Re-CoSKQ: Towards POIs Recommendation Using Collective Spatial Keyword Queries (Position Paper)

Ramón Hermoso, Sergio Ilarri, Raquel Trillo-Lado
{rhermoso,silarri,raqueltl}@unizar.es

University of Zaragoza (Spain)
COS2MOS Group (http://cos2mos.unizar.es/)

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Introduction and goals

- Interest of recommender systems in mobile computing scenarios
- The location is a key spatial attribute: Can techniques from the field of spatial databases help?
  - Explore the potential use of Collective Spatial Keyword Querying (CoSKQ)
Collective Spatial Keyword Querying (CoSKQ)

- Retrieve spatial objects that match the user preferences given:
  - Specific locations (of the user and also of the objects)
  - A set of keywords

- Use of IR-tree data structures (balanced trees that allow indexing objects and keywords)

- Exact solutions (NP-complete) + heuristics
Proposal: Re-CoSKQ for the recommendation of POIs

- Semantic coverage of the query keywords
  - No exact match required

- Minimize the cost:
  - Distance to get to the POIs
  - Similarity between the query and the descriptions of items
Examples of Cost Functions

\[
cost(q, \Omega') = \alpha \cdot \max_{o \in \Omega'} \left[ \text{dist}(q, o, \lambda) \right] + \beta \cdot \max_{o_1, o_2 \in \Omega'} \left[ \text{dist}(o_1, o_2) \right] \\
+ \omega \cdot \max_{k_1 \in q, k_2 \notin q, o \in \Omega'} \left[ \text{dist}(k_1, k_2) \right] \\
\]  \hspace{1cm} \text{\textsc{Type 1 – Comb}}

\[
cost(q, \Omega') = \max \left\{ \alpha \cdot \max_{o \in \Omega'} \left[ \text{dist}(q, o, \lambda) \right], \beta \cdot \max_{o_1, o_2 \in \Omega'} \left[ \text{dist}(o_1, o_2) \right], \omega \cdot \max_{k_1 \in q, k_2 \notin q, o \in \Omega'} \left[ \text{dist}(k_1, k_2) \right] \right\} \\
\]  \hspace{1cm} \text{\textsc{Type 2 – Max}}

\[
cost(q, \Omega') = \alpha \cdot \min_{o \in \Omega'} \left[ \text{dist}(q, o, \lambda) \right] + \beta \cdot \max_{o_1, o_2 \in \Omega'} \left[ \text{dist}(o_1, o_2) \right] \\
+ \omega \cdot \max_{k_1 \in q, k_2 \notin q, o \in \Omega'} \left[ \text{dist}(k_1, k_2) \right] \\
\]  \hspace{1cm} \text{\textsc{Type 3 – Min-Max}}

\[
cost(q, \Omega') = \left[ \left( \alpha \cdot \left( \sum_{o \in \Omega'} \left( \text{dist}(q, o, \lambda) \right) \phi_1 \right)^\frac{1}{\phi_1} \right)^\phi_2 \\
+ \left( \beta \cdot \max_{o_1, o_2 \in \Omega'} \left[ \text{dist}(o_1, o_2) \right] \right)^\phi_2 \\
+ \left( \omega \cdot \max_{k_1 \in q, k_2 \notin q, o \in \Omega'} \left[ \text{dist}(k_1, k_2) \right] \right)^\phi_2 \right]^{\frac{1}{\phi_2}} \\
\]  \hspace{1cm} \text{\textsc{Type 4 – Unified Cost Function}}

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Current and Future Work

• Implementation of the evaluation proposal
• Evaluation of the performance and feasibility/benefits, comparison with other LARS
• Tuning and consideration of alternative functions
• Extensions: dynamic weights for cost functions, etc.
• Consider combining it with other pure RS approaches