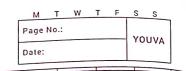
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| | Mathematics |
| 0.1 | Gaussian Process Prior |
| [1] [2] | Lets assume the mean function to be o. i.e m(x)=0 & the covariance function |
| | $K(x, x') = 6^{2}xe^{\left((n-x')^{2}\right)}$ $6^{2} \rightarrow Variance$ |
| | 5 ² -> Variance L -> length scale |
| | This is the Radial Basis Function (RBF) kesnel |
| | $u \sim GP(o, k(n, n'))$ $p(u) = N(o, k)$ |
| | Training data set is $S = \{(n_1, y_1), \dots, (n_n, y_n)\}$ |
| | $y = \pm u(n) + \varepsilon$ |
| | Covariance Matrix |
| | $K(x_{1}x) = \begin{bmatrix} k(\eta_{1}, \eta_{1}) & K(\eta_{1}, \eta_{2}) & \dots & k(\eta_{1}, \eta_{n}) \\ K(\eta_{2}, \eta_{1}) & K(\eta_{2}, \eta_{2}) & \dots & \dots \end{bmatrix}$ |
| | $k(\alpha_1, \alpha_2)$ $k(\alpha_1, \alpha_2)$ $k(\alpha_1, \alpha_n)$ |



Now, as we want to interpolate the data points exactly. We will add some noise to the diagonal elements.

$$K(x,x) = K(x,x) + 6 n^2 I$$

Posterior Predictive Distribution



$$u(x^*) = \underbrace{k(x^*, X) \times F(X)}_{[k(x, x) + 6 - n^2 I]}$$

$$\sigma^{2}(x^{*}) = k(x^{*}, x^{*}) - \mu(x^{*})$$

Mere x* is test data points.

K(x*, X) is a vector of covariances between the test data points & training data points.

F(X) is the vector of function values corresponding to the training data points.

Using the posterior predictive distributions we can interpolate between the given data points & extrapolate into the test data points. The mean function $u(x^*)$ provides the interpolated to values, while the variance function $\sigma^2(x^*)$ gives an indication of the uncertainty

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| | in the predictions. |
| | Note that in our question there is no added noise so $6^2 n I = 0$ |
| | The makernel function should be positive semidefines that we can perform cholesky decomposition on the mateix. |
| | The state of the s |
| | To Compute cholesky decomposition we need to find a lower triangular matrix L such that |
| | $K(X,X) = L L^{T}$ |
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