A MIXED MODEL FOR VARIANCE OF SUCCESSIVE DIFFERENCE OF STATIONARY TIME SERIES: MODELING TEMPORAL INSTABILITY IN INTENSIVE LONGITUDINAL DATA

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ABSTRACT

Temporal instability of a stochastic process has been of interest in many areas of behavioral and social science. Recent development in data collection techniques in behavioral and health sciences, such as *Ecological Momentary Assessment* (EMA) enables researchers in these areas to get direct assessment on temporal fluctuations over time for many individuals. Although many researchers have used variance and autocorrelation as a temporal instability measure, their utility and interpretation are limited to index temporal instability. I propose variance of successive difference (VSD) of stationary time series as an overall index of temporal instability such that it is a function of variance and first order autocorrelation of time series. A version of variance of successive difference of unequally spaced time series is also presented as well as distinction of within-day and between-day instability measures. Given that VSD is an individual difference measure, it is proposed that group differences on these indices be explored using a mixed variance model proposed by Hedeker et al. (2008). To illustrate, we present EMA data from a study of negative mood in borderline personality disorder (BPD) and major depressive disorder (MDD) patients, resulting that BPD patients showed more negative affective instability than MDD patients.