Scalable Gaussian Processes[1]

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December 5, 2022

[1]Main papers: Quiñonero Candela and Rasmussen (2005),Hensman et al. (2013) and Wu et al. (2022)

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Problem Statement

- Gaussian Processes can accurately model complex data, but they're also very inefficient. Is there a way to make them more scalable?

Gaussian Processes

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Gaussian Processes

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Sparse GPs

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Subset of Regressors (SoR)

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Sparse Pseudo Input Gaussian Processes (SPGP)

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Unifying framework for Sparse GP

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Variational Gaussian Process

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Variational Gaussian Process

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Stochastic Variational Inference for GPs

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Stochastic Variational Inference for GPs

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Variational Nearest Neighbor GPS

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Final Remarks

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References I

Hensman, J., Fusi, N., and Lawrence, N. (2013). Gaussian processes for big data. *Proceedings of the Twenty-Ninth Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 282–290.

Quiñonero Candela, J. and Rasmussen, C. E. (2005). A unifying view of sparse approximate gaussian process regression. *Journal of Machine Learning Research*, 6:1939–1959.

Wu, L., Pleiss, G., and Cunningham, J. P. (2022). Variational nearest neighbor Gaussian process. In *Proceedings of the 39th International Conference on Machine Learning*, volume 162 of *Proceedings of Machine Learning Research*, pages 24114–24130. PMLR.