

Knee Data - Discrete Mixture Model

February 5, 2020

The "knee"-data from "catdata" are loaded.

```
> library(catdata)
> data(knee)
```

The data set contains longitudinal data and is currently in the "wide" format, now it is transformed into the "long" format by the function "reshape".

In addition the response is dichotomized, "age" is centered around 30 and a quadratic effect "age2" of age is created.

```
> knee <- reshape(knee, direction="long", varying=list(5:8), v.names="R",
+                 timevar="Time")
> knee$RD <- rep(0, length(knee$R))
> knee$RD[knee$R>2] <- 1
> knee$Age <- knee$Age - 30
> knee$Age2 <- knee$Age^2
```

The covariates "Th" and "Sex" are factorized.

```
> knee$Th <- as.factor(knee$Th)
> knee$Sex <- as.factor(knee$Sex)
```

For discrete mixture models the library "flexmix" is used.

```
> library(flexmix)
```

Now some discrete mixture models are fitted, each with another number of components. Every model fits fixed effects for the covariates "Th", "Sex", "Age" and "Age2" while the intercepts vary across components.

```
> kneeflex2 <- stepFlexmix(cbind(RD,1-RD) ~ 1 | N,          model = FLXMRglmfix(family =
+   "binomial", fixed= ~ Th + Sex + Age + Age2), k = 2, nrep = 5, data = knee)

2 : * * * * *

> kneeflex3 <- stepFlexmix(cbind(RD,1-RD) ~ 1 | N,          model = FLXMRglmfix(family =
+   "binomial", fixed= ~ Th + Sex + Age + Age2), k = 3, nrep = 5, data = knee)

3 : * * * * *

> kneeflex4 <- stepFlexmix(cbind(RD,1-RD) ~ 1 | N,          model = FLXMRglmfix(family =
+   "binomial", fixed= ~ Th + Sex + Age + Age2), k = 4, nrep = 5, data = knee)
```

4 : * * * * *

We compare the fitted models by BIC.

```
> summary(kneeflex2)@BIC
```

```
[1] 501
```

```
> summary(kneeflex3)@BIC
```

```
[1] 513
```

```
> summary(kneeflex4)@BIC
```

```
[1] 522
```

As the model with two components has the lowest BIC, the coefficients of that model are printed.

```
> summary(refit(kneeflex2))
```

\$Comp.1

	Estimate	Std. Error	z value	Pr(> z)	
Th2	-1.84224	0.51196	-3.60	0.00032	***
Sex1	-0.10206	0.39794	-0.26	0.79759	
Age	0.02024	0.02079	0.97	0.33032	
Age2	-0.00613	0.00219	-2.80	0.00519	**
(Intercept)	-0.96012	0.46730	-2.05	0.03992	*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

\$Comp.2

	Estimate	Std. Error	z value	Pr(> z)	
Th2	-1.84224	0.51196	-3.60	0.00032	***
Sex1	-0.10206	0.39794	-0.26	0.79759	
Age	0.02024	0.02079	0.97	0.33032	
Age2	-0.00613	0.00219	-2.80	0.00519	**
(Intercept)	3.92648	0.61617	6.37	1.9e-10	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1