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Research on cluster analysis of spatio-temporal trajectory data for extracting hot spots.
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Summary: With the rapid development and application of Internet technology and mobile intelligence technology, the rapid expansion of the location information of mobile objects also makes the information content develop towards the direction of diversification and complexity, which also brings great difficulties to the research of spatio-temporal trajectory data. Therefore, the core problem and key in the field of spatio-temporal data mining have gradually changed to how to efficiently mine the implied valuable information from these complex and multifaceted spatio-temporal trajectory data. This paper takes the spatio-temporal characteristics of the spatio-temporal trajectory data with unstable sampling frequency and sparse trajectory points as the starting point, delves into the spatio-temporal composition of the trajectory and designs a pre-processing method suitable for the spatio-temporal trajectory data. At the same time, based on the spatial and temporal changes of the trajectory data of moving objects in motion, the activity pattern of the research object is explored, and the hot spot area discovery and periodic pattern discovery methods are constructed in this way. Finally, from the perspective of practical application, the Chinese Bulbul observation data from 2016 to 2019 were taken as the research object to realize the algorithm proposed in this paper, combining the partitioning based clustering algorithm and the density based clustering algorithm, to detect the hot spots of moving targets. The experimental results are consistent with the real activity track of the Chinese bulbul, which proves that the method is effective, so as to realize the exploration of the activity law of the mobile object.

MSC:
62H30 Classification and discrimination; cluster analysis (statistical aspects)
62R07 Statistical aspects of big data and data science

Keywords:
cluster analysis; data mining; spatio-temporal trajectory; hot-region