The Improvement of Single Linkage Threshold on the Match Index between Artifact and Computer Model in the Application of

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ABSTRACT

This research is mainly on the investigation of relationship bewteen the precision of repeated measurements and the point position of repeated measurement. Statistically if the point position has nothing to do with its precision of repeated measurement, the hypothesis testing on the equality of the covariance for each point position should show not much difference among themselves. On the other hand, if the precision depends on the point position, then their covariance matrices should be quite different. Based on the similarity of the covariance matrices, we are going to deduct a rule, i.e., to what extent should the deviation among the repeated measurement be considered as abnormal. We convert the covariance matrix into a 1*6 array and depict each array into a 2D graph using principal component analysis. Then by observing the closeness among points in the graph and cluster analysis, we are able to find the region of most clustered points. Then pool the covariance matrices in the region and use that pooled covariance matrix to generate two points at a time and measure the Euclidean distance among them. Repeating the process 2000 times, we are able to find the sample mean and standard deviation and its upper limit of sample mean plus three sample standard deviations. This upper limit will be the threshold we use in the cluster analysis in the repeated measurement to delineate the outliner.

Keywords : principal component analysis ; covariance matrix, repeated ; measurements ; select appropriate point measurements

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