CONFIDENCE AND PREDICTION INTERVALS COMPUTED FROM POISSON SEQUENCES OF EXTREME EVENTS

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ABSTRACT. We suggest two methods for constructing confidence and prediction intervals in the context of Poisson streams of extreme events. The first method is based on the assumption that the strengths of events follow a Pareto distribution, and produces intervals that are either exact or guaranteed to be conservative. The second approach, valid very generally, gives intervals whose true levels approximate the nominal levels. It is shown that the accuracy of the approximation may be improved by calibration, and that, with or without calibration, accuracy remains high even when the contexts of the confidence or prediction statements are distant exponentially far from the context of the data. Seven specific types of confidence or prediction interval are considered. Four require data on both events and inter-event times, but the other three need only data on events. The methods are applied to data on the expense of windstorms to a Swedish insurance group.

KEYWORDS. Bootstrap, conservative intervals, coverage accuracy, extreme-value theory, generalised Pareto distribution, Monte Carlo methods, Pareto distribution, Poisson process, simulation.

SHORT TITLE. Confidence and prediction intervals.

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