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**Weekly Assignment – 11**

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**Improving the Effectiveness of POI Recommendations**

We develop a graph-based metric embedding (GME) model to learn the representation of POIs in a low-dimension latent space. Then, we propose a time decay method to track and represent the dynamic user preferences based on the learnt POI embeddings.

To model the sequential influence of POIs, we further extend our GME to GME-S model by exploiting and integrating the sequential patterns in the learning process of POI embeddings. To the best of our knowledge, this is the first work that uses the metric embedding method to unify dynamic user preferences and the sequential influence in a principled manner.

We conduct comprehensive experiments to evaluate the performance of our proposed methods on two large scale real datasets. The results show the superiority of our proposals in recommending next POIs for users by comparing with the state-of-the-art techniques.

**Graph-Based Metric Embedding**

We first formulate the problem definitions, and then present our proposed Graph-based Metric Embedding (GME) model, as well as its extension GME-S which incorporate the sequential influence.

**POI:** It is defined as a uniquely identified specific site

**Check-in-Activity:** A user check-in activity is represented by a triple (u,v,t) that means user “u” visits POI “V” at time **“**t”.

**User Profile:** Each user u, we create a user profile Du, which is a set of check-in activities associated with u. The dataset D used in our model includes all user profiles.

**POI-POI Graph:** A POI-POI co-occurrence graph, denoted as G= (V, E), captures the POI co-occurrence information in a user profile Du. V is a set of POIs and E is the set of edges between POIs.

**POI Embedding:** Each POI “V” in the dataset D will be represented by a POI embedding qv in the Rd metric.

**User Embedding:** For each user u in the dataset D, his/her dynamic preferences will be represented as a time-aware embedding pu, t in the Rd metric.