Modeling Spatial Interactions (Wagrien)

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05 August, 2017

Abstract

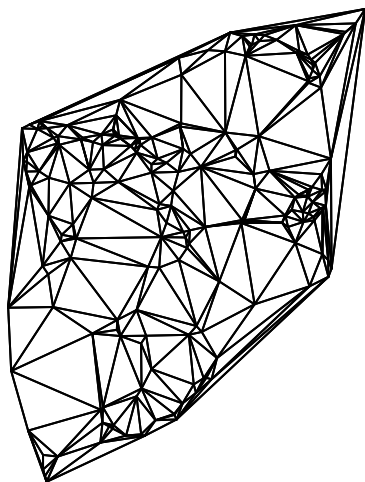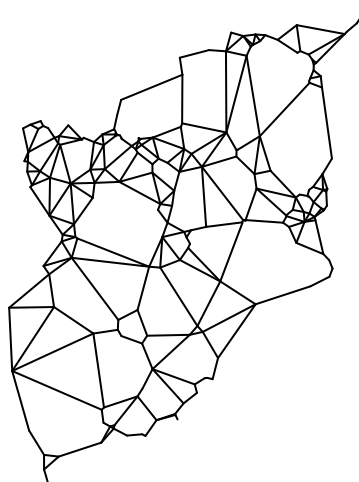Text of abstract

Contents

1 Analyses

1.1 Create Delaunay Graph and calculate the distances between the connected points

Delaunay graph

Gabriel graph

1.2 Interaction

A singly-constrained interaction is calculated:
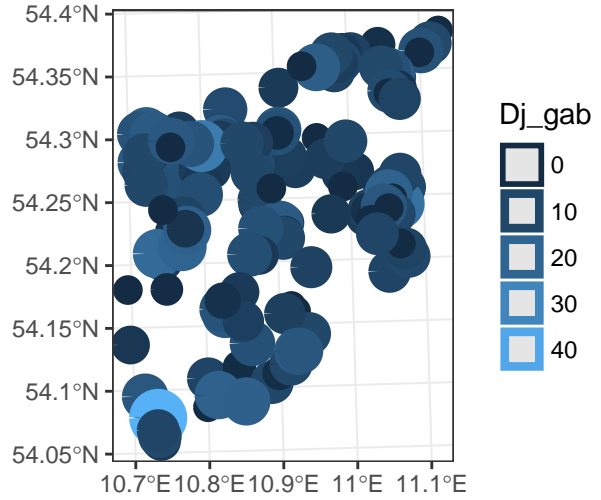
$$D_j = \sum_i \frac{O_i * W_j * c_{ij}^{-\beta}}{\sum_k W_k * c_{ik}^{-\beta}}$$

(Rihll and Wilson, 1988, Mathematical Appendix)

A
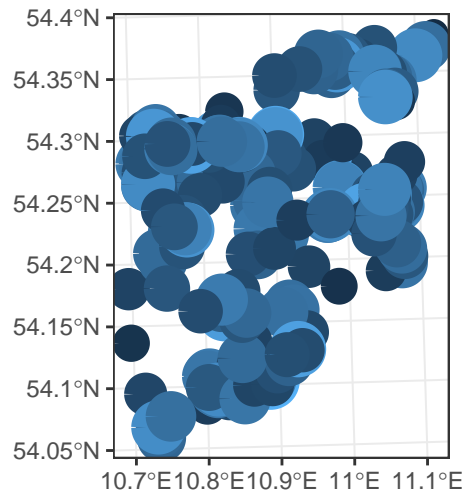
B

1.3 Network measures as attributes for Interaction

1.3.1 What is the influence of different beta values on the location importance of sites?

First, let us have a look at changing β values for the power function

Location attractiveness (Dj) in relation to degree–centrality and distance weight (beta) factors

Connections based on Delaunay graph; Origins weighted equally; attractiveness equals degree centrality

Degree centrality 3 4 5 6 7 8 9 10

Data source: settlements in Wagrien (Schleswig Holstein, Germany)

