

$$f_j \sim \mathcal{GP}(0, \kappa_j(\cdot, \cdot)) \rightarrow p(\mathbf{f} | \boldsymbol{\theta}_0) = \prod_{j=1}^Q p(\mathbf{f}_{\bullet j} | \boldsymbol{\theta}_0) = \prod_{j=1}^Q \mathcal{N}(\mathbf{f}_{\bullet j}; \mathbf{0}, \mathbf{K}_j)$$

Diagram illustrating the decomposition of the joint prior distribution over latent functions \mathbf{f} given hyperparameters $\boldsymbol{\theta}_0$.

The equation shows that the joint prior $p(\mathbf{f} | \boldsymbol{\theta}_0)$ is the product of the priors for each function j , $p(\mathbf{f}_{\bullet j} | \boldsymbol{\theta}_0)$, which are Gaussian distributions with mean $\mathbf{0}$ and covariance matrix \mathbf{K}_j .

Annotations (indicated by green arrows):

- $\kappa_j(\cdot, \cdot)$: Covariance function of j^{th} GP
- $\mathbf{f}_{\bullet j}$: All $N \times Q$ latent function values
- $\boldsymbol{\theta}_0$: Covariance Hyper-parameters
- $\mathbf{f}_{\bullet j}$: All N latent values for function j
- \mathbf{K}_j : Covariance matrix induced by κ_j

$$p(\mathbf{y} | \mathbf{f}, \boldsymbol{\theta}_1) = \prod_{n=1}^N p(\mathbf{y}_n | \mathbf{f}_{n\bullet}, \boldsymbol{\theta}_1)$$

Diagram illustrating the conditional likelihood of observations \mathbf{y} given the latent functions \mathbf{f} and parameters $\boldsymbol{\theta}_1$.

The equation shows that the joint likelihood $p(\mathbf{y} | \mathbf{f}, \boldsymbol{\theta}_1)$ is the product of the conditional likelihoods for each data point n , $p(\mathbf{y}_n | \mathbf{f}_{n\bullet}, \boldsymbol{\theta}_1)$.

Annotations (indicated by green arrows):

- $\boldsymbol{\theta}_1$: Cond. Likelihood parameters
- $\mathbf{y}_n, \mathbf{f}_{n\bullet}$: Observations and latent functions for data-point n