

DEPARTMENT OF MATHEMATICS AND STATISTICS
MISSISSIPPI STATE UNIVERSITY

COLLOQUIUM

Semiparametric Mixtures of Regressions

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Allen 14

Abstract. (Finite) mixtures of regressions models are appropriate when regression data are believed to belong to two or more distinct categories, but the categories themselves are unobserved. Mixtures of regressions have been employed in numerous disciplines, including economics, machine learning, and psychology. In this talk, we discuss novel semiparametric extensions to the traditional mixture of linear regressions model and estimation procedures.

We first discuss the setting of modeling the mixing proportions nonparametrically as a function of the predictors. This framework allows for more flexibility in the modeling of the mixing proportions than the fully parametric hierarchical mixture of experts model, which is found in the machine learning literature. We present an EM-like algorithm that iterates between global estimation of the component parameters and local estimation of the mixing proportions.

Next, we consider a mixture of regressions model where the errors are assumed to be independent and identically distributed, but no other assumption is made. An EM-like algorithm is presented for optimization of this model, which incorporates a density estimation step. Recent work on maximized smoothed likelihood estimation is incorporated into our algorithm. We also discuss a sufficient condition for the identifiability of the parameters, which is stated and proved in Hunter and Young (2011).

We will also briefly discuss a few novel parametric mixtures of regressions models and how the semi-parametric approaches discussed in this talk could provide greater flexibility in those modeling strategies. The semiparametric approaches will be illustrated on a potato plant study and simulation results will be discussed. The relevant R functions for each analysis are also available in the contributed package `mixtools` (Young et al., 2010) on CRAN.

Dr. Young is a candidate for a position in our department. There will be a reception for him in Allen 467 at 3:00 pm following his talk.

Contact Jan DuBien, dubien@math.msstate.edu or (662) 325-7157, for additional information.