MODEL SELECTION AND CONDITIONAL INFERENCE FOR THE EXTREME VALUE DISTRIBUTIONS WITH APPLICATIONS TO RAINFALL DATA

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A likelihood based approach is proposed to select an appropriate extreme value distribution for maxima of a phenomenon of interest from the Generalized Extreme Value family of distributions. The whole relative profile likelihood of the corresponding shape parameter is used to select a sub-family of plausible models: Weibull, Gumbel, or Frechet. For the Weibull or Frechet models, a threshold parameter restricts the support of the maxima of interest. This parameter has a distinct physical meaning and seems to stand on a different logical level from the remaining scale and shape parameters. Maximum likelihood estimates (m.l.e.) of the latter parameters frequently vary widely as the threshold parameter varies within a plausible range, reflecting the flatness of the likelihood function near its mode, and that the m.l.e. are highly correlated. However inferences about functions of these parameters such as the quantiles, often the parameters of interest, turn to be quite stable as the threshold parameter varies. Thus, it seems reasonable to estimate them assuming that the threshold parameter is fixed equal to its m.l.e., improving greatly the estimation efficiency. These ideas can also be applied to lifetime or survival data, as discussed in Lawless (2003, *Statistical Models and Methods for Lifetime Data*). It seems they have not yet been applied to extreme value data. An application to maxima of rainfall data sets is presented.