Dynamic Trees for Learning and Design

This talk presents a new response surface methodology, dynamic trees, for learning, optimization, and sequential design -- applications where Gaussian processes (GPs) have reigned supreme. Dynamic trees are thrifty on space and time: no need to store or invert big matrices. They are flexible: natively accommodating nonstationarity or heteroskedasticity. And they are inherently sequential, which means sequential design decisions (like for optimization/exploration) can be turned around quickly. Other benefits include the ability to deal with categorical predictors and responses, and to decompose partial dependencies by main, first order, and total effects, and fully online implementation. The talk will focus on the the dynamic tree methodology, inference by sequential Monte Carlo, design/optimization heuristics by active learning with illustrations, and applications in massive and streaming data contexts. It will also highlight an R package implementing the methods, called dynaTree, which is available on CRAN.

For more details see: http://arxiv.org/abs/0912.1586