

On Map Construction, Map Comparison, and Trajectory Clustering

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Geo-referenced trajectory data is collected in a wide range of applications, such as for a variety of location-based services on street maps, hiking trail logging, and the study of social behavior in animals. There has been a recent surge of algorithms for aggregating trajectory data, in particular by constructing road maps, e.g., [1–3, 8–36]. Road map construction is a type of geometric reconstruction problem in which the task is to extract the underlying geometric graph structure described by a set of movement-constrained trajectories, or in other words reconstruct a geometric domain that has been sampled with continuous curves that are subject to noise. See Figures 1 and 2 for an example trajectory data set and different constructed road maps.

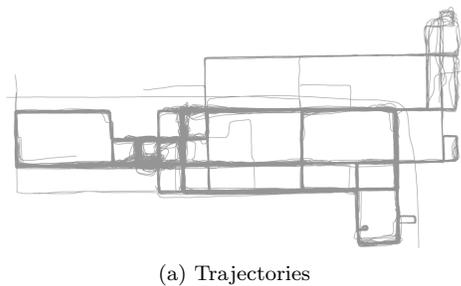


Figure 1: Chicago dataset of shuttle bus trajectories [9, 10]. The data and figure are available on mapconstruction.org.

A related problem is *map comparison*, which can be used to assess the quality of map construction algorithms or two compare road maps from different sources. Different approaches for map comparison include signatures and distance measures, e.g., [4, 5, 9]. Comparisons of map construction algorithms, including experimental quality assessments, can be found in [6, 7, 9].

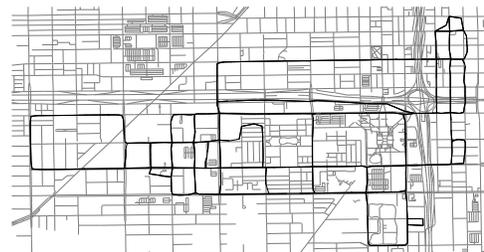
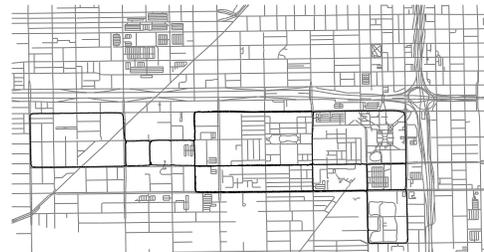
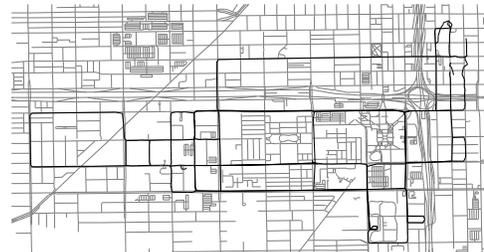
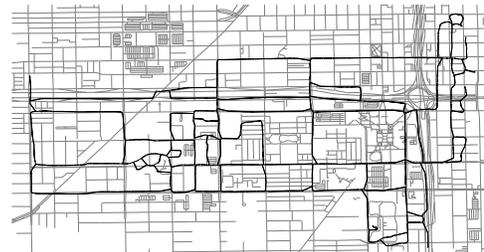


Figure 2: Constructed maps (in black) overlaid on ground-truth map (in gray) for the Chicago dataset of shuttle bus trajectories [9, 10]. The data and figures are available on mapconstruction.org.

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