A formal model for extracting landmarks from spatial descriptions

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Abstract: Landmarks are salient features in relation to which the objects or their relationships of spatial descriptions are specified. Landmarks play a key role in spatial cognition since they have characteristics such as cognitive significance, high familiarity as well as specific location. A number of spatial descriptions in our daily life are one of the most meaningful sources in order to identify these landmarks based on human spatial knowledge which cannot be found in current spatial databases. However, identifying landmarks from spatial descriptions is non-trivial and far from being solved since human spatial descriptions use uncertain feature name with various abbreviations and synonyms, omitted feature type and attribute, vernaculars, and ambiguous qualitative spatial expressions. Therefore, this paper proposes a formal model for extracting objective landmarks from individual spatial descriptions.

Hypothesis

• Landmarks can be identified from spatial relations with high redundancy in spatial descriptions.

Methodology

• Topological graph construction: Graphs are generated from individual spatial descriptions.

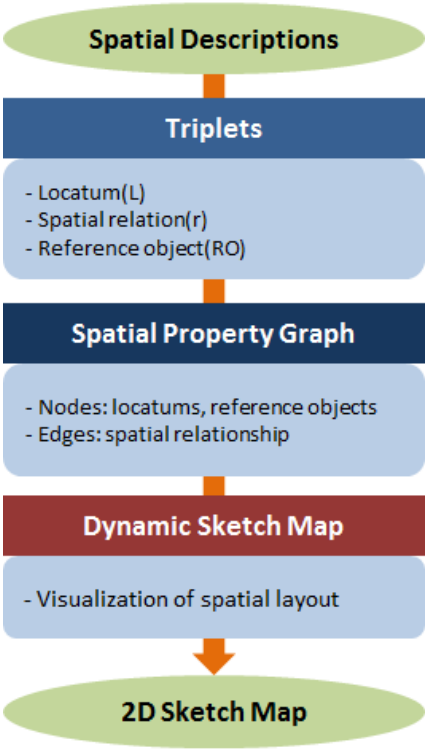
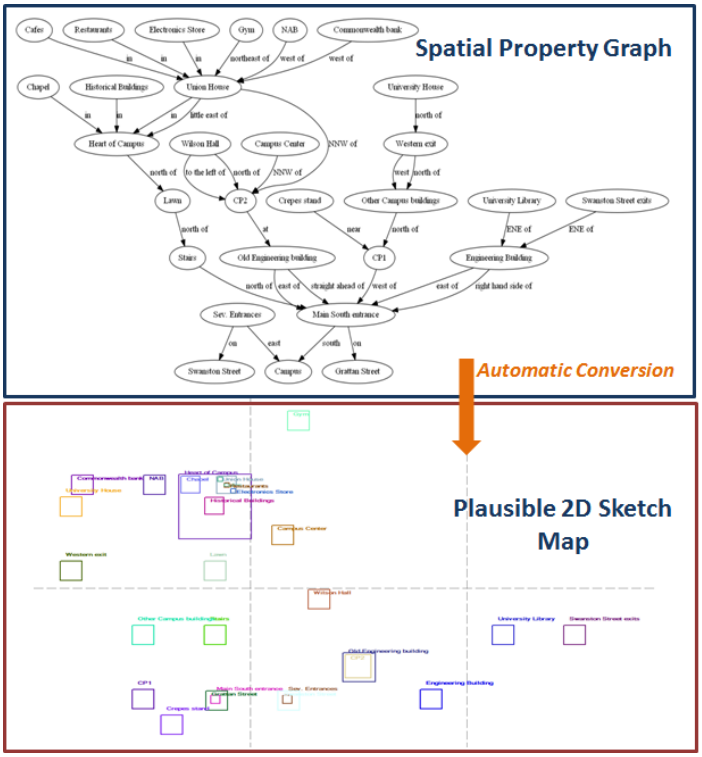
• Landmark identification: To identify landmarks, their characteristics are extracted by graph similarity and matching.

•Landmark extraction: Landmarks are extracted by processing feature frequency, feature similarity, feature hierarchy, and so on.

Major progress

• Construction of the spatial property graph capturing the spatial relationships between entities

• Dynamic sketch drawing from triplets which provide the identified entities and their spatial relations

• Generating a topological sketch map that minimizes conflicts between the verbalized spatial relationships

• Plausible representation of the described environment by automatic processing