

Forecasting mortality rates with a functional signature data approach

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Abstract

Mortality modeling and forecasting serves as a cornerstone in decision-making processes, playing a pivotal role in shaping decisions across diverse sectors such as insurance, pensions, and assurance. Functional data models, or more commonly known as the Hyndman-Ullah (HU) models have greatly contributed in this branch of literature with its implementation of functional principal component (FPC) decomposition on log mortality rate functions with an age continuum. In this study, we seek to use a new representation in place of FPC decomposition using a rich algebra from rough path theory called the *signature*, along with principal component regression. The proposed model is then used to forecast mortality rates of 21 different countries with horizons up to 10 and evaluated with MSE and MAE. Empirical results show that overall, the proposed model is able to demonstrate better out-of-sample performance than the HU model.

Keywords: Mortality forecasting, functional data models, signature

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