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Behnaz Dehghanian
Northeastern Illinois University

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IMPROVING THE PREDICTION ACCURACY FOR PRIVACY-PRESERVING POINT-OF-INTEREST RECOMMENDER SYSTEMS

Behnaz Dehghanian, Department of Computer Science, Northeastern Illinois University,
Chicago, IL 60625

In today's world, computers have become an essential element in the life of individuals of all ages. In the past decades, our life has significantly changed, resulting from the emergence of the Internet. A tremendous amount of information is generated daily in cyberspace, so users regularly feel overwhelmed by a mess of data. Since finding the needed information is very challenging, recommender systems seek to help people by filtering out unrelated data and only presenting those that are highly interesting to them. Depending on the application domain, recommender systems may predict ratings or preferences for users on particular objects, e.g., products, movies, and business entities. One of the major concerns is the potential privacy leakage of the users. Although privacy preservation techniques were proposed in the past decades, they more or less sacrifice prediction accuracy. In our previous research, a privacy-preserving point-of-interest (POI) recommender system was proposed to protect users' privacy while making personalized POI recommendations. The model shares group preferences rather than individual interests with the service provider to hide users' private ratings on POIs. In this research, we aim to improve the prediction accuracy of the previous model. Due to the vital role of geolocation information in POI recommendations, we incorporated the GPS coordinates of each user's frequently visited places into a clustering procedure when generating user groups. Preliminary experiments were carried out on a subset of the Yelp business review data, and the results were visualized using the t-SNE technique. As we move on, an equally important component of the system – latent factor learner, will be improved by modifying existing dimensionality reduction techniques such as nonnegative matrix tri-factorization and singular value decomposition. We believe that with all these modifications, the prediction accuracy of the recommender system can be improved over the previous model. Moreover, we will be exploring the application of neural networks in this framework. The experimental results will be studied and compared against existing approaches.