

From Penalized Splines to Mixed Models-Connecting the Dots (but not the data)

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A simple mathematical connection exists between the objective function in penalized spline regression and the solution for fixed and random effects in variance component models. The presentation explores and demonstrates this connection and gives applications of low-rank mixed model smoothing for bivariate, longitudinal, and spatial data. The random nature of the spline coefficients in mixed model smoothing has a number of important consequences, for example, the degree of smoothness relates directly to a variance component and can be estimated by likelihood-based methods. Implications of random splines and the problem of knot selection and placement with efficient space partitioning algorithms are also discussed in the talk.