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# Lansing woods

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# 1 Data description

It's an important question in forest ecology wether certain tree species are spatially associated with each other and how they respond to competition. The Lansing Woods dataset [2] contains the location and botanical classification of 2251 trees. The data was collected in Lansing Woods, Clinton County, Michigan USA by D.J. Gerrard in 1969 from a square area of $282 \times 282$ metres.

The dataset is available in the *R* package *spatstat* [3, 1]. It's a categorically marked dataset, where the mark can have one of the values

- blackoak
  - *Quercus velutina*
  - known associates: whiteoak, redoak, hickory, maple
- redoak
  - *Quercus rubra*
  - known associates: whiteoak, blackoak
- whiteoak
  - *Quercus alba*
  - known associates: whiteoak, redoak
- hickory
  - *Carya*
  - known associates:
- maple
  - *Acer*
  - known associates:
- misc

Look it up

Look it up

find the original article

The interesting questions will be:

- do the associations known *a priori* show in the data
- do some species avoid some other species
- clustering behavior inside and between the species

The dataset is plotted in figure 1.

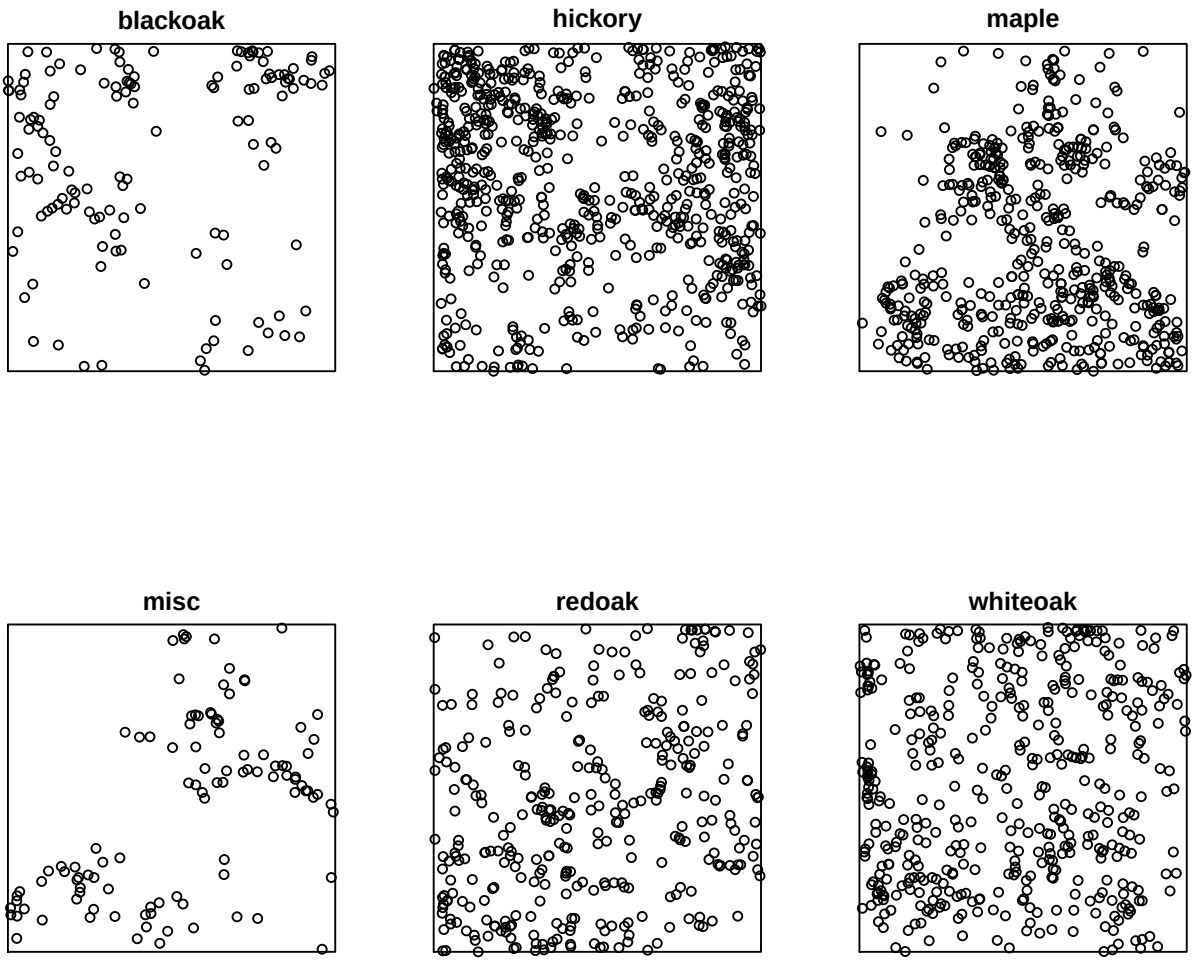


Figure 1: The Lansing woods dataset plotted by separating the data by the marks (species)

