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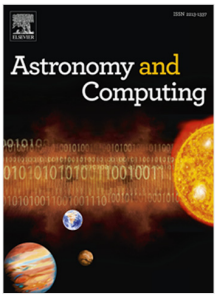

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`correlcalc`: A 'Generic' Recipe for Calculation of Two-point Correlation Function

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Abstract

This article presents a recipe for computation of galaxy two-point correlation function (2pCF) from redshift surveys using `python`. One of the salient features of this approach is that it can be used for calculating galaxy clustering for any arbitrary geometry (or Cosmology) model. Being efficient enough to run on a low-spec desktop computer for small datasets, this 'recipe' can be used for quick validation of alternative models and for pedagogical purposes.

Keywords: Two-point correlation function, `BallTree`, Galaxy Clustering, redshift surveys, 2pCF for alternative models

1. Introduction

The two-point correlation function (2pCF from here on) is one of the vital statistics that can be obtained from redshift surveys. 2pCF provides information about galaxy clustering in redshift space and in turn provides crucial observables such as Baryon Acoustic Oscillation peak position (BAO peak)[1], structure growth rate[2] and test of geometry of the Universe through Alcock-Paczynski test[3].

The brute-force calculation of 2pCF is $O(N^2)$ process[4] as one needs to calculate pair-wise distances of all data points and bin them. It gets computationally more intensive as histogram construction time gets added to the time

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