

Chapter Four

A SIMULATION EXPERIMENT

In this chapter a description is given to the simulation experiment conducted to examine the performance of the CPM relative to that of the MIN and RM methods.

To conduct this simulation, we assumed that, there are two treatments T_1 and T_2 , and three covariate variables c_1 , c_2 and c_3 . The first covariate c_1 has two levels l_{11} and l_{12} , c_2 has three levels l_{21} , l_{22} and l_{23} and c_3 has two levels l_{31} and l_{32} . This yields $2 * 3 * 2 = 12$ single layers in the trial.

Different sample sizes are chosen to make reliable simulation. The first sample size is 10. This helps test the methods in case, when the sample size is less than the size of a single layers in the trial. Other sample sizes are 20(20)100 and 200(200)1000 (where 20(20) 100 for example means starting with a sample of size 20 and then increasing it by 20 i.e 40, 60, ..., up to 100). The simulation would be repeated 1000 times for each sample size.

The software STATA₁₂ is used to conduct this simulation. A do-file (a file which you make a program in, in STATA) is programmed to generate random data with the above covariate variables and then assign each patient to treatment T_1 or T_2 as follows (see appendix C):

1. Randomly (with equal probabilities).
2. By MIN formula (see 2.4).
3. By CPM formula, where $\lambda_{ij} = 50\%$, \forall_{ij} (see 3.2).

The generated data of the simulation is shown in appendix B, and summarized in appendix A.

The data will be analyzed and discussed in chapters five to seven for small, medium and large samples respectively. The discussion aims to make a comparison between critical percentage, imbalance minimization and pure randomization methods to determine which one of them is the best in the term of imbalance.

The data was generated by STATA₁₂ software. The simulation was conducted with sample sizes 10, 20, 40, 60, 80, 100, 200, 400, 600, 800 and 1000. The wide range of sample size is selected to make the comparison clear and more reliable. The simulation was repeated 1000 times in each sample size.

The tables and graphs in this chapter show the amount of imbalance by frequencies and percentages for each method in every single layer and for total of treatment, too.