CS598 - Coding Assignment 3

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Report the estimated transition matrix A_{2*2} and emission matrix B_{2*3} from custom-built Baum-Welch algorithm with 100 iterations.

```
data = read.csv("Coding3_HMM_Data.csv")

mz=2; mx=3
ini.A = matrix(1, mz, mz)
ini.A = ini.A/rowSums(ini.A)
ini.B = matrix(1:6, mz, mx)
ini.B = ini.B/rowSums(ini.B)
ini.w = c(1/2, 1/2)

myout = myBW(data$X, ini.A, ini.B, ini.w, n.iter = 100)
myout$A; myout$B
```

```
##           [,1]      [,2]
## [1,] 0.5381634 0.4618366
## [2,] 0.4866444 0.5133556
```

```
##           [,1]      [,2]      [,3]
## [1,] 0.1627751 0.2625807 0.5746441
## [2,] 0.2514996 0.2778097 0.4706907
```

Save the output, a sequence of length 500 taking values either "A" or "B", from custom-built Viterbi algorithm in a file named Coding3_HMM_Viterbi_Output.txt. Then compare the result with the sequence generated by function: `viterbi` in HMM package.

```
char_map = c('A', 'B')

myout.Z = myViterbi(data$X, myout$A, myout$B, ini.w)
myout.Z = char_map[myout.Z]

write.table(myout.Z, file = "Coding3_HMM_Viterbi_Output.txt",
            row.names = FALSE, col.names = FALSE)

hmm0 =initHMM(c("A", "B"), c(1, 2, 3),
              startProbs = ini.w,
              transProbs = ini.A, emissionProbs = ini.B)
true.out = baumWelch(hmm0, data$X, maxIterations=100, pseudoCount=0)
true.viterbi = viterbi(true.out$hmm, data$X)

sum(true.viterbi != myout.Z)
```

```
## [1] 0
```

The results are identical.