

# Large deviation theory for non-regular location shift family

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**Abstract** We apply non-regular extensions of the large deviation theory to non-regular location shift families. Our calculation contains the location shift families generated by Beta distribution, Weibull distribution, and Gamma distribution. We point out the optimal estimator depends on the choice of our criterion in the non-regular case. The limits of relative Rényi entropies play an important role in our derivation.

**Keywords** Non-regular location shift family · Beta distribution · Weibull distribution · Gamma distribution · Large deviation · Relative Rényi entropy