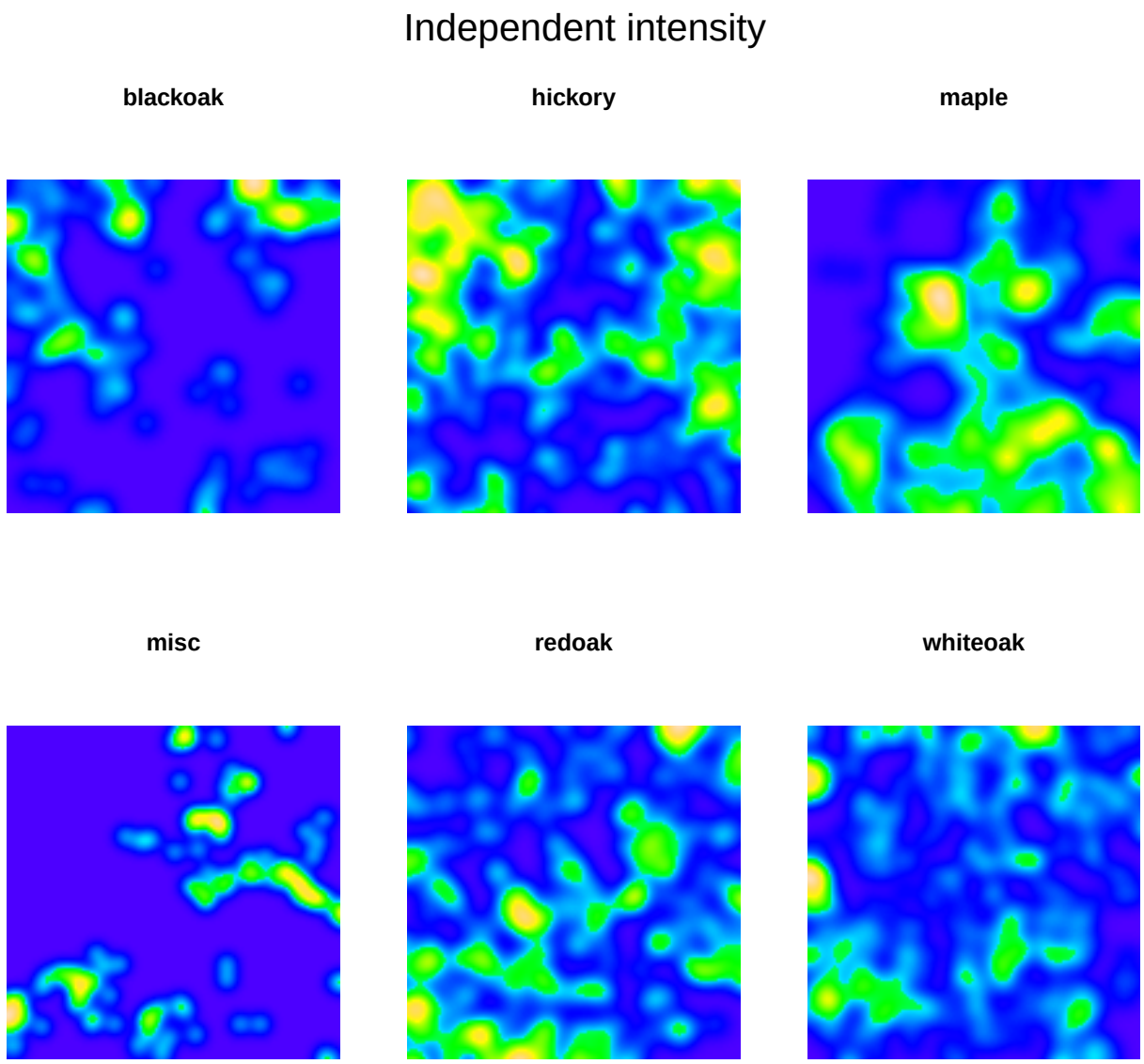


Figure 2: Independent smoothed intensity estimates

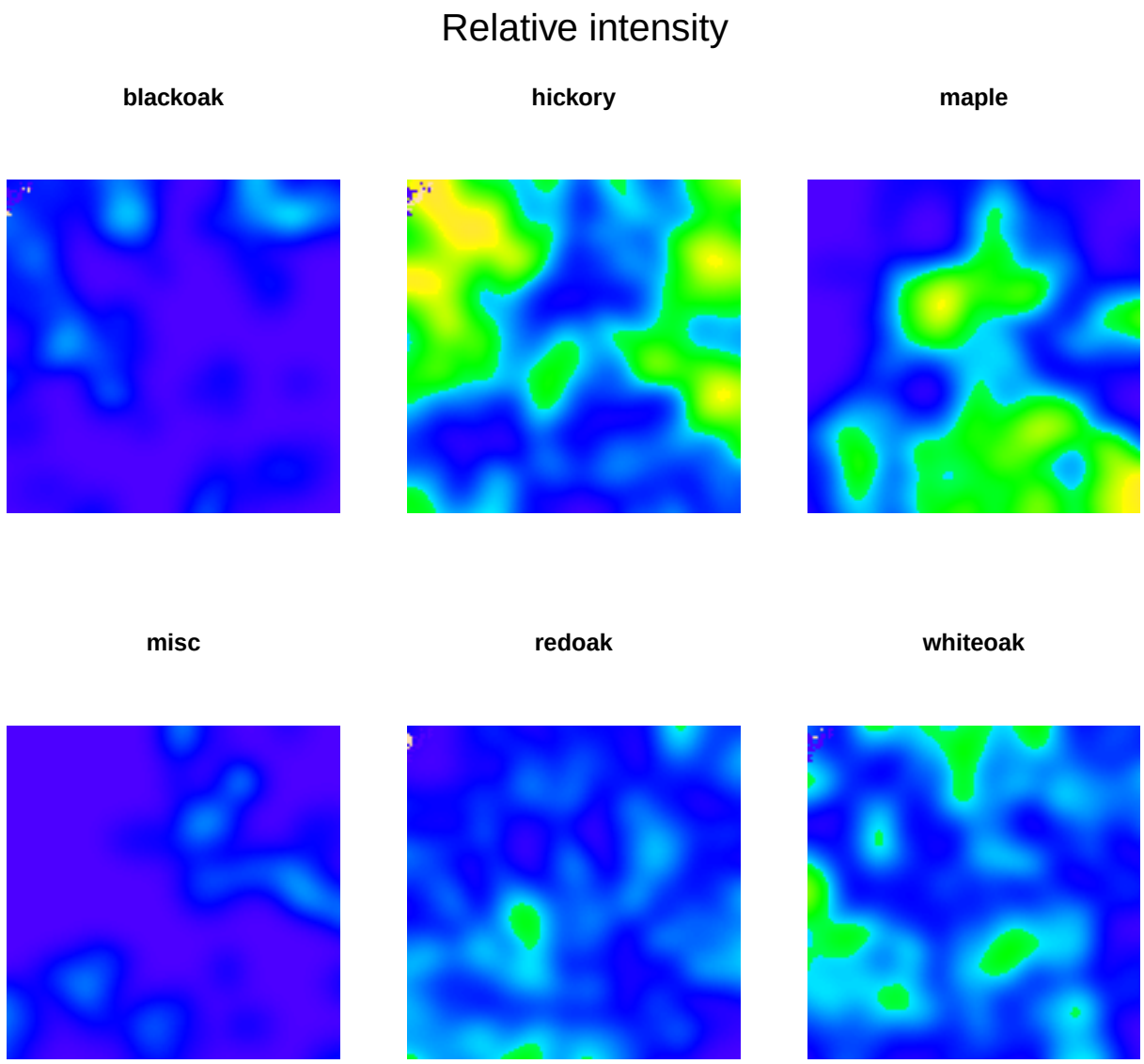


Figure 3: Smoothed intensity estimates across all species

## 2 Intensity analysis

It's obvious just by looking at figure 2 that the intensity profiles exhibit significant interspecies variability. For exampe whiteoak seems to have almost homogenous intensity whereas maple displays a much more inhomogenous pattern. Gaussian kernel smoothed intensity estimates, separately estimated for each species, is displayed in figure 2. Another Gaussian kernel smoothed intensity estimate is displayed in figure 3, but in this version the intensities are directly comparable between the species.

## 3 Methods

## 4 Results

## 5 Conclusion

## References


[1] Adrian Baddeley and Rolf Turner. "Spatstat: an R package for analyzing spatial point patterns". In: *Journal of Statistical Software* 12.6 (2005). ISSN 1548-7660, pp. 1–42. URL: www.jstatsoft.org (cit. on p. 1).

[2] D.J. Gerrard. "Competition quotient: a new measure of the competition affecting individual forest trees". In: *Research Bulletin 20, Agricultural Experiment Station* (1969) (cit. on p. 1).

[3] R Development Core Team. *R: A Language and Environment for Statistical Computing*. ISBN 3-900051-07-0. R Foundation for Statistical Computing. Vienna, Austria, 2011. URL: http://www.R-project.org/ (cit. on p. 1).


## 1 R code