

Projects for NMST543 Spatial statistics

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2021/2022

The projects include a short research part, usually a single paper. The materials will be provided by the teacher. The aim is to get familiar with a new technique / method related to the topics we have covered.

The focus is on the motivation of the method, its foundations and basic concepts, range of applicability, ...

Details of the proofs etc. are not really important for us now.

Each method is already implemented in the *spatstat* package.

The task is to “try” the method, identify the situations in which it is useful and in which it is not useful, create pictures that illustrate what the method does etc.

The output of the project will be a script illustrating the method and a pdf file giving the necessary overview of the method, examples of its use and everything the student finds interesting.

The pdf file should be written so that a clever colleague (who knows the basics of the spatial statistics that we have covered so far) would understand the principles of the method and would be able to use it on his/her own dataset.

With all this being said it is clear that there is no “correct” or “incorrect” solution to the project. However, only serious attempts will be appreciated by the course credit.

You will also be asked to give a 20 minute presentation about the project in the last week of the teaching period.

Deadline for handing in the pdf files and scripts is the end of the examination period (but it is much better to do it earlier in case some changes are required).

Nonparametric estimate of intensity as function of a covariate.

```
library(spatstat)  
?rhohat
```

Does the intensity of a point process depend on a given covariate?

References:

Baddeley, A., Chang, Y.-M., Song, Y. and Turner, R. (2012)
Nonparametric estimation of the dependence of a point process
on spatial covariates. *Statistics and Its Interface* 5 (2), 221–236.

Lurking variable plot.

```
library(spatstat)  
?lurking
```

Plot spatial point process residuals against a covariate to see if the covariate should be included in the model.

References:

Baddeley, A., Turner, R., Moller, J. and Hazelton, M. (2005) Residual analysis for spatial point processes. *Journal of the Royal Statistical Society, Series B* 67, 617–666.

Berman's tests for point process model.

```
library(spatstat)  
?berman.test
```

References:

Berman, M. (1986) Testing for spatial association between a point process and another stochastic process. *Applied Statistics* 35, 54–62.