Boston University Statistics and Probability Seminar Series

Szegö Theorem and Prediction Problem

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Abstract: Let $X(t)$, $t = 0, \pm 1, \dots$, be a second order stationary random sequence with spectral density function $f(\lambda)$, $\lambda \in [-\pi, \pi]$. Denote by $\sigma_n^2(f)$ the best linear mean square one-step prediction error in predicting the random variable $X(0)$ by the past of $X(t)$ of length n, and let $\sigma^2(f) = \sigma_\infty^2(f)$ be the prediction error by the entire past.

The Szegö classical "weak" theorem states that the relative prediction error $\delta_n(f) = \sigma_n^2(f) - \sigma^2(f)$ is nonnegative and tends to zero as $n \to \infty$.

In this talk we will present some (old and new) results that describe the rate of decrease of the relative prediction error $\delta_n(f)$ to zero as $n \to \infty$, depending on the dependence structure of the underlying process $X(t)$ and the smoothness properties of its spectral density function $f(\lambda)$.

We also will discuss the inverse problem: for a given rate of decrease of the relative prediction error $\delta_n(f)$ to zero, describe the process $X(t)$ compatible with that rate. Specify then dependence structure of $X(t)$ and the smoothness properties of its spectral density $f(\lambda)$.

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