

Fourier analysis of irregularly spaced data on \mathbf{R}^d

Yasumasa Matsuda¹ and Yoshihiro Yajima^{2,*}

¹ Faculty of Economics, Tohoku University

² Faculty of Economics, University of Tokyo

Abstract

The purpose of this paper is to propose a frequency domain approach for irregularly spaced data on \mathbf{R}^d . We extend the original definition of the periodogram for time series to that for irregularly spaced data and define nonparametric and parametric spectral density estimators in a way similar to the classical approach. Introduction of the mixed asymptotics employed in Hall and Patil (1994) makes it possible to provide asymptotic theories to the spectral estimators. The asymptotic result for the parametric one is regarded as a natural extension of the classical result for regularly spaced data obtained by Dunsmuir (1979) and Dahlhaus and Künsch (1987) to that for irregularly spaced data. Empirical studies are also included to illustrate the frequency domain approach.

Key words: Fourier analysis, random field, spatio-temporal data

*Corresponding author

E-mail address: yajima@e.u-tokyo.ac.jp (Yoshihiro Yajima)

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