Studying the evolution of forest fires in Galicia using area-level Poisson mixed models with time effects

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Currently, forest fires are one of the main causes of forest destruction. This problem particularly affects the Mediterranean areas where fires increase significantly in spring and summer periods. Conventional modelling of this type of responses variables to high levels of disaggregation has a high error. In this work we use area-level Poisson mixed models with time effects to describe and predict the evolution of the number of fires in Galicia, taking the forest districts as territorial division. More precisely, we consider two types of models based on the assumed temporal structure. The first one assumes that temporary effects are distributed independently, while the second one considers that they are distributed according to an autoregressive process of order 1. In this context, we have obtained the empirical best predictor (EBP) and we compare it with others estimators such as synthetic or plug-in estimators. Finally, we consider the bootstrap mean squared error (MSE) as accuracy measure of the proposed estimator and we validate its behaviour through some simulation studies.

Keywords: Mixed models, empirical best predictors and mean squared error.