	NO
8	25	26.2	RECRUIT	NOT RECRUIT	NO
9	21	25.72727273	RECRUIT	NOT RECRUIT	NO
10	45	27.33333333	NOT RECRUIT	RECRUIT	NO
11	46	28.76923077	NOT RECRUIT	RECRUIT	NO
12	18	28	RECRUIT	NOT RECRUIT	NO
13	20	27.46666667	RECRUIT	RECRUIT	YES
14	20	27	RECRUIT	NOT RECRUIT	NO
15	18	26.47058824	RECRUIT	NOT RECRUIT	NO
16	42	27.33333333	NOT RECRUIT	RECRUIT	NO
17	39	27.94736842	NOT RECRUIT	NOT RECRUIT	YES
18	50	29.05	NOT RECRUIT	RECRUIT	NO
19	45	29.80952381	NOT RECRUIT	NOT RECRUIT	YES
20	53	30.86363636	NOT RECRUIT	RECRUIT	
Accuracy					3/20 = 0.15

b)

2b					
Year	Profit Percentage	Prediction	Predicted Decision	Actual Decision	Correct?
-1	39				
0	33				
1	20	36.00	RECRUIT	NOT RECRUIT	NO
2	15	30.67	RECRUIT	NOT RECRUIT	NO
3	35	22.67	RECRUIT	RECRUIT	YES
4	20	23.33	NOT RECRUIT	NOT RECRUIT	YES
5	15	23.33	RECRUIT	NOT RECRUIT	NO
6	34	23.33	RECRUIT	RECRUIT	YES
7	26	23	NOT RECRUIT	NOT RECRUIT	YES
8	25	25	NOT RECRUIT	NOT RECRUIT	YES
9	21	28.33	RECRUIT	NOT RECRUIT	NO
10	45	24	RECRUIT	RECRUIT	YES
11	46	30.33	NOT RECRUIT	RECRUIT	NO
12	18	37.33	NOT RECRUIT	NOT RECRUIT	YES
13	20	36.33	RECRUIT	RECRUIT	YES
14	20	28	RECRUIT	NOT RECRUIT	NO
15	18	19.33	NOT RECRUIT	NOT RECRUIT	YES
16	42	19.33	RECRUIT	RECRUIT	YES
17	39	26.67	NOT RECRUIT	NOT RECRUIT	YES
18	50	33	NOT RECRUIT	RECRUIT	NO
19	45	43.67	NOT RECRUIT	NOT RECRUIT	YES
20	53	44.67	NOT RECRUIT	RECRUIT	NO
Accuracy					12/20 = 0.6

c)

2c					
Year	Profit Percentage	Prediction	Predicted Decision	Actual Decision	Correct?
-1	39				
0	33				
1	20	36.00	RECRUIT	NOT RECRUIT	NO
2	15	30.67	RECRUIT	NOT RECRUIT	NO
3	35	22.67	RECRUIT	RECRUIT	YES
4	20	23.33	NOT RECRUIT	NOT RECRUIT	YES
5	15	23.33	RECRUIT	NOT RECRUIT	NO
6	34	23.33	RECRUIT	RECRUIT	YES
7	26	23	NOT RECRUIT	NOT RECRUIT	YES
8	25	25	NOT RECRUIT	NOT RECRUIT	YES
9	21	28.33	RECRUIT	NOT RECRUIT	NO
10	45	24	RECRUIT	RECRUIT	YES
11	46	30.33	NOT RECRUIT	RECRUIT	NO
12	18	37.33	NOT RECRUIT	NOT RECRUIT	YES
13	20	36.33	RECRUIT	RECRUIT	YES
14	20	28	RECRUIT	NOT RECRUIT	NO
15	18	19.33	NOT RECRUIT	NOT RECRUIT	YES
16	42	19.33	RECRUIT	RECRUIT	YES
17	39	26.67	NOT RECRUIT	NOT RECRUIT	YES
18	50	33	NOT RECRUIT	RECRUIT	NO
19	45	43.67	NOT RECRUIT	NOT RECRUIT	YES
20	53	44.67	NOT RECRUIT	RECRUIT	NO
Accuracy					12/20 = 0.6

- d) 3 is better.
- e) Exponentially weighted moving averages has no effect compared to the original accuracy. It is the same which is still worse than sliding window averages.

