

Bayesian Inference for Magnetic Resonance Fingerprinting

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Abstract

Magnetic resonance imaging (MRI) is widely used in clinical routine. MRI is a fast, non-invasive technique that provides good tissue contrasts. However, generally, only qualitative images are obtained through MRI. Estimation of the absolute values of the tissue related parameters, like the proton density and the spin relaxation times, together with an uncertainty, poses an interesting challenge. This information will potentially lead to additional diagnostic insights, e.g., when monitoring therapies or when comparing MRI images from different subjects or different MRI scanners.

In 2013 Dan Ma et.al. proposed Magnetic Resonance Fingerprinting (MRF) as a new approach for quantitative MRI that allows for the estimation of the tissue related parameters of a whole brain slice within short acquisition time.

In this talk I will present a new, Bayesian approach to MRF. Three different prior distributions for the tissue related parameters will be introduced, then the properties of the resulting posterior distributions will be investigated. In the end, the benefit of incorporating prior knowledge will be evaluated.