Travel Mode - Multinomial Logit Model

August 21, 2024

For multinomial models that include category–specific as well as global effects the function "mlogit" from the library "mlogit" can be used.

```
> library(mlogit)
```

The "Travel Mode"–data are stored in the "Edcat"–package and can be loaded by the following command.

```
> data(ModeChoice, package="Ecdat")
```

For the use of the function "mlogit" an appropriate data set has to be built. This is done by use of the function "mlogit.data".

```
> travel.long <- mlogit.data(ModeChoice, choice="mode", shape="long", alt.levels=
+ c("air","train","bus","car"))
```

Now the model can be fitted. In the formula first the category–specific effects and then, separated by "|", the global effects are specified.

```
> travel.kat.id <- mlogit(mode ~ invt + gc|hinc, data=travel.long)
> summary(travel.kat.id)
```

Now the same model is fitted with the package "VGAM".

```
> library(VGAM)
```

At first the data need to be prepared adequately to be ready for use with the function "vglm".

```
> travelmode <- matrix(ModeChoice$mode, byrow = T, ncol = 4)
> colnames(travelmode) <- c("air","train","bus","car")
> travelhinc <- matrix(ModeChoice$hinc, byrow = T, ncol = 4)
> travelhinc <- travelhinc[,1]
> travelinvt <- matrix(ModeChoice$invt, byrow = T, ncol = 4)
> colnames(travelinvt) <- c("invtair","invttrain","invtbus","invtcar")
> travelgc <- matrix(ModeChoice$gc, byrow = T, ncol = 4)
> colnames(travelgc) <- c("gcair","gctrain","gcbus","gccar")
> travelinvt <- sweep(travelinvt[,-1], 1, travelinvt[,1])
> travelgc <- sweep(travelgc[,-1], 1, travelgc[,1])
> Invt <- travelinvt[,1]
> Gc <- travelgc[,1]
> traveldat <- cbind(travelhinc, travelinvt, Invt, travelgc, Gc)
> traveldat <- as.data.frame(traveldat)
```

Now the model can be fitted.

```
> fit <- vglm(travelmode ~ Invt + Gc + travelhinc,
+             multinomial(parallel = FALSE ~ travelhinc, refLevel = 1),
+             xij = list(Invt ~ invttrain + invtbus + invtcar,
+                        Gc ~ gctrain + gcbus + gccar),
+             form2 = ~ Invt + invttrain + invtbus + invtcar +
+                       Gc + gctrain + gcbus + gccar + travelhinc,
+             data = traveldat, trace = TRUE)
> summary(fit)
> summary(travel.kat.id)
```

At last we compare the coefficients of the two fitted models.

```
> summary(travel.kat.id)$CoefTable
> summary(fit)@coef3
```