

Generic FG-SPA Update Rules Design of Linear Canonical Message Representation

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Abstract:

This paper focuses an implementing issue of the sum-product algorithm on factor graphs (FG-SPA) in a general system. The overall goal is to propose a message representation and corresponding update rules for both discretely and continuously valued variables with an acceptable exactness-complexity trade-off. We propose the update rules for a generic class of linear message representations with orthogonal canonical kernels. The proposed update rule design is combined with an already known message parameterization based on the Karhunen-Loeve Transform (KLT) of the message. This combination of the proposed generic update rules with the KLT-message representation forms a generic implementation framework of the FG-SPA applicable whenever the KLT is defined. This framework preserves the properties of the KLT-message representation that is the best linear approximation in the MSE sense. A particular example on a joint detection and phase estimation is shown to verify the framework and to compare the proposed method with a conventional solution.