Machine Learning Algorithms: From Math to Code Assignment for Gaussian Process Regression

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1 Ch8.m

Implement the method of Gaussian process regression and carry out regression based on the dataset in problem as in Example 8.1 with N = 8 training samples randomly drawn from a noisy sinusoidal function $y = f(x) + n = \cos(2\pi f x) + n$ in the domain `x=0:0.1:9`. Here $f = 0.2$ is the frequency and the noise has a Gaussian distribution with $(\mu_n = 0, \sigma_n^2)$.

1. Plot your results in terms of the mean $E[f_*]$ for the regression function and variance $\pm\text{Var}[f_*]$ for the range of certainty as three curves, the same as in Figs. 8.2 and 8.3.

2. Try different values for the hyperparameter α (variable a in Eq. (8.3)) to see how the smoothness of the regression function is affected, and to make a proper tradeoff between underfitting and overfitting.

For this problem set, you should complete the missing code and add appropriate comments (to key steps and formulas of the algorithm) for Ch8.m, and submit it with a report describing your results in a compressed .zip file on canvas.

In the report, you should

1. Include plots with $\sigma_n = 0.2, \alpha = 1$.

2. Answer question 2 above with necessary explanations.

Notes

- Source code and report should be compressed into a single .zip file named **Group_xx.zip** and handed on canvas before **next monday midnight, July 17 23:59**.