

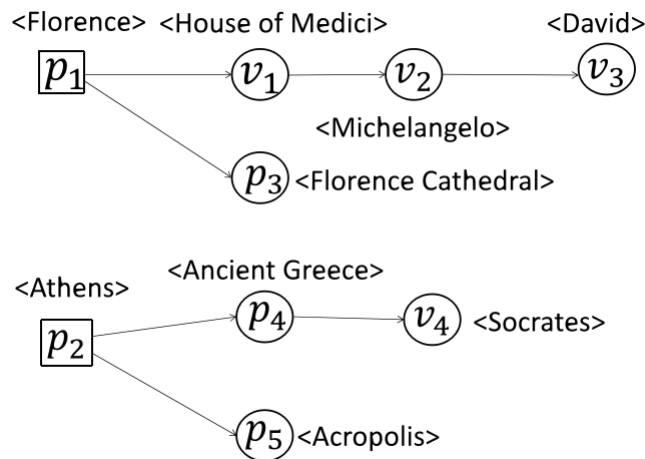
Skyline query based on RDF graph

1. RDF Graph

Define:

1. A directed graph $G = (V, E)$, V is for the set of vertices, and E is for the set of edges in the graph.
2. V contains two types of vertices: site vertices p_i and non-site vertices v_i .
3. p_i : spatial coordinate attributes and text attributes.
 v_i : text attributes. (write for v . ψ)

RDF Graph example:



Text attributes:

p_1 : { city, European, Italian}
 v_1 : { renaissance, commerce, dynasty}
 v_2 : { Italian, sculptor, painter, architect}
 v_3 : { sculpture, art, history}
 p_3 : { art, myth, ancient}
 p_2 : { city, European, Greek, capital}
 p_4 : { city-state, ancient civilization, war, Olympic}
 v_4 : { philosopher, history, dialectic, knowledgeable}
 p_5 : { ancient, art, myth, sculpture}

Spatial coordinate attributes:

p_1 : {33.84833, 35.58278}
 p_2 : {30.37917, 70.34861}
 p_3 : {-19.81667, -68.31667}
 p_4 : {20.71722, 104.06806}
 p_5 : {34.24509, -97.24807}

2. Relevant Semantic Location

Define:

1. Given a set of keywords ϕ and a RDF graph $G = (V, E)$
2. The semantic location p associated with ϕ is a tree with p as its root node, writing for $T_p = (V', E')$, which needs to satisfy the conditions: $V' \subseteq V, E' \subseteq E, \bigcup_{v \in V'} v.\psi \supseteq \phi$.
This means that the union of all text attributes belonging to the vertices of the T_p contains ϕ .
3. The distance between p to $w_i \in \phi$ in T_p :

$$d_g(T_p, w_i) = \min_{v \in V'} d(p, v), w_i \in v.\psi$$

where $d(p, v)$ is the length of the shortest path from p to v in T_p .

3. Semantic Location Domination

Define:

1. Given a set of keywords ϕ and a RDF graph $G = (V, E)$
2. $T = \{T_{p_i}\}$, semantic location domination is a partial order relation over T , given $T_{p_1} \in T, T_{p_2} \in T$, if they satisfy the following two conditions:

$$\begin{aligned} \exists w_i \in \phi, d_g(T_{p_1}, w_i) < d_g(T_{p_2}, w_i) \\ \forall w_i \in \phi, d_g(T_{p_1}, w_i) \leq d_g(T_{p_2}, w_i) \end{aligned}$$

then T_{p_1} dominates T_{p_2} , writing for $T_{p_1} \prec T_{p_2}$

4. Skyline Query

Define:

1. Given a set of keywords ϕ and a RDF graph $G = (V, E)$
2. $T = \{T_{p_i}\}$, if $T_{p_i} \in T$ and $\forall T_{p_j} \in T, i \neq j, T_{p_j} \not\prec T_{p_i}$, then we call p_i is a skyline semantic Location (or skyline point, SP)
3. Skyline query result is a set $S(G, \phi) = \{p_i\}$, p_i is a skyline point.