Math508 Homework 7

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Abstract

Viterbi Decoding Algorith to find optimal path

1 No. 1

Tossing of coins with initial coin randomly(uniformly) selected. Tossing continues possibly changing the coin with probability 1/3. Assume we observed $Y_{[0,10]} = HHHHTHTTTT$.

The optimal path (order of coins chosen) found by Viterbi algorithm is

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[1, 1, 1, 1, 3, 1, 3, 3, 3, 3]
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2 No. 2

Hidden markov model on a simple reflected r.w. X_n on A[0,20] starting at 10. $P(W_1 = \pm L) = \frac{1}{2}$. $Y_n = min\{max\{X_n + W_n, 0\}, 20\}$. Simulate X_n, Y_n, $0 \leq n \leq 400$, for $L = 10, 14, 16, 17$, find two optimal path estimates X_n^{*max} and X_n^{*min} of X_n by choosing maximal and minimal solution of the maximization problem in every Viterbi Algorithm step.

For $L = 10$, check Figure 1; for $L = 14$, check Figure 2; for $L = 16$, check Figure 3; for $L = 17$, check Figure 4.

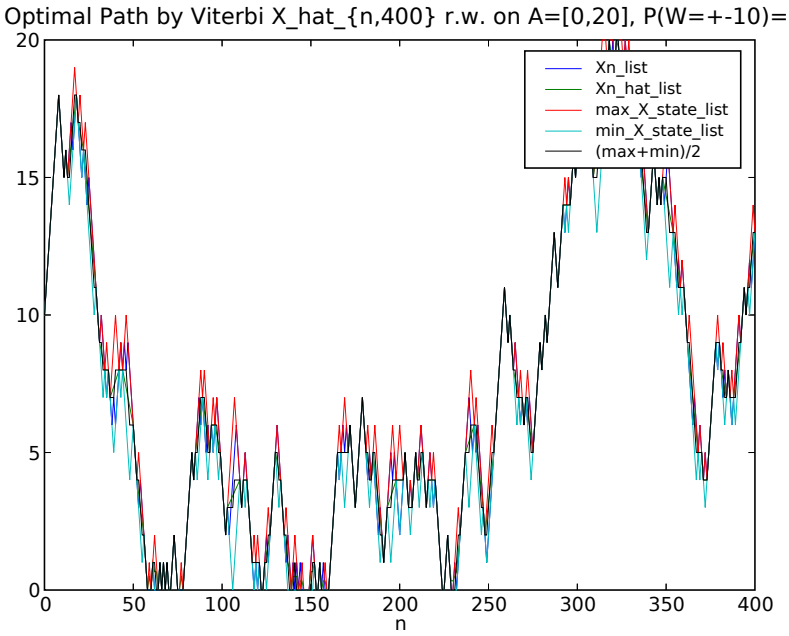

Figure 1:

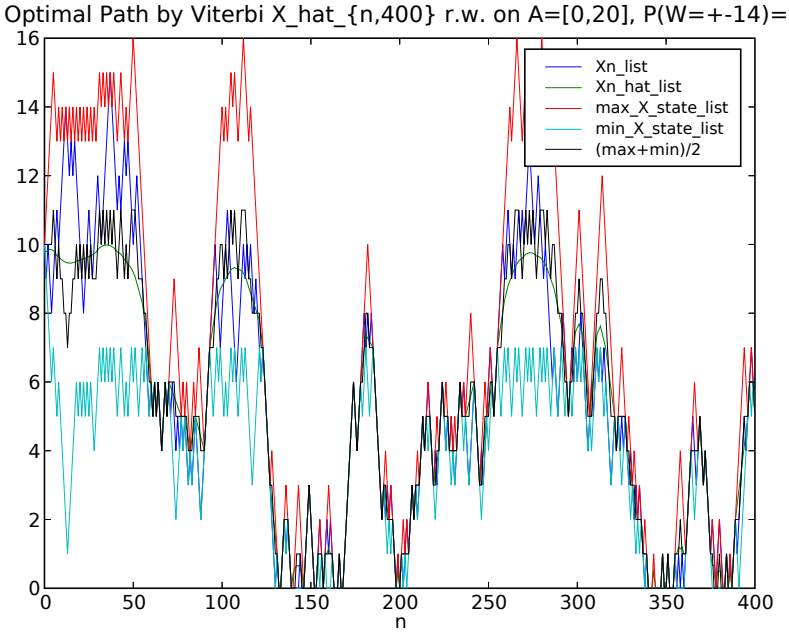

Figure 2:

