An Introduction to the R Package mpplot

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1 Overview

This package provides functions to creates coefficient plots for MCMCregress models in MCMCpack. It can also be used to predict new cases, create interaction plots, and create short tables of regression results. There are no dependencies beyond the graphics package which is part of the R installation, and MCMCpack which is used for these regression models in the first place.

2 Coefficient Plot

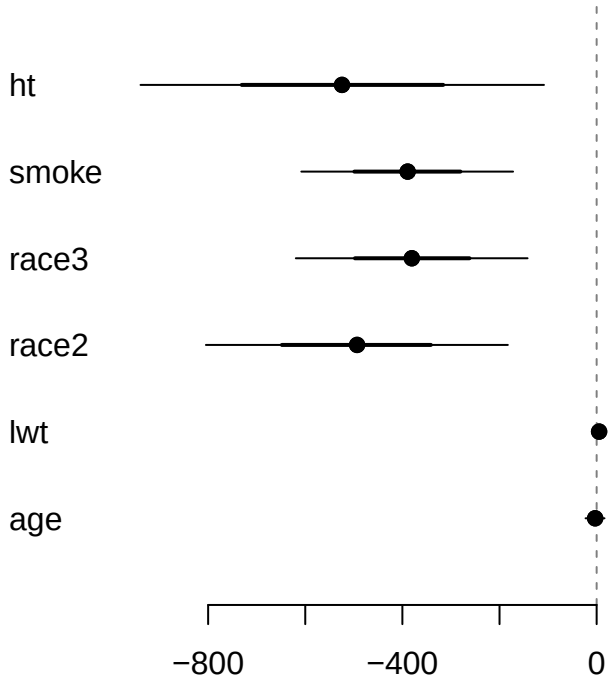
The function *cplot* creates a coefficient plot: a graphical presentation of the coefficients and uncertainty in a regression model to better understand regression results in substantive term. The code has only been tested on regression models created with the MCMCregress function of package MCMCpack.

Let us begin with a regression model using MCMCpack. We use the birth weight data included in the package. The data identify risk factors associated with low infant birth weight. is the birth weight (in grams), *age* is the age of the mother (in years), *lwt* is the mother's weight at last menstrual period (in pounds), *race* differentiates between White (=1), Black (=2), and other (=3). The smoking status during pregnancy is captures in *smoke*, while *ht* identifies a history of hypertension.

```
> library(MCMCpack)
> library(mpplot)
> birthwt$race = as.factor(birthwt$race)
> m = MCMCregress(bwt ~ age + lwt + race + smoke + ht, data=birthwt)
```

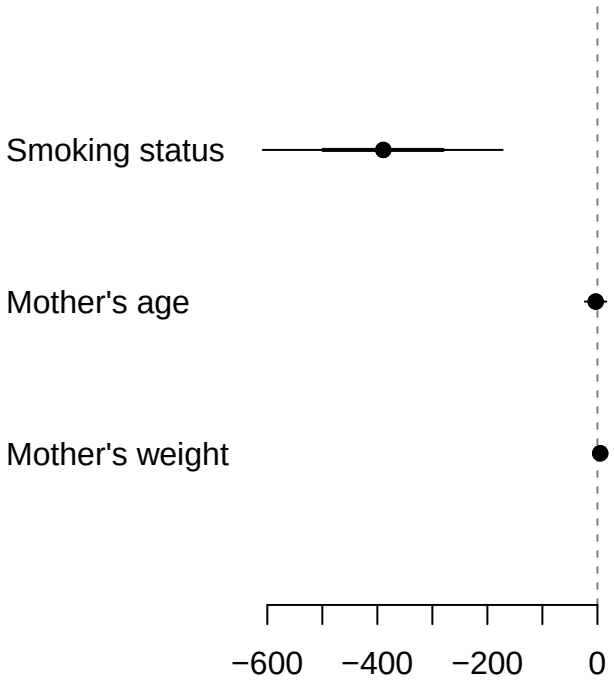
The command *cplot* takes the name of the model (without quotes) and provides a coefficient plot.

```
> cplot(m)
```



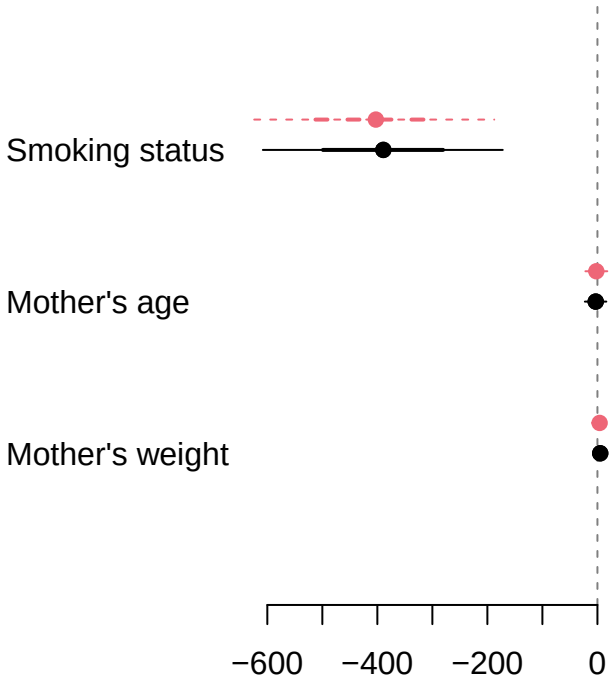
The figures are customizable and the coefficients of a a second model can be added. Let us customize the figure a bit. To begin with, we use the *vars* argument to pick just those variables that we want to show. At the same time, we change the order of the coefficients to be shown. With the *names* argument we replace the variable names with something more meaningful, creating a figure we can share.

```
> cplot(m, vars=c("lwt", "age", "smoke"),
+       names=c("Mother's weight", "Mother's age", "Smoking status"))
```



To illustrate how to add a second model to the coefficient plot, we start with an alternative model that does not control for hypertension (ht). We create the coefficient plot as above, and then call *cplot* again with the *adj* argument set to 0.2. This adds the second model, with a distance of 0.2. We change the second model a bit to make the difference clearer, like setting the line colour with *ccolor*, and changing the line type (*lty*).

```
> ma = MCMCregress(bwt ~ age + lwt + race + smoke, data=birthwt)
> cplot(m, vars=c("lwt", "age", "smoke"),
+       names=c("Mother's weight", "Mother's age", "Smoking status"))
> cplot(ma, vars=c("lwt", "age", "smoke"),
+       names=c("Mother's weight", "Mother's age", "Smoking status"),
+       ccolor="#EE6677", lty=2, adj=0.2)
```



3 Coefficient Table

With *ctable* we can create a short table of the coefficients

```
> ctable(m)
```

```
          Mean    2.5%   97.5%
age      -3.07  -22.13   15.84
lwt       5.06    1.56    8.58
race2 -493.28 -799.36 -188.89
race3 -380.53 -614.68 -146.88
smoke -389.14 -603.21 -175.32
ht    -524.34 -932.07 -117.57
```

By default, the tables only show the coefficients and an interval. The probabilities can be customized as shown with the *probs* argument for illustrative purposes, and we can select the variables to be included with the *vars* argument. The *names* argument also works like with the *cplot* function.

```
> ctable(m, probs=c(.025, .1, .5, .89), vars=c("smoke", "ht", "lwt", "age"),
+        names=c("Smoking", "Hypertension", "Weight", "Age"))

                Mean    2.5%     10%     50%     89%
Smoking      -389.14 -603.21 -529.03 -389.38 -255.09
Hypertension -524.34 -932.07 -789.96 -524.63 -269.57
Weight          5.06    1.56    2.78    5.07    7.23
Age            -3.07  -22.13  -15.70   -2.98    8.91
```

With the function *kable* in the *knitr* package, these tables can easily be modified.

4 Interaction Plot

Interaction plots show the predicted values from a model (y-axis, the outcome variable) for when values on one variable vary (x-axis, the focal variable) at specific values on a third variable (two lines, the fixed variable). Here we look at the interaction between age of the mother (age) and the mother's weight (lwt).

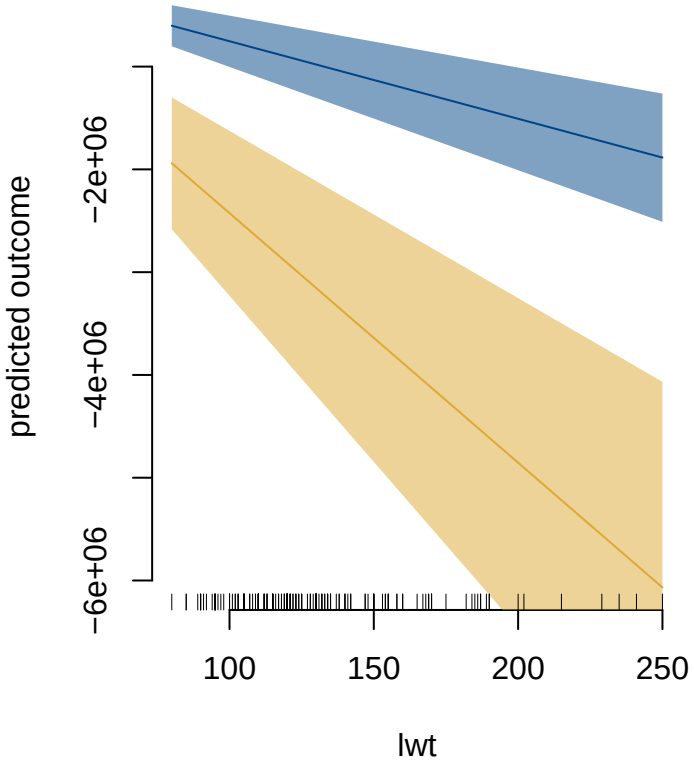
```
> mi = MCMCregress(bwt ~ age * lwt + race + smoke + ht, data=birthwt)
```

The command *iplot* takes the name of the model (*mi* in this case), plus two strings that identify the focal and the fixed variables: *focal = "lwt"* and *"fixed = "age"*. These are the required arguments to draw an interaction plot.

In this case, we also specified the credibility interval to be shown, and the values of the fixed variable at which we want to compare, so age 18 and 45 in this example. Because the numbers are so small, the values on the y-axis are turned with *las=3*; by default the labels are presented horizontally to easily read them.

```
> iplot(mi, focal="lwt", fixed="age", probs=c(0.2, 0.8), at=c(18, 45), las=3)

[1] 3
```


predicted outcome
−2e+06
−4e+06
−6e+06
100
150
200
250
lwt