

**Mixture Models, Robustness and the Weighted Likelihood Methodology**

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Abstract:

In this paper we apply the weighted likelihood methodology in the context of mixture models with the aim to address the robustness questions associated with this model. We show that the weighted likelihood methodology produces robust and first order efficient estimators. Moreover, the method is able to unearth data substructures in the form of multiple roots. This is particularly useful here as the existence of multiple roots could indicate multiple potential mixture model fits due to the presence of more components than originally specified. A new stopping rule for the weighted likelihood algorithm is implemented and details about convergence are discussed. We also provide new insight into the problem of multiple roots.