

Supplementary material for Interpretable deep Gaussian processes with moments

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1 Second moment for SC[NuN]

Following Eq. (15) in the main text, the second moment for the two-layer DGP is given by,

$$\frac{\sigma_2^2}{2} \left\{ 1 + \exp[2e^{(-\alpha\|\mathbf{x}_i\|^2 + 2\beta\mathbf{x}_i \cdot \mathbf{x}_j - \alpha\|\mathbf{x}_j\|^2)} - e^{-2(\alpha-\beta)\|\mathbf{x}_i\|^2} - e^{-2(\alpha-\beta)\|\mathbf{x}_j\|^2}] \right\} \quad (1)$$

where we have suppressed the factor of $\sigma_1^2/2\ell_2^2$ inside the bracket for convenience.

2 Experiments on two UCI datasets

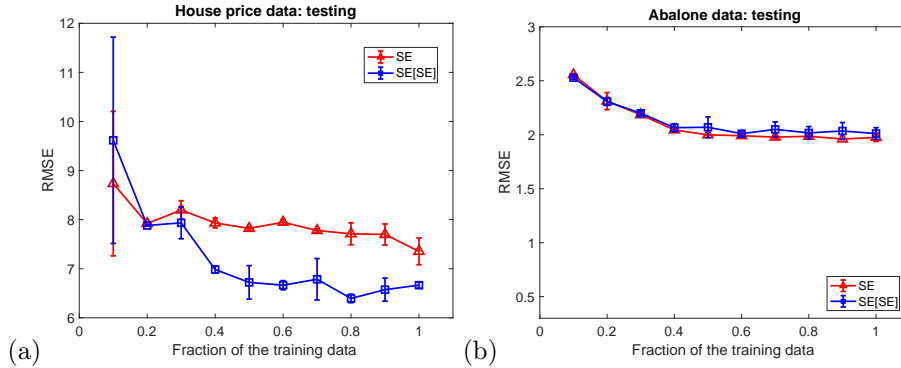


Figure 1: Simulated regression using UCI data sets. House Price data has a total of 320 training and 94 testing data points. Abalone data has a total of 400 training and 400 testing data points.

3 Results using Doubly Stochastic Variational Inference for Deep Gaussian Process

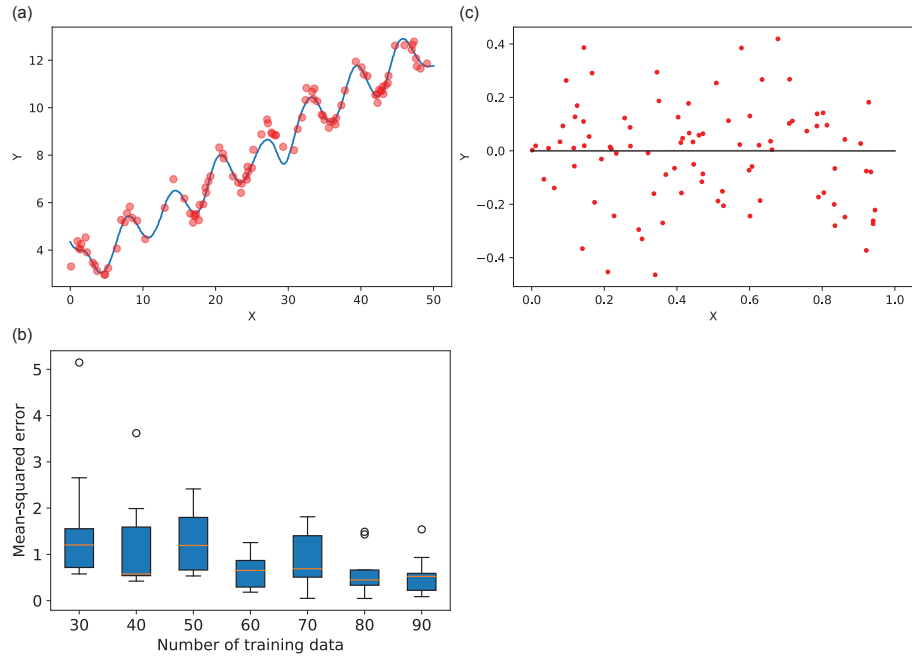


Figure 2: Fit result using the method proposed by Salimbeni and Deisenroth (2017) (<https://github.com/ICL-SML/Doubly-Stochastic-DGP>). Panels (a), (b), and (c) correspond to Figure 1 (e), (f), and (g), respectively. Because of the existence of outliers, we used boxplots instead of mean \pm se for the mean-square error in panel (b).

References

Salimbeni, H. and Deisenroth, M. (2017). Doubly stochastic variational inference for deep gaussian processes. In *Advances in Neural Information Processing Systems*.