Modeling with a Markov Model

A Markov model of a person's tendency to exercise or not. A Markov process has:

- a finite set of states
- fixed transition probabilities between states

Initial state: 30 days: 25 exercised (E), 5 did not (N)

Transition probabilities:

- E -> E .8
- E -> N .2
- N -> N .75
- N -> E .25

```
# build the transition matrix for the model
transMatrix <- matrix(c(.8, .2, .25, .75), nrow=2)
transMatrix
```

```
##      [,1] [,2]
## [1,]  0.8 0.25
## [2,]  0.2 0.75
```

```
# represent the initial state in the exercise matrix
exercise <- matrix(c(5/30, 25/30), nrow=2)
exercise
```

```
##           [,1]
## [1,] 0.1666667
## [2,] 0.8333333
```

Alter the number of iterations.

After 6 iterations, the model stabilizes at around 54% to 46%. After 5000 iterations, about the same.

```
for (i in 1:10){
  exercise <- transMatrix %*% exercise
  print(paste("exercise at i=", i, ":", format(round(exercise[1,], 2))))
}
```

```
## [1] "exercise at i= 1 : 0.34"
## [1] "exercise at i= 2 : 0.44"
## [1] "exercise at i= 3 : 0.49"
## [1] "exercise at i= 4 : 0.52"
## [1] "exercise at i= 5 : 0.54"
## [1] "exercise at i= 6 : 0.54"
## [1] "exercise at i= 7 : 0.55"
## [1] "exercise at i= 8 : 0.55"
## [1] "exercise at i= 9 : 0.55"
## [1] "exercise at i= 10 : 0.55"
```

```
exercise
```

```
##           [,1]
```

```
## [1,] 0.5545705
## [2,] 0.4454295
```