OmicabelNoMM User's Guide

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Chapter 1

Quick Usage

Chapter 2

Understanding OmicabelNoMM

2.1 Overview

2.2 Glossary

2.3 Formulas

2.3.1 Possible analysis

Basic analysis

$$y \sim \beta_0 1 + \beta_1 x \tag{2.1}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_r x_r \tag{2.2}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_{l+1} x_{l+1} + \cdots + \beta_p x_p \tag{2.3}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_r \left(x_{l+1} + \cdots + x_p\right) \tag{2.4}$$

Analysis with factors/dosages

$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_r \phi_1 x_r \tag{2.5}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_{l+1} \phi_1 x_{l+1} + \cdots + \beta_p \phi_r x_p \tag{2.6}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_r \left(\phi_1 x_{l+1} + \cdots + \phi_r x_p\right) \tag{2.7}$$

Analysis with Interactions/Environmental Effects

$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_r i_1 x_r \tag{2.8}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_{l+1} i_1 x_r + \cdots + \beta_j j_1 x_r \tag{2.9}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_r i_1 \left(x_{l+1} + \cdots + x_p\right) \tag{2.10}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_{l+1} i_1 \left(x_{l+1} + \cdots + x_p\right) + \cdots + \beta_j i_j \left(x_{l+1} + \cdots + x_p\right) \tag{2.11}$$

Analysis with Interactions/Environmental Effects keeping original variable

$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_{l+1} x_r + \beta_{l+2} i_1 x_r \tag{2.12}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_{l+1} x_r + \beta_{l+2} i_1 x_r + \cdots + \beta_j j_1 x_r \tag{2.13}$$

Analysis with Interactions and factors

$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_r i_1 \phi_1 x_r \tag{2.14}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_{l+1} i_1 \phi_1 x_r + \cdots + \beta_j j_1 \phi_1 x_r \tag{2.15}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_r i_1 \left(\phi_{l+1} x_{l+1} + \cdots + \phi_p x_p\right) \tag{2.16}$$
$$y \sim \cdots + \beta_l cov_l + \beta_{l+1} i_1 \left(\phi_{l+1} x_{l+1} + \cdots + \phi_p x_p\right) + \cdots + \beta_j i_j \left(\phi_{l+1} x_{l+1} + \cdots + \phi_p x_p\right) \tag{2.17}$$

Analysis with Interactions and factor keeping original variable

$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_{l+1} \phi_r x_r + \beta_{l+2} i_1 \phi_r x_r \tag{2.18}$$
$$y \sim \beta_0 1 + \beta_1 cov_1 + \cdots + \beta_l cov_l + \beta_{l+1} \phi_r x_r + \beta_{l+2} i_1 \phi_r x_r + \cdots + \beta_j j_1 \phi_r x_r \tag{2.19}$$

2.3.2 Regression Coefficients

$\beta = (X^T X)^{-1} X^T y$

2.3.3 T-statistic

2.3.4 P-values

2.4 Algorithm

2.5 Compromises

Chapter 3

Setting OmicabelNoMM up

3.1 Your Machine

3.1.1 Clusters vs personal Computers

3.2 Source Files

```
user@ubuntu:~$ svn checkout svn://svn.r-forge.r-project.org/svnroot/genabel/pkg/OmicABELnoMM
Checked out revision 1838.
user@ubuntu:~$ cd OmicABELnoMM/
user@ubuntu:~/OmicABELnoMM$
$
```

3.3 Compilers

```
TODO:Install Compilers cmds
$
```

3.4 3rd Party Libraries

```
TODO:Install BOOST and BLAS LIBRARIES cmds
$
```

3.5 Compiling

For compiling the final executable binary use:

```
user@ubuntu:~/OmicABELnoMM$ make
$
```

For compiling the test binary use:

```
user@ubuntu:~/OmicABELnoMM$ make check
$
```

Chapter 4

Preparing Source Data

4.1 Overview

4.2 Databel

4.3 Covariates

4.4 Independent Variables, SNPs,CPG Sites,Measurements used to explain other Measurements

4.5 Dependent Variable, Phenotypes,Measurements to be explained

Chapter 5

Running Analysis

5.1 WARNING: Theoretical Caveats

5.2 Simple Linear Regression

5.3 Cluster usage for Simple Linear Regression

5.4 Covariates in Linear Regression

5.5 Simple interactions of non linear terms, Enviromental Effects

Chapter 6

FAQ