Hidden Markov Model

Modified from: https://www.r-bloggers.com/hmm-example-with-depmixs4/

```r
library(depmixS4)
```

```
## Warning: package 'depmixS4' was built under R version 4.0.2
```

```
## Loading required package: nnet
```

```
## Loading required package: MASS
```

```
## Loading required package: Rsolnp
```

```
## Warning: package 'Rsolnp' was built under R version 4.0.2
```

```
## Loading required package: nlme
```

```r
# generate our data
n <- 140 # number of transitions (7 days, 10 weeks)
obs <- rep(c(c(2, 2), c(2, 1), c(1, 1), c(1, 1), c(1, 1), c(1, 1), c(1, 2)), 10)
```

```r
set.seed(1234)
# 1. create the model
mod <- depmix(response = obs ~ 1, data=data.frame(obs), nstates=2)

# 2. fit the model
f <- fit(mod)
```

```
## converged at iteration 8 with logLik: 4462.099
```

```r
summary(f)
```

```
## Initial state probabilities model
## pr1 pr2
##   1   0
##
## Transition matrix
##         toS1  toS2
## fromS1 0.744 0.256
## fromS2 0.100 0.900
##
## Response parameters
## Resp 1 : gaussian
##     Re1.(Intercept) Re1.sd
## St1               2      0
## St2               1      0
```
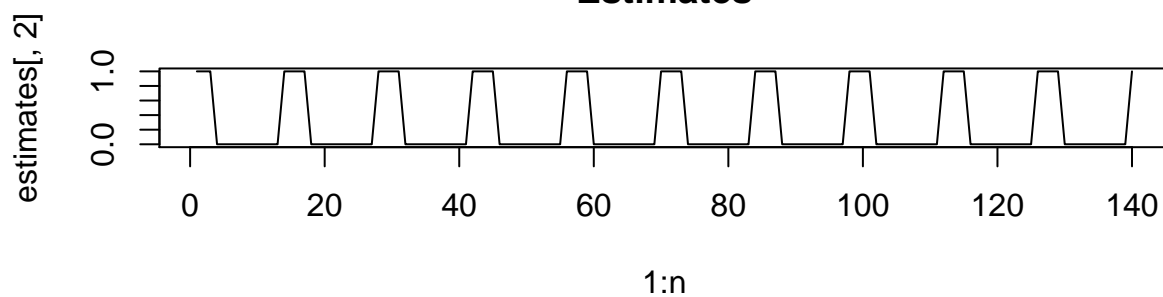
```r
# get the estimated state for each timestep
estimates <- posterior(f)

par(mfrow=c(2,1))
plot(1:n, obs, type='l', main='Observations, X')
plot(1:n, estimates[,2], type='l', main='Estimates')
```

Observations, X

obs

1:n

Estimates

estimates[, 2]

1:n
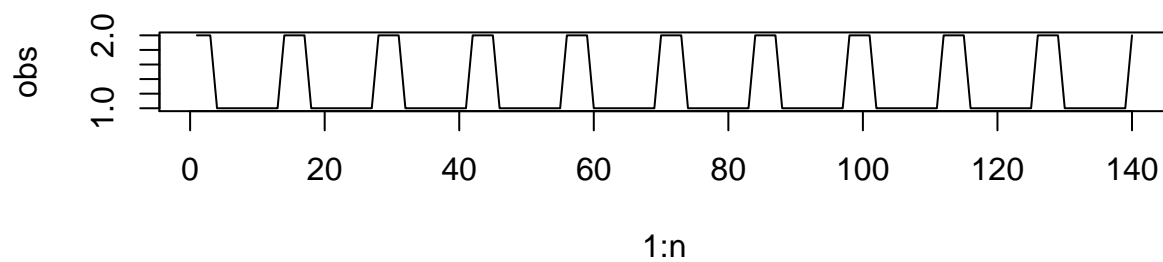
What did it learn?

```
head(estimates)
```

```
##   state S1 S2
## 1     1  1  0
## 2     1  1  0
## 3     1  1  0
## 4     2  0  1
## 5     2  0  1
## 6     2  0  1
```