

Dynamic clustering township level data by the mixture of longitudinal factor analyzer approach

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Abstract

Previous studies have demonstrated that counties, towns, districts, and cities (collectively referred to as townships) can be grouped into several clusters, with each cluster exhibiting similar patterns across regional and demographic indicators. Such classifications help policymakers formulate region-specific development strategies. However, the development trajectories of these townships are characterized by substantial heterogeneity and temporal dynamics. Traditional clustering approaches are limited in their ability to capture both the complex structure of latent classes and the latent factors that evolve over time in longitudinal data. The present study applies a mixture of longitudinal factor analyzer approach to township-level data spanning 2011 to 2022 in Taiwan. This method uncovers the diverse developmental trajectories of townships and identifies distinct developmental types, along with the underlying latent factors that drive them, such as socioeconomic vitality and aging pressure. The resulting cluster classifications extend beyond conventional measures of urbanization to encompass the economic, social, and cultural characteristics unique to each area.

Keyword: longitudinal clustering, longitudinal factor analysis, mixture of longitudinal factor analyzer, township level data