Local Variance Estimation for Censored Observations

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This talk is motivated by a problem frequently considered in medical science. Assume we have information about a number of patients that is collected during the treatment of a disease. With the help of these data the doctor wants to predict whether the illness may come back after the healing, e.g., the survival time of a new patient depending on different factors ("predictors"). Mathematically speaking, the task is to estimate the mean survival time Y given a realization x of the d-dimensional predictor vector X: $\mathbb{E}\{Y|X = x\} =: m(x)$. The quality of the prediction by m can be globally defined by the (minimum) mean squared error and locally by the *local variance* $\sigma^2(x) := \mathbb{E}\{(Y - m(X))^2|X = x\}$.

The aim of the talk is to give estimators of the local variance function and to show the common properties of convergence and its rate. In particular, we deal with local averaging (partitioning, nearest neighbor) and least squares estimation methods.

A feature that complicates the analysis is that the follow-up program of the patients may be incomplete. After a certain censoring time, there is no information any longer about the patient. We estimate the local variance also under censoring, using in addition the product-limit estimator.