THE UNIVERSITY OF CHICAGO

Department of Statistics

MASTER'S THESIS PRESENTATION

YUFEI ZHANG

Department of Statistics
The University of Chicago

Extreme Value Approximation

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Jones 304, 5747 S. Ellis Avenue

ABSTRACT

Consider a random variable X and have u as the supremum of the support X. If the conditional distribution of $(X - \alpha_t)/\beta_t$ given $X > t$ converges to a nontrivial distribution as $t \uparrow u$ for some function α_t and some positive function β_t, then this limiting conditional distribution must be a generalized Pareto distribution.

Statistical methods for extremes use only a small fraction of the available observations. Most existing methods in statistics of extremes treat all retained observations equally weighted. There are also some methods for reducing bias when estimating extremes, but they mostly pick some kind of sharp cutoff between observations that are extreme and those that are not.

In this paper, a method that fits the extreme observations in GPD distribution and allows downward weighting of observations as they become less extreme is introduced so as to avoid sharp cutoff. This method with downward weighting is compared is the method that uses sharp cutoff and uses equally weighting on observations by comparing their accuracy to estimated extreme quantiles of some random distributions.

The main purpose of this paper is that observations with some random distributions, a statistic method for extremes that allows downward weighting observations as they become less extreme (weighted method based on weighted composite likelihood) would be able to have a better estimation for extreme quantiles than methods that only has sharp cutoff and makes all observations equally weighted, or we say, unweighted method.

Consider a random variable X following a certein distribution with number of observations to be n. The accuracy of estimating $1 - k/n$ quantile for that distribution using the weighted method and the unweighted method will be compared, where $k \in (0.5,5)$. The value of k is set to be in that range so that a very exterme quantile is compared when n is large enough.

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