Tail Analysis without Tail Information: A Worst-Case Perspective

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One bottleneck in tail modeling is that, by its own nature, tail data is often very limited. Conventional approach uses parametric fitting, and the validity of the choice of parametric model is usually hard to verify. In this talk, we explore an alternative, worst-case perspective that does not require any parametric assumption and is based solely on the geometric premise of tail convexity. This geometric feature is shared among any known parametric tail distributions, and hence is a reasonable, and more conservative, alternative to any parametric fitting. We provide quantitative and qualitative contributions under the proposed framework. Namely, given any bounded performance criterion, we demonstrate that the worst-case convex tail behavior is in some sense either extremely light-tailed or extremely heavy-tailed. We demonstrate that distinguishing these two cases, as well as finding the worst-case tail itself, can be solved by low-dimensional nonlinear programs. We illustrate applications