TWO−DIMENSIONAL GARCH MODEL WITH APPLICATION TO ANOMALY DETECTION (WedPmPO4)

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Abstract :

In this paper, we introduce a two−dimensional Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model for clutter modeling and anomaly detection. The one−dimensional GARCH model is widely used for modeling financial time series. Extending the one−dimensional GARCH model into two dimensions yields a novel clutter model which is capable of taking into account important characteristics of natural clutter, namely heavy tailed distribution and innovations clustering. We show that the two−dimensional GARCH model generalizes the casual Gauss Markov random field (GMRF) model, and develop a matched subspace detector (MSD) for detecting anomalies in GARCH clutter. Experimental results demonstrate that a reduced false alarm rate can be achieved without compromising the detection rate by using an MSD under GARCH clutter modeling, rather than GMRF clutter modeling.

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