

ASSIGNMENT 7

7.1 Viterbi algorithm

1. Sentence

democracyistheworstformofgovernmentexceptforaltheothers

2. Plot

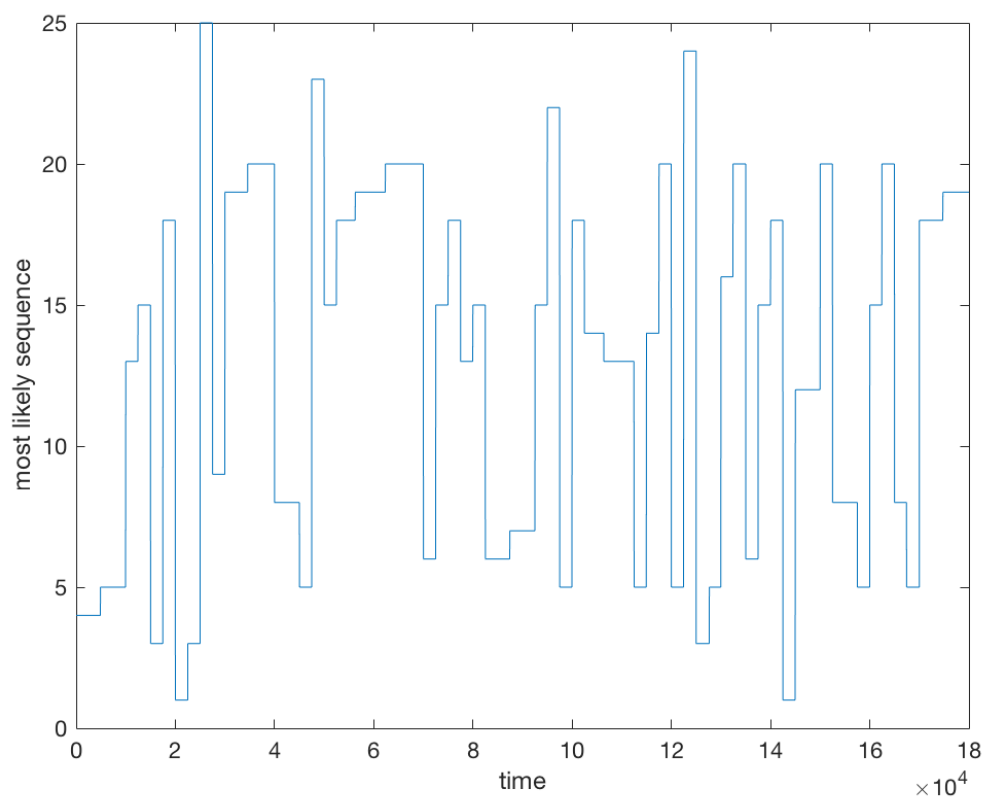


Figure 1: the most likely sequence of hidden states versus time

3. Source Code

Listing 1: hw7_1.m

```
1  clear all
2
3  T = 180000;
4
5  Pi = load('initialStateDistribution.txt');
6  A = load('transitionMatrix.txt');
7  B = load('emissionMatrix.txt');
8  Ot = load('observations.txt');
9
10 % iteration
11 l = zeros(26,T);
12 phi = zeros(T,26);
13 l(:,1) = log(Pi)+log(B(:,Ot(1)+1));
14
15 for t = 2:T
16     [ltmp, phi(t,:)] = max(l(:,t-1)+log(A));
17     l(:,t) = ltmp + log(B(:,Ot(t)+1));
18 end
19
20 % backtracking
21 S = zeros(T,1);
22 [~,ST] = max(l(:,T));
23 S(T) = ST;
24
25 for t = T:-1:2
26     S(t-1) = phi(t,S(t));
27 end
28
29 % translate
30 char = ['a','b','c','d','e','f','g','h','i','j','k','l','m',...
31         'n','o','p','q','r','s','t','u','v','w','x','y','z'];
32 sentence = char(S(1));
33 for i = 2:T
34     if(S(i) ~= S(i-1))
35         sentence = [sentence, char(S(i))];
36     end
37 end
38 disp(sentence);
39
40 % figure
41 figure;
42 plot(S);
43 xlabel('time');
```

```
44 ylabel( 'most_likely_sequence' );
```

Submitted by Xiaowen Mao on Nov 15.