Representing Additive Models as Mixed Models

Notations Cheat Sheet

Truncated Power Basis

$$y = \theta_0 + \theta_1 x + \theta_2 x^2 + ... + \theta_d x^d + \sum_{k=1}^{K} \theta_{dk} (x - \kappa_k)_+^d$$

θ_l	coefficients
κ_k	kth knot
K	number of knots

Additive Models

$$y = \sum_{j=1}^{p} V_j \xi_j + U\gamma$$

p	number of covariates
V_j	design matrices for non-linear effects
ξ_j	non-linear parameters
U	design matrix for linear effects
γ	linear parameter vectors
$b_k(.)$	basis function for kth knot
λ_j	roughness penalty
K_j	penalty matrix

Representation

$$\xi_j = \tilde{X}_j \beta_j + \tilde{Z}_j b_j$$

Σ_j	covariance matrix of prior
τ_j^2	variance of prior
β_j	non-penalized part of ξ_j
$\tilde{X}_j$	
b_j	penalized part of ξ_j
$\tilde{Z}_j$	
Z	
X	

Inference

W	
Q	