

# Euclidean Distance Matrix Analysis of Landmarks data: Estimation of Variance

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## **Abstract**

Form of an object consists of size and shape. The form of an object is the characteristic that remains invariant under a group of transformations comprising translation, rotation, and/or reflection. We resort to landmarks for the difficulties of quantifying the entire form. The landmarks are a few biologically important points on a subject represent the form. Estimating the variability of the landmarks within population is important in fields such as evolutionary quantitative genetics, surgery, protein science, etc. General variance covariance matrix is not identifiable but some constrains imposed structured matrix is identifiable. In this thesis, I give conditions under which the variance covariance matrix of landmarks data is identifiable. And I provide a simple approach: Euclidean Distance Matrix Analysis (EDMA) to estimate the mean form and variance covariance matrix. The estimator of the variance covariance matrix by EDM is consistent.