Activity Identification from Animal GPS Tracks with Spatial Temporal Clustering Method DDB-SMoT

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Abstract

With various GPS devices or services growing rapidly, large amount of GPS tracking data has been collected, both for human beings and wild animals. However, the raw GPS data cannot directly provide us with any valuable information because of the semantic gap between it and the raw GPS trajectory data. As a result, algorithms are needed to extract the semantic information from raw GPS data. To solve this problem, this project creates the Semantic Analysis Software to provide semantic analysis based on stops in the trajectory detected by DDB-SMoT and POI (Point of Interest) list to output activities to explain the meaning of the given trajectory. To better illustrate the analysis process and result, the project also develops Semantic Analysis Web Application to display the semantic enrichment process with bear and deer GPS trajectories provided by Missouri Department of Conservation.

To provide labeled trajectory for evaluating the new stop detection algorithm DDB-SMoT, the project creates Trajectory Generator Software. Through experiments, the DDB-SMoT algorithm has an overall accuracy of 91.18% when detecting stops and movement points in animal trajectory generated by the trajectory generator. Because lack of a rich animal POI dataset and activity ground truth, the verification of the semantic analysis process will leave as future work for the project.