Maximizing leave-one-out likelihood for the location parameter of unbounded densities

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Abstract   We propose simple estimation of the location parameter for a density that is unbounded at the mode. The estimator maximizes a modified likelihood in which the singular term in the full likelihood is left out, whenever the parameter value approaches a neighborhood of the singularity location. The consistency and super-efficiency of this maximum leave-one-out likelihood estimator is shown through a direct argument. The importance for estimation within parametric families is discussed and illustrated by an example involving the gamma mixture of normal distributions.