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

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

COS2MOS COMPLEXITY MANAGEMENT

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

$$cost(q,\mathbb{O}') = \alpha \cdot \max_{o\in\mathbb{O}'}\left[dist(q.\lambda, o.\lambda)\right] + \beta \cdot \max_{o_1,o_2\in\mathbb{O}'}\left[dist(o_1,o_2)\right] \\ + \omega \cdot \max_{k_1\in q.\kappa,k_2\in\cup_{o\in\mathbb{O}'}o.\kappa}\left[dist(k_1,k_2)\right]$$

← TYPE 1 – COMB

$$cost(q,\mathbb{O}') = \max\left\{\alpha \cdot \max_{o\in\mathbb{O}'}\left[dist(q.\lambda, o.\lambda)\right], \beta \cdot \max_{o_1,o_2\in\mathbb{O}'}\left[dist(o_1,o_2)\right], \\ \omega \cdot \max_{k_1\in q.\kappa,k_2\in\cup_{o\in\mathbb{O}'}o.\kappa}\left[dist(k_1,k_2)\right]\right\}$$

← TYPE 2 – MAX

$$cost(q,\mathbb{O}') = \alpha \cdot \min_{o\in\mathbb{O}'}\left[dist(q.\lambda, o.\lambda)\right] + \beta \cdot \max_{o_1,o_2\in\mathbb{O}'}\left[dist(o_1,o_2)\right] \\ + \omega \cdot \max_{k_1\in q.\kappa,k_2\in\cup_{o\in\mathbb{O}'}o.\kappa}\left[dist(k_1,k_2)\right]$$

← TYPE 3 – MIN-MAX

$$cost(q,\mathbb{O}') = \left[\left(\alpha \cdot \left(\sum_{o\in\mathbb{O}'}(dist(q.\lambda, o.\lambda))^{\phi_1}\right)^{\frac{1}{\phi_1}}\right)^{\phi_2} \\ + \left(\beta \cdot \max_{o_1,o_2\in\mathbb{O}'} dist(o_1,o_2)\right)^{\phi_2} \\ + \left(\omega \cdot \max_{k_1\in q.\kappa,k_2\in\cup_{o\in\mathbb{O}'}o.\kappa} dist(k_1,k_2)\right)^{\phi_2}\right]^{\frac{1}{\phi_2}}$$

← TYPE 4 – UNIFIED COST FUNCTION

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

THANK YOU...

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