

Modeling Clusters of Extreme Values

Natalia M. Markovich

Academy of Sciences, Moscow

In practice it is important to evaluate the impact of clusters of extreme observations caused by the dependence in time series. The clusters contain consecutive exceedances of time series over a threshold separated by return intervals with consecutive non-exceedances. We derive asymptotically equal distributions of the number of inter-arrival times between events of interest arising both between two consecutive exceedances of a stationary process $\{R_n : n \geq 1\}$ and between two consecutive non-exceedances. It is found that the distributions are geometric like and corrupted by the extremal index. It is derived that the limit distribution tails of the return intervals and the duration of clusters that are defined as sums of random number of the weakly dependent regularly varying inter-arrival times with tail index $0 < \alpha < 2$ are bounded by sums of stable and exponentially distributed components. The inferences are valid when the threshold is taken as a sufficiently high quantile of the underlying process $\{R_n\}$.