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A Variational Bayes Approach to Decoding in a Phase-Uncertain Digital Receiver

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(Submitted on 4 Jul 2011)

This paper presents a Bayesian approach to symbol and phase inference in a phase-unsynchronized digital receiver. It primarily extends [Quinn 2011] to the multi-symbol case, using the variational Bayes (VB) approximation to deal with the combinatorial complexity of the phase inference in this case. The work provides a fully Bayesian extension of the EM-based framework underlying current turbo-synchronization methods, since it induces a von Mises prior on the time-invariant phase parmeter. As a result, we achieve tractable iterative algorithms with improved robustness in low SNR regimes, compared to the current EM-based approaches. As a corollary to our analysis we also discover the importance of prior regularization in elegantly tackling the significant problem of phase ambiguity.

Submission history

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