

Functional Marginal Structural Models for Time-varying Confounding of Mood Assessments

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Abstract: The increasingly dense assessments of multiple biosignals have provided opportunities for us to objectively track time-updated biological, yet also posed challenges for statistical analysis. For example, in two families of mood disorders from the National Institutes of Mental Health and Lausanne-Geneva, the participants were evaluated on their minute-by-minute physical activity intensities continuously over two weeks using accelerometers. Meanwhile, they also answered questionnaires about their mood and behaviors through ecological momentary assessments (EMA) several times a day. While we are interested in the time-varying effects of mood (sadness, anxiety etc.) on endpoint events such as migraine, we are aware that physical activity might potentially influence mood at the next time point. Hence we propose a marginal structural models (MSM) for functional data such as continuous daily physical activity profiles and use inverse probability weighting to correct for potential bias induced by the time-dependent confounding effects of physical activities on mood.