2 Colophon

This report was generated on 2017-08-05 19:10:13 using the following computational environment and dependencies:

```
#>  setting  value
#>  version  R version 3.4.1 (2017-06-30)
#>  system   x86_64, linux-gnu
#>  ui       X11
#>  language en_US
#>  collate  en_US.UTF-8
#>  tz       Europe/Berlin
#>  date     2017-08-05
#>
#>  package    * version  date        source
#>  assertthat   0.2.0    2017-04-11 CRAN (R 3.4.0)
#>  backports    1.0.5    2017-01-18 CRAN (R 3.4.0)
#>  base       * 3.4.1    2017-07-01 local
#>  base64enc    0.1-3    2015-07-28 CRAN (R 3.4.0)
#>  bindr        0.1      2016-11-13 cran (@0.1)
#>  bindrcpp     0.2      2017-06-17 cran (@0.2)
#>  bookdown     0.4      2017-05-20 CRAN (R 3.4.0)
#>  boot         1.3-19   2017-04-21 CRAN (R 3.4.0)
#>  coda         0.19-1   2016-12-08 CRAN (R 3.4.0)
#>  codetools    0.2-15   2016-10-05 CRAN (R 3.3.1)
```

```
#>   colorspace    1.3-2        2016-12-14 cran (@1.3-2)
#>   compiler      3.4.1        2017-07-01 local
#>   cowplot       0.8.0        2017-07-30 CRAN (R 3.4.1)
#>   crosstalk     1.0.0        2016-12-21 CRAN (R 3.4.0)
#>   datasets    * 3.4.1        2017-07-01 local
#>   DBI           0.7          2017-06-18 cran (@0.7)
#>   deldir        0.1-9        2015-03-09 CRAN (R 3.2.2)
#>   devtools      1.13.2       2017-06-02 CRAN (R 3.4.1)
#>   digest        0.6.12       2017-01-27 cran (@0.6.12)
#>   dplyr         0.7.2.9000   2017-08-04 Github (tidyverse/dplyr@65db321)
#>   evaluate      0.10         2016-10-11 CRAN (R 3.4.0)
#>   expm          0.999-2      2017-03-29 CRAN (R 3.4.0)
#>   foreach       1.4.3        2015-10-13 CRAN (R 3.2.2)
#>   gdalUtils     2.0.1.7      2015-10-10 CRAN (R 3.4.0)
#>   gdata         2.17.0       2015-07-04 CRAN (R 3.2.1)
#>   ggjoy         0.2.0.9990   2017-07-25 Github (clauswilke/ggjoy@0276877)
#>   ggplot2     * 2.2.1.9000   2017-07-25 Github (tidyverse/ggplot2@331977e)
#>   glue          1.1.1        2017-06-21 cran (@1.1.1)
#>   gmodels       2.16.2       2015-07-22 CRAN (R 3.4.0)
#>   graphics    * 3.4.1        2017-07-01 local
#>   grDevices   * 3.4.1        2017-07-01 local
#>   grid          3.4.1        2017-07-01 local
#>   gridExtra     2.2.1        2016-02-29 CRAN (R 3.4.0)
#>   gtable        0.2.0        2016-02-26 cran (@0.2.0)
#>   gtools        3.5.0        2015-05-29 CRAN (R 3.2.0)
#>   hms           0.3          2016-11-22 CRAN (R 3.4.0)
#>   htmltools     0.3.6        2017-04-28 CRAN (R 3.4.0)
#>   htmlwidgets   0.9          2017-07-10 cran (@0.9)
#>   httpuv        1.3.3        2015-08-04 CRAN (R 3.4.0)
#>   igraph        1.0.1        2015-06-26 cran (@1.0.1)
#>   iterators     1.0.8        2015-10-13 CRAN (R 3.2.2)
#>   jsonlite      1.5          2017-06-01 cran (@1.5)
#>   knitr         1.16         2017-05-18 CRAN (R 3.4.1)
#>   labeling      0.3          2014-08-23 CRAN (R 3.1.1)
#>   lattice       0.20-35      2017-03-25 CRAN (R 3.3.3)
#>   lazyeval      0.2.0        2016-06-12 CRAN (R 3.4.0)
#>   leaflet       1.1.0        2017-02-21 CRAN (R 3.4.0)
#>   LearnBayes    2.15         2014-05-29 CRAN (R 3.4.0)
