# Multivariate Functional Linear Discriminant Analysis for Partially-Observed Time Series (Abstract Reprint)

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**Abstract Reprint.** This is an abstract reprint of the journal article by Bordoloi, Réda, Trautmann, Bej, and Wolkenhauer (2025).

## Abstract

The more extensive access to time-series data, especially for biomedical purposes, raises new methodological challenges, particularly regarding missing values. Functional linear discriminant analysis (FLDA) extends Linear Discriminant Analysis (LDA)-mediated multiclass classification and dimension reduction to data in the form of fragmented observations of a univariate function. For large multivariate and partially-observed data, there are two challenges: (i) statistical dependencies between different components of a multivariate function and (ii) heterogeneous sampling times with missing features. We here develop a multivariate version of FLDA, called MUDRA, to tackle these challenges and describe a computationally efficient expectation/conditional-maximisation (ECM) algorithm to infer its parameters without any tensor inversions. We assess its predictive power on the "Articulary Words" dataset and show its improvement over the state-of-the-art, especially in the case of missing data. This advancement in dimension reduction of multivariate functional data holds promise for enhancing classification accuracy in scenarios like partially observed short multivariate time series analysis.

## References

Bordoloi, R.; Réda, C.; Trautmann, O.; Bej, S.; and Wolkenhauer, O. 2025. Multivariate functional linear discriminant analysis for partially-observed time series. *Machine Learning*, 114: 80.