The output in R is given below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sequence | 1 Hidden State | 2 Hidden States | | 3 Hidden States | |
|  | AIC | AIC | % Increase | AIC | % Increase |
| 1 | 992.0096 | **976.3713** | **-1.5764** | 980.4732 | 0.4201 |
| 2 | **1101.103** | 1110.292 | 0.8346 | 1124.236 | 1.2559 |
| 3 | 1098.827 | 1039.076 | -5.438 | **1040.261** | **0.1149** |

For each of the states, the percentage increase of AIC over that of 1 state less is calculated to give a clearer view in the AIC change. My best guess of the number of states of each sequence is as follows:

For Sequence 1, AIC is lowest at k = 2, so it is likely that sequence 1 has 2 hidden states.

For Sequence 2, AIC is lowest at k = 1, so it is likely that sequence 2 has 1 hidden state.

For Sequence 3, AIC is lowest at k = 2 , and AIC of k = 3 is very close to that of k = 2 (just 0.11% increase). Therefore, it is possible that sequence 3 has 2 or 3 hidden states. In this case, I have already guessed sequence 1 has 2 hidden states, hence I would guess sequence 3 has 3 states here.

For sequence 1,

Transition matrix A of the hidden chain :

and the emission matrix B :

For sequence 2,

Transition matrix A does not exist because there is no transition.

and the emission matrix B :

For sequence 3,

Transition matrix A of the hidden chain:

and the emission matrix B :