Mismatched Estimation in an Exponential Family

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In this paper we discuss the information geometric framework for the mismatched estimation problem in an exponential family. In the context of population decoding in neuroscience, one often uses a mismatched model or an unfaithful model instead of the original model for a computational convenience or to quantify the correlated activities of neurons etc., see [1], [2] for more details. Oizumi et al. [1] studied the maximum likelihood estimation problem based on a mismatched model in the case of an exponential family from an information geometric point of view. In this paper we discuss the information geometric approach to the general estimation problem based on a mismatched model in an exponential family. We describe the necessary and sufficient conditions for an estimator based on mismatched model to be consistent and efficient. Then we consider the maximum likelihood estimator based on a mismatched model. Oizumi et al. [1] stated certain conditions for the maximum likelihood estimator based on a mismatched model to be consistent and efficient. We give a theoretical formulation of their results in a curved exponential family and a detailed proof of the same.

Keywords: Exponential family, Mismatched model, deformed exponential family

References

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