Nonparametric Bayes

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Dirichlet Process Mixtures of Generalized Linear Models: Summary

Into: What is a Dirichlet Process

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Model Examples

Gaussian

This model has been proposed by West et al. (1994), Escobar and West (1995) and Muller et al. (1996.) As a more introductory input, we explain each component in detail.

We have continuous covariates and responses in $\mathbb{R}$. It is modeled locally with a Normal distribution for the explanatory variables and a linear regression model for the response.

The explanatory variables have mean $\mu_{i,j}$ for the j-th dimension of the i-th observation (e.g. the 3rd term of the 2nd observation.) Similarly, we have $\sigma^2_{i,j}$ for this same logic. There are d total dimensions and n total observations .

We have the GLM parameters as linear predictors $\{\beta_{i,j}\}_{j=0}^{d}$ with response variance $\sigma^2_{i,y}$.

We define $\vec{\theta}_{y,i}$ for the regression parameters as follows:

$$\vec{\theta}_{y,i} = \left\{(\vec{\beta}_{i,j}, \sigma_{i,y}) \text{ where } \vec{\beta}_{i,j} = \{\beta_{i,0}, \beta_{i,1} \dots \beta_{i,d}\}\right\} \equiv \left(\{\beta_{i,j}\}_{j=0}^{d}, \sigma_{i,y}\right) \equiv \left(\beta_{i,0:d}, \sigma_{i,y}\right)$$

Then, for the covariates, we have $\vec{\theta}_{x,i}$, where k is used over j to indicate indexing beginning at 1.

$$\vec{\theta}_{x,i} = \left\{(\vec{\mu}_{i,k}, \vec{\sigma}_{i,k}) \text{ where } \vec{\mu}_{i,k} = \{\mu_{i,1}, \mu_{i,2}, \dots \mu_{i,d}\} \text{ and } \vec{\sigma}_{i,k} = \{\sigma_{i,1}, \sigma_{i,2}, \dots \sigma_{i,d}\}\right\} \equiv \left[(\mu_{i,j}, \sigma_{i,j})\right]_{j=1}^{d} \equiv \left(\mu_{i,1:d}, \sigma_{i,1:d}\right)$$