**An Application of The Markov Chain Monte Carlo (MCMC) Method to Open Cluster Membership Determination**

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ABSTRACT

The determination of membership in open clusters will be more difficult than determination membership of the globular clusters. This is due to the location of open clusters which located on the galactic disk. From that location, when observing open clusters, it will be observed foreground and background stars also. So determining the membership of open clusters becomes important for knowing the actual members of the cluster.

Determination of membership in cluster could be done by calculating the probability of a star becoming a cluster member. We used double elliptic bivariate Gaussian function to represent the population of cluster and field stars in the region. The function has eleven parameters and will be solved by using Markov Chain Monte Carlo (MCMC). The Metropolis-Hastings Algorithm is used in this works to obtain the probability of open cluster membership.

We used astrometric data from GAIA Data Release 2 for three open clusters which their membership are to be determined i.e. Collinder 135, IC 1590, and NGC 2262. Our result is in agreement with the MWSC II catalogue. After the cluster membership is obtained, the physical parameters of the three cluster using isochrones fitting from Girardi et al. (2000) are determined.

*Keywords: Probability; Open Cluster; MCMC; Metropolis-Hastings; and GAIA Data Release 2*

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