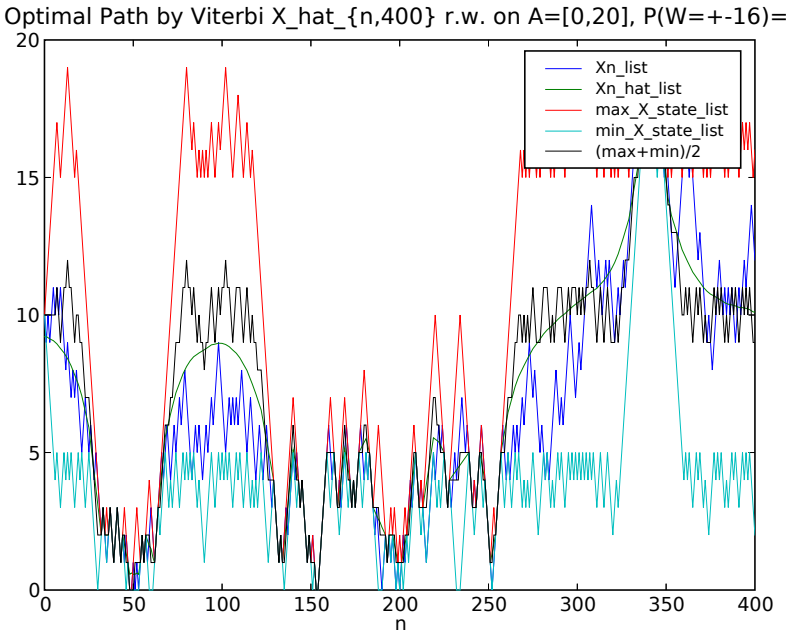

Figure 3:

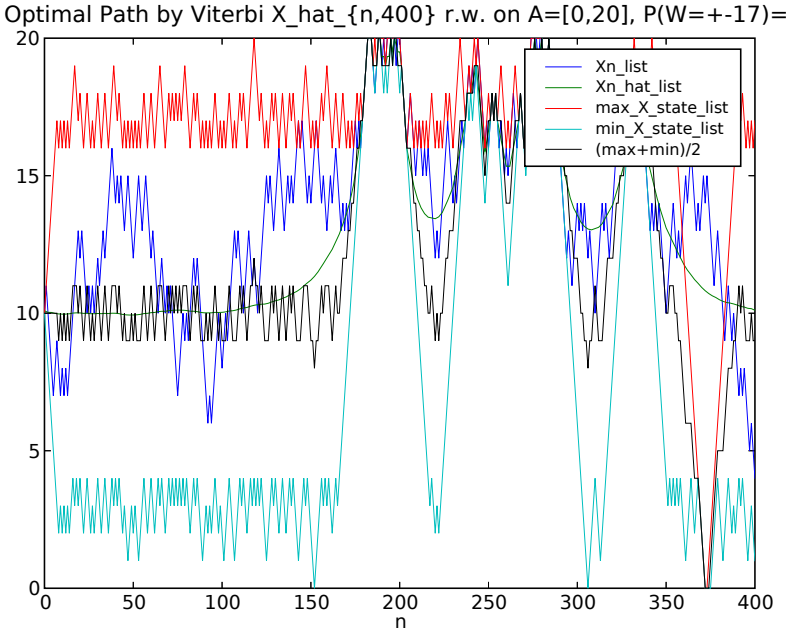

Figure 4: