Negative Binomial Regression with R

Introduction Negative binomial regression is for modeling count variables, usually for over-dispersed count outcome variables.

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This page uses the following packages. Make sure that you can load them before trying to run the examples on this page. If you do not have a package installed, run: install.packages("packagename"), or if you see the version is out of date, run: update.packages().

```
require(foreign)
require(ggplot2)
require(MASS)
Version info: Code for this page was tested
On: 2013-01-22
```

Examples of negative binomial regression

- Example 1. School administrators study the attendance behavior of high school juniors at two schools. Predictors of the number of days of absence include the type of program in which the student is enrolled and a standardized test in math.
- Example 2. A health-related researcher is studying the number of hospital visits in past 12 months by senior citizens in a community based on the characteristics of the individuals and the types of health plans under which each one is covered.

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Description of the data Let's pursue Example 1 from above.

- We have attendance data on 314 high school juniors from two urban high schools in the file **nb_data**.
- The response variable of interest is days absent, daysabs. The variable math gives the standardized math score for each student.
- The variable prog is a three-level nominal variable indicating the type of instructional program in which the student is enrolled.

Exploratory Data Analysis

```
dat <- read.dta("http://www.ats.ucla.edu/sta
dat <- within(dat, {
prog <- factor(prog, levels = 1:3, labels =
id <- factor(id)
})
```

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```
summary(dat)
        id          gender          math
  1001   :  1   female:160   Min.   : 1.0
  1002   :  1   male  :154   1st Qu.:28.0
  1003   :  1                Median :48.0
  1004   :  1                Mean   :48.3
  1005   :  1                3rd Qu.:70.0
  1006   :  1                Max.   :99.0
  (Other):308
         prog
 General   : 40
```

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```
ggplot(dat, aes(daysabs, fill = prog)) + geom_
., margins = TRUE, scales = "free")
```

Histogram plots showing distribution of the data
Each variable has 314 valid observations and their distributions seem quite reasonable. The unconditional mean of our outcome variable is much lower than its variance.