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Sojourn Times and the Fragility Index

Michael Falk, Martin Hofmann

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We investigate the sojourn time above a high threshold of a continuous stochastic process Y on [0,1]. It turns out that the limit, as the threshold increases, of the expected sojourn time given that it is positive, exists if the copula process corresponding to Y is in the functional domain of attraction of of an extreme value process. This limit coincides with the limit of the fragility index corresponding to finite (n-)dimensional distributions of Y as n and the threshold increase.
If the process is in a certain neighborhood of a generalized Pareto process, then we can replace the constant threshold by a general threshold function and we can compute the asymptotic sojourn time distribution. An extreme value process is a prominent example. Given that there is an exceedance at some t_0 above the threshold, we can also compute the asymptotic distribution of the time cluster length, which the process spends above the threshold function.

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