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Introduction to spatio-temporal data driven urban computing

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This special issue of *Distributed and Parallel Databases* journal covers recent advances in spatio-temporal data analytics in the context of urban computing. It contains 9 articles that present solid research studies and innovative ideas in the area of spatio-temporal data analytics for urban computing applications. All of the 9 papers went through at least two rounds of rigorous reviews by the guest editors and invited reviewers.

Location-based recommender systems are becoming increasingly important in the community of urban computing. The paper, by Hao Zhou et al., "Hybrid route recommendation with taxi and shared bicycles," develops a two-phase data-driven recommendation framework that integrates prediction and recommendation phases for providing reliable route recommendation results. Another paper, by Hao Zhang et al., "On accurate POI recommendation via transfer learning," proposes a transfer learning based deep neural model that fuses cross-domain knowledge to achieve more accurate POI recommendation.

Spatial keyword search has been receiving much attention in area of spatio-temporal data analytics. Xiangguo Zhao et al. develop anindex structure that comprehensively considers the social, spatial, and textual information of massive-scale spatio-temporal data to support social-aware spatial keyword group query in their paper "Social-aware spatial keyword top-k group query." Jiajie Xu et al. propose a hybrid indexing structure that integrate the spatial and semantic information of spatio-temporal datain their paper "Multi-objective spatial keyword query with semantics: a distance-owner based approach."

Matching of spatio-temporal data is a fundamental research problem in spatio-temporal data analytics. The paper, by Ning Wang et al., "An efficient algorithm for spatio-textual location matching," targets the problem of finding all location pairs whose spatio-textual similarity exceeds a given threshold. This matching query is useful in urban computing applications including hot region detection and traffic

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congestion alleviation. Additionally, their paper "Privacy-preserving spatial keyword location-to-trajectory matching," presents a network expansion algorithm and pruning strategies for finding location-trajectory pairs from spatio-temporal data while preserving the users' privacy.

Further, the paper, by Lei Xiao et al., "LSTM-based deep learning for spatial–temporal software testing," developsa test case prioritization approach using LSTM-based deep learning, which exhibits potential application value in self-driving cars. Another paper, by Zhen chang Xia et al., "ForeXGBoost: passenger car sales prediction based on XGBoost," presents a prediction model that utilizes data filling algorithms. The model achieves a high prediction accuracy with short running time for vehicle sales prediction. Finally, the paper, by Zhiqiang Liu et al., "A parameter-level parallel optimization algorithm for large-scale spatio-temporal data mining," propose an efficient parameter-level parallel optimization algorithm for large-scale spatio-temporal data mining.

Those nine articles represent diverse directions in the fast-growing area of spatio-temporal data analytics in urban computing community. We hope that these papers will foster the development of urban computing techniques and inspire more research in this promising area.