

**Hybrid Estimation Procedure of Poisson Autoregressive PAR(p) Model  
using Backfitting Algorithm**

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PAOLO VICTOR TAMORO REDOND

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## ABSTRACT

A Poisson autoregressive PAR(p) model that accounts for discreteness and autocorrelation of count time series data is usually estimated within the context of state-space modelling framework. However, the complexity of dependencies exhibited by count time series data also complicates maximum likelihood estimation. The PAR(p) model is viewed as an additive model and is estimated using a hybrid of conditional least squares and MLE in the backfitting framework. Simulation studies show that the PAR(p) model viewed as an additive model, is always better than PAR(p) model in the state-space context whenever the non-normality of covariates for the latter is evident. In cases where the MLE of the PAR(p) model in the state-space context exists, the estimates are comparable with the proposed method. The proposed method is then used in modelling incidence of tuberculosis, elucidating the role of various stakeholders in curbing the prevalence rate of the disease.

Keywords: additive model, backfitting algorithm, count time series, poisson autoregression