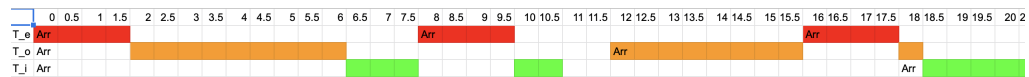
2e					
Year	Profit Percentage	Prediction	Predicted Decision	Actual Decision	Correct?
-1	39	39			
0	33	35.40	RECRUIT		
1	20	26.16	RECRUIT	NOT RECRUIT	NO
2	15	19.46	RECRUIT	NOT RECRUIT	NO
3	35	28.79	NOT RECRUIT	RECRUIT	NO
4	20	23.51	RECRUIT	NOT RECRUIT	NO
5	15	18.41	RECRUIT	NOT RECRUIT	NO
6	34	27.76	NOT RECRUIT	RECRUIT	NO
7	26	26.70	RECRUIT	NOT RECRUIT	NO
8	25	25.68	RECRUIT	NOT RECRUIT	NO
9	21	22.87	RECRUIT	NOT RECRUIT	NO
10	45	36.15	NOT RECRUIT	RECRUIT	NO
11	46	42.06	NOT RECRUIT	RECRUIT	NO
12	18	27.62	RECRUIT	NOT RECRUIT	NO
13	20	23.05	RECRUIT	RECRUIT	YES
14	20	21.22	RECRUIT	NOT RECRUIT	NO
15	18	19.29	RECRUIT	NOT RECRUIT	NO
16	42	32.92	NOT RECRUIT	RECRUIT	NO
17	39	36.57	NOT RECRUIT	NOT RECRUIT	YES
18	50	44.63	NOT RECRUIT	RECRUIT	NO
19	45	44.85	NOT RECRUIT	NOT RECRUIT	YES
20	53	49.74	NOT RECRUIT	RECRUIT	NO
Accuracy				3/20 = 0.15	

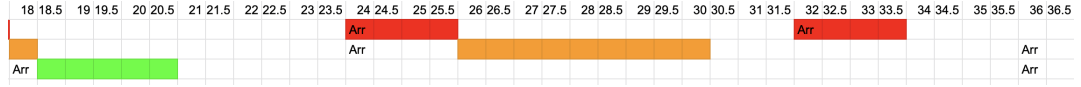
- f) The prediction accuracy stays the same as simple weighted average.

2f					
Year	Profit Percentage	Prediction	Predicted Decision	Actual Decision	Correct?
-1	39	39			
0	33	37.80	RECRUIT		
1	20	34.24	RECRUIT	NOT RECRUIT	NO
2	15	30.39	RECRUIT	NOT RECRUIT	NO
3	35	31.31	NOT RECRUIT	RECRUIT	NO
4	20	29.05	RECRUIT	NOT RECRUIT	NO
5	15	26.24	RECRUIT	NOT RECRUIT	NO
6	34	27.79	NOT RECRUIT	RECRUIT	NO
7	26	27.43	RECRUIT	NOT RECRUIT	NO
8	25	26.95	RECRUIT	NOT RECRUIT	NO
9	21	25.76	RECRUIT	NOT RECRUIT	NO
10	45	29.61	NOT RECRUIT	RECRUIT	NO
11	46	32.88	NOT RECRUIT	RECRUIT	NO
12	18	29.91	RECRUIT	NOT RECRUIT	NO
13	20	27.93	RECRUIT	RECRUIT	YES
14	20	26.34	RECRUIT	NOT RECRUIT	NO
15	18	24.67	RECRUIT	NOT RECRUIT	NO
16	42	28.14	NOT RECRUIT	RECRUIT	NO
17	39	30.31	NOT RECRUIT	NOT RECRUIT	YES
18	50	34.25	NOT RECRUIT	RECRUIT	NO
19	45	36.40	NOT RECRUIT	NOT RECRUIT	YES
20	53	39.72	NOT RECRUIT	RECRUIT	NO
Accuracy				3/20 = 0.15	

Problem 3

- a) $\rho_{EKG} = 0.25$, $\rho_{OSB} = 0.375$, $\rho_{ICP} = 0.1389$.
 $\rho_{TOTAL} = 0.7639$
- b) This task can be scheduled under RM because total utilization is less than $n(2^{\frac{1}{n}} - 1) = 3(2^{\frac{1}{3}} - 1) = 0.7798$
- c)





d) If we add this new utilization then the total utilization will equal 0.8139. Which would be greater than $n(2^{\frac{1}{n}} - 1) = 4(2^{\frac{1}{4}} - 1) = 0.7568$ meaning it would not be schedulable under RM.

e) With an additional CPU. For $N=2$, $N(2^{\frac{1}{2}} - 1) = 2(2^{\frac{1}{2}} - 1) = 0.8284$ which is greater than the total utilization of 0.8139.