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[ABSTRACT]

Which predicts location and number of emergencies better: Artificial neural networks or zero-inflated count models

Ambulance response time to emergency medical situations must fall within specific time frames. Number and location of ambulances is one primary way decision makers can meet response times, and much ambulance deployment research has been done to minimize resource use and maximize coverage. The models are contingent on having accurate forecasts of spatial location and volume of emergency calls. The finer the granularity of time and space that these predictions are to be made, the greater the chance that the count values are zero. This phenomenon renders traditional forecasting techniques impotent. When the huge majority of observations are zero, a forecast of zero every time will have an extremely low error. Multiple artificial neural network (ANNs) frameworks will be employed along with zero-inflated count models (negative binomial and zero-inflated poisson). Call volume with regard to space and time in a major Southeastern city will be broken down to different levels of granularity and the models will be tested for fitness and compared.