BOSTON UNIVERSITY

Boston University Statistics and Probability Seminar Series

A Reduced Mean-Square Error Quadratic Inverse Spectrum Estimator

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Thursday, Nov 6, 2008, 4-5pm
Mathematics and Computer Science (MCS) Building, Room 148
111 Cummington Street, Boston

Tea and Cookies at 3:30pm in MCS 153

Abstract: A new spectrum estimator is introduced. The new estimator exploits quadratic inverse theory (see Thomson 1990, 2001), to attain improved mean-square error performance over the standard, eigenvalue weighted, non-adaptive spectrum estimator. In Thomson(1982), the standard, consistent, multitaper estimator is obtained by averaging a high-resolution, inconsistent, spectrum estimator over the estimator bandwidth. The improved performance of the proposed estimator results from replacing this average with a weighted average, computed in the space spanned by the quadratic inverse basis. The weighting, determined analytically, is chosen such that the resulting estimator minimizes the sum of the variance and the square of the in-band bias; neglecting bias due to spectral leakage and potential bias due to the possible incompleteness of the quadratic inverse basis. The relative reduction of the mean-square error of the proposed spectrum estimator is validated, by simulation, for an ARMA(4,2) process. The reduction is found to be approximately equal to the square of the spectrum at frequencies relatively unaffected by spectral leakage. At leakage prone frequencies, performance increase is reduced, qualitatively consistent with the effect of the eigenvalue weighting in the standard multitaper estimator.

Throughout the talk, an effort will be made to provide background on spectral time-series analysis, on the multitaper method of spectrum estimation, and on quadratic inverse theory.

For directions and maps, please see *http://math.bu.edu/research/statistics/statseminar.html.*