

A Robust Approach to Multivariate Joint Modelling

supervised by

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In recent years, it has become common practice to gather longitudinal data over time where information on multiple longitudinal responses are gathered concurrently [1]. These longitudinal responses frequently impact time-to-event processes, with the related survival data often being collected alongside the repeated measurements. Consequently, joint modelling techniques which simultaneously analyse a longitudinal and survival process have recently been extended to handle multivariate longitudinal responses [2, 3, 4].

However, such developments commonly assume normality for the longitudinal random terms, an assumption which can be greatly affected by the presence of longitudinal outliers, introducing bias into the analysis. Previous research has verified such negative impacts in the estimation of parameters, and thus interpretations, of the estimated joint model in the analysis of a single longitudinal process within a joint model setting.

This research proposes the development of a more robust joint modelling approach which down weighs the impact of longitudinal outliers within multiple longitudinal processes simultaneously. This sub-model is then linked to the survival process through a joint likelihood approach.

This research may be applied to a wide range of applications, including medical research and astrostatistics, and will feed into a user-friendly software package currently under development.

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