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ASYMPTOTICALLY EFFICIENT PARAMETER ESTIMATION IN HIDDEN MARKOV SPATIO-TEMPORAL RANDOM FIELDS

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Abstract: Estimation of the parameters of Markov random field models for spatial and temporal data arises in many applications. There are computational and statistical challenges in developing efficient estimators because of the complexity of the joint distribution of the spatio-temporal models, especially when they involve hidden states that also need to be estimated from the observations. We develop composite likelihood estimators that are analytically and computationally tractable, and show that they are asymptotically efficient under some mild correlation decay assumptions.

Key words and phrases. Block maximum likelihood estimator, composite likelihood, correlation decay, hidden Markov random fields, image analysis, locally asymptotically normal family, ρ-mixing.