#>   magrittr    * 1.5          2014-11-22 CRAN (R 3.2.1)
#>   mapview       2.1.5        2017-08-04 Github (r-spatial/mapview@2535694)
#>   MASS          7.3-47       2017-04-21 CRAN (R 3.4.0)
#>   Matrix      * 1.2-10       2017-04-28 CRAN (R 3.4.0)
#>   memoise       1.1.0        2017-04-21 CRAN (R 3.4.0)
#>   methods     * 3.4.1        2017-07-01 local
#>   mime          0.5          2016-07-07 CRAN (R 3.4.0)
#>   moin        * 0.1          2017-08-05 local (CRC1266-A2/moin@NA)
#>   munsell       0.4.3        2016-02-13 cran (@0.4.3)
#>   nlme          3.1-131      2017-02-06 CRAN (R 3.4.0)
#>   pkgconfig     2.0.1        2017-03-21 cran (@2.0.1)
#>   plyr          1.8.4        2016-06-08 cran (@1.8.4)
#>   png           0.1-7        2013-12-03 CRAN (R 3.4.0)
#>   purrr         0.2.2.2      2017-05-11 CRAN (R 3.4.0)
#>   R.methodsS3   1.7.1        2016-02-16 CRAN (R 3.4.0)
#>   R.oo          1.21.0       2016-11-01 CRAN (R 3.4.0)
```

```
#>  R.utils      2.5.0       2016-11-07 CRAN (R 3.4.0)
#>  R6           2.2.2       2017-06-17 cran (@2.2.2)
#>  raster       2.5-8       2016-06-02 CRAN (R 3.4.0)
#>  Rcpp         0.12.12     2017-07-15 cran (@0.12.12)
#>  readr      * 1.1.1       2017-05-16 CRAN (R 3.4.0)
#>  rgdal        1.2-8       2017-07-01 CRAN (R 3.4.1)
#>  rgeos      * 0.3-23      2017-04-06 CRAN (R 3.4.1)
#>  rlang        0.1.1.9000  2017-08-04 Github (tidyverse/rlang@ff87439)
#>  rmarkdown    1.6         2017-06-15 CRAN (R 3.4.1)
#>  rprojroot    1.2         2017-01-16 CRAN (R 3.4.0)
#>  satellite    1.0.0       2017-08-03 cran (@1.0.0)
#>  scales       0.4.1.9002  2017-08-04 Github (hadley/scales@842ad87)
#>  sf           0.5-4       2017-08-04 Github (r-spatial/sf@7734517)
#>  shiny        1.0.3       2017-04-26 CRAN (R 3.4.0)
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#>  stats      * 3.4.1       2017-07-01 local
#>  stats4       3.4.1       2017-07-01 local
#>  stringi      1.1.5       2017-04-07 cran (@1.1.5)
#>  stringr      1.2.0       2017-02-18 cran (@1.2.0)
#>  tibble       1.3.3       2017-05-28 cran (@1.3.3)
#>  tools        3.4.1       2017-07-01 local
#>  udunits2     0.13        2016-11-17 CRAN (R 3.4.0)
#>  units        0.4-5       2017-06-15 cran (@0.4-5)
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#>  viridis      0.4.0       2017-03-27 CRAN (R 3.4.1)
#>  viridisLite  0.2.0       2017-03-24 CRAN (R 3.4.0)
#>  webshot      0.4.1       2017-05-31 cran (@0.4.1)
#>  withr        1.0.2       2016-06-20 CRAN (R 3.4.0)
#>  xtable       1.8-2       2016-02-05 CRAN (R 3.4.0)
#>  yaml         2.1.14      2016-11-12 CRAN (R 3.4.0)
```

The current git commit of this file is 5b78aa7d01f66696a622018c30a5aa7920e9d5cf, which is on the master branch and was made by Daniel Knitter on 2017-08-05 18:59:13. The current commit message is "change singly-constrained function parameter (comments)". The repository is online at git@github.com:CRC1266-A2/moin

References

Rihll, T.E., Wilson, A.G., 1988. Modelling Settlement Structures. Working Paper, University Leeds 516.