

Comment on “Cosmic structures” and on
“Analysis of spatial point patterns

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SCMA IV

Cosmic structures

Initial conditions



N body simulations

Map of the universe

Cosmic structures

Initial conditions



N body simulations (some aspects still unclear)

Map of the universe (sampling/data issues)

Cosmic structures

Initial conditions



N body simulations (some aspects still unclear)

Map of the universe (sampling/data issues)

Similar to goodness-of-fit testing in spatial point process model fitting.



- Martínez proposes Minkowski functionals.
- Properties of excursion sets of density fluctuations about the mean at multiple scales.
- galaxy data \longrightarrow density \longrightarrow wavelets \longrightarrow MF's

- Martínez proposes Minkowski functionals.
- Properties of excursion sets of density fluctuations about the mean at multiple scales.
- galaxy data \longrightarrow density \longrightarrow wavelets \longrightarrow MF's
- Why use v_3 , number of holes in the excursion set?
- How does one understand/interpret deviations of empirical v_3 from, say, that of the Gaussian?
- Is v_3 affected by the boundaries of the survey?

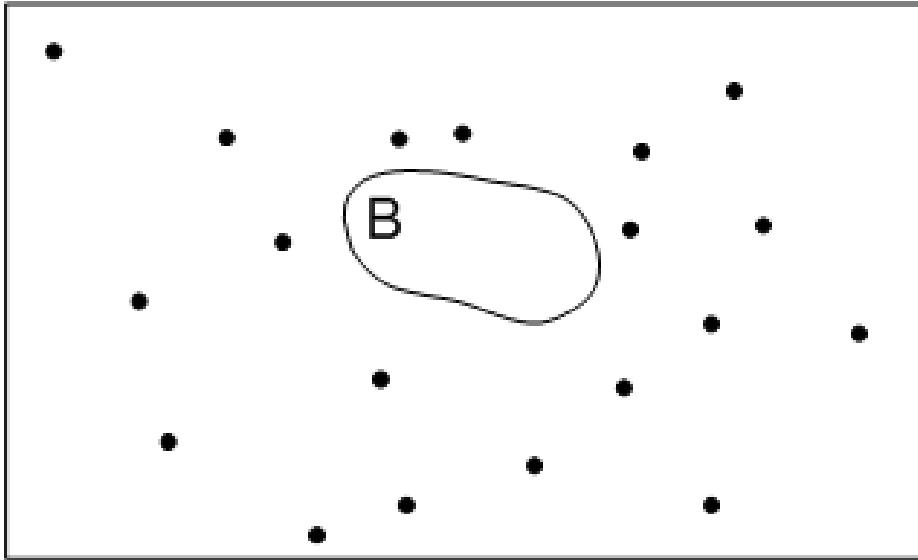
- Different surveys yield different estimates of correlation length, e.g. 2dF vs SDSS – ascribed to different galaxy content in the 2 surveys.

How to tell if differences in results between surveys are due to actual differences, or just random variation?

- Can we combine information from different surveys?

Analysis of spatial point patterns

- Extended residuals for 1-D pt process to general spatial pt processes, using the Papangelou conditional intensity.
- Having diagnostic plots is useful.
- Possibility of separating clustering from inhomogeneity.



For $u \in B$, $\lambda(u, X)$ is probability of having a point at u , given point process X .

$\int_B \lambda(u, X)$ – add up probability for all points in B ;
related to expected number of points in B

- Mark plot appears difficult to interpret:
 - residuals correlated;
 - residuals are zero when summed over B ;
 - which B ?
- Lurking variable plot – pts on line are dependent; difficult to judge in less clear-cut cases?
- Many types of residuals can be defined, using different h 's. Need guidelines for practitioners. How to proceed if different residuals yield different conclusions?

- If clustering and inhomogeneity (spatial trend) are present and incorrectly modelled, would one be masked by the other and not show up in the diagnostic plot?
- Large datasets in 3-D – challenges for visualization and computation.
- Can the method be applied to dynamic models, in terms of initial conditions?

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