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Point source inference using Parametric Cataloguing

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The identification and description of point sources is one of the oldest problems in astronomy; yet, even today an efficient and comprehensive statistical treatment for point sources remains one of the field's hardest problems. For dim or crowded populations, likelihood based inference methods are needed to estimate the uncertainty of the population characteristics. Probabilistic cataloguing is a leading method for this task, and solves the exact problem with Monte Carlo sampling. However, it requires a mathematical formulation that prevents efficient sampling techniques and so is limited to small populations. I present a new formulation of the method that allows the most efficient sampling techniques to be used, enabling the application to an order of magnitude more sources.

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