

**STANFORD UNIVERSITY**  
**DEPARTMENT OF STATISTICS**  
**DEPARTMENTAL SEMINAR**

4:15 p.m., Tuesday, July 12, 2005  
Sequoia Hall Room 200  
(Cookies at 3:45 in 1st Floor Lounge)

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**ESTIMATION OF SHAPE-RESTRICTED FUNCTIONS: SHAPE  
MODIFICATION VIA CONSTRAINED UNIFORM APPROXIMATION**

In this talk, we describe an estimator for shape-restricted functions that consists of: (i) nonparametric function estimation without taking into account the shape constraint and (ii) shape modification of the nonparametric estimate by solving a related constrained uniform approximation problem. We consider the three shape constraints—monotonicity, convexity/concavity, and monotone convexity/concavity which occur commonly in practical applications. The main motivation behind the two-stage estimator is that, for these constraints, it is relatively inexpensive to modify the shape of the first-stage nonparametric estimate via constrained uniform approximation so that the shape-modified one always has a uniform approximation error smaller than or equal to that of the first-stage one. As a result, the shape-modified estimate converges uniformly to the true function at least as fast as the first-stage. However, the performance is shown to be asymptotically dominated by the first-stage nonparametric estimate. This is joint work with S.J. Kim at EE, Stanford Univ.