

Computer lab 5

Fractional factorial designs

This computer lab is about a two-level fractional factorial design, which was described in detail in Chapter 6 in [1] and in Chapter 8 in [2]. In this lab we perform 2^{5-1} fractional design using the data from Problem 2 in Chapter 6 in [1].

First, create a proper text file (separate the numbers in the rows by the space) and put it in the same folder with your R-script. Then upload the data using the command

```
data = read.csv("your_data_file.txt", header=TRUE)
```

and create the variables with the names of the columns of the frame:

```
attach(data)
```

Before constructing a model we need to know the main effects, which are given by

$$Effect_i = \frac{2(Contrast_i)}{N},$$

where $Contrast_i$ is found using the plus and minus signs in column i and $N = 2^{5-1}$.

Question1: which factors are significant?

Question2: find the aliases for 2^{5-1} design.

Next, let us construct the model with significant factors and analyse it. First we have to factorize the variables

```
A <- as.factor(A)
B <- as.factor(B)
C <- as.factor(C)
D <- as.factor(D)
E <- as.factor(E)
```

and then we can create a linear model

```
model1 <- lm(Y~*****:*, data = data1)
summary(aov(model1))
```

At the end do not forget to detach the names:

`detach(data)`

Referenser

- [1] BOX, G. E. P., HUNTER, J. S. and HUNTER, W. G. (2005). Statistics for Experiments John Wiley & Sons.
- [2] MONTGOMERY, D. C. (2009). Statistics for Experiments John Wiley & Sons.