GESONGEN: An Interface for Generating and Visualizing Geosocial Networks

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Geosocial Network Generation

Many applications utilize combinations of social connections and locations to offer services. For example:

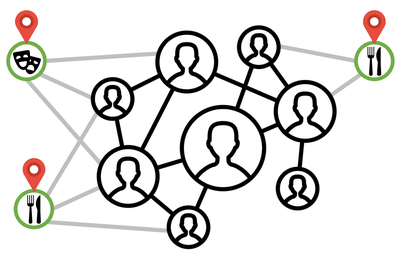
- Yelp allows users to check in at restaurants and leave reviews.
- Facebook considers the location (residence) of users to make page recommendations.
- X identifies trending topics by analyzing post locations and social connections.

However, mostly due to privacy concerns, the availability of geosocial network data is limited. Hence, the generation of realistic geo-social networks is a widely adopted solution for benchmarking the efficiency and robustness of geosocial queries.

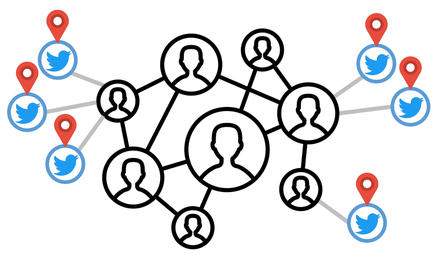
Geosocial Network Types

GESONGEN considers three types of geo-social networks*:

Type G_s



Type G_c



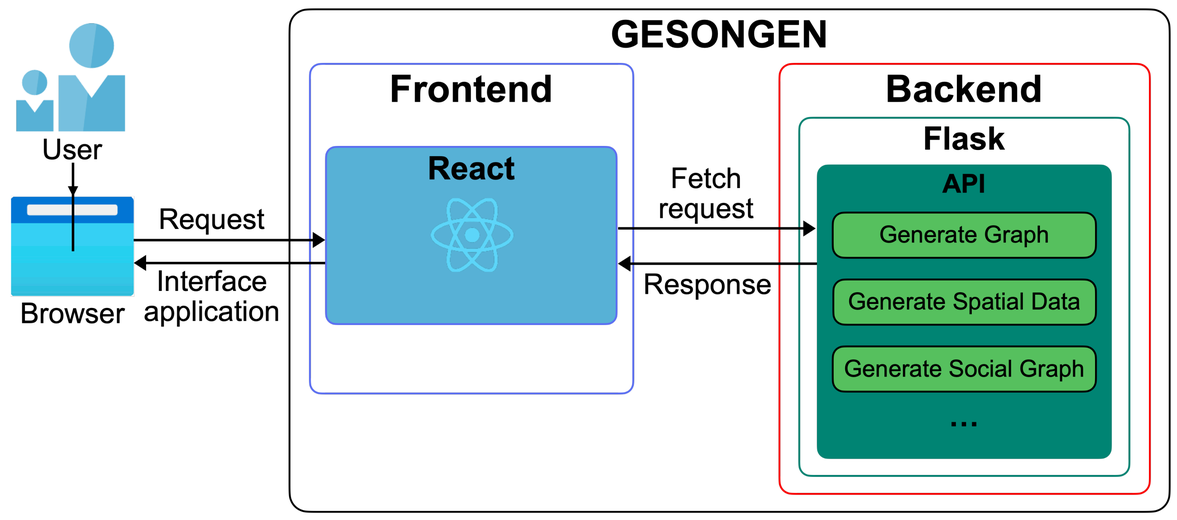
Type G_p

- Type G_s
  - All vertices represent the same type of entity
  - Some vertices are associated with a location
  - Example: Author citation network where geo-spatial information models the location of the affiliation of a researcher
- Type G_c
  - Vertices may represent different types of entities
  - Depending on their type, vertices can be **spatial**, i.e., be associated with spatial information, or **social.**
  - Social vertices can be connected to each other.
  - Spatial vertices can be connected to many social vertices, but never to each other.
  - Example: Applications like Yelp that allow users to check in at venues.
- Type G_p :
  - Vertices may represent different types of entities
  - Depending on their type, vertices can be **spatial** or **social.**
  - Social vertices can be connected to each other, but spatial vertices cannot.
  - Each spatial vertex is connected to a single social vertex.
  - Example: Applications like X that store the location from where a post was made.

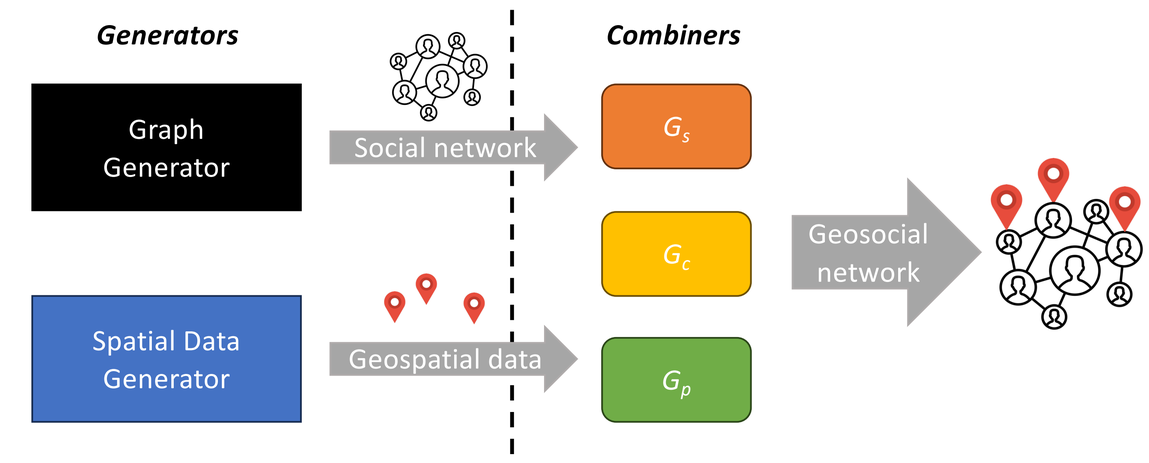
*Sarsour et al., *Towards generating realistic geosocial networks*, LocalRec @ ACM SIGSPATIAL 2023

System Architecture

Overview of GESONGEN:



Backend/Network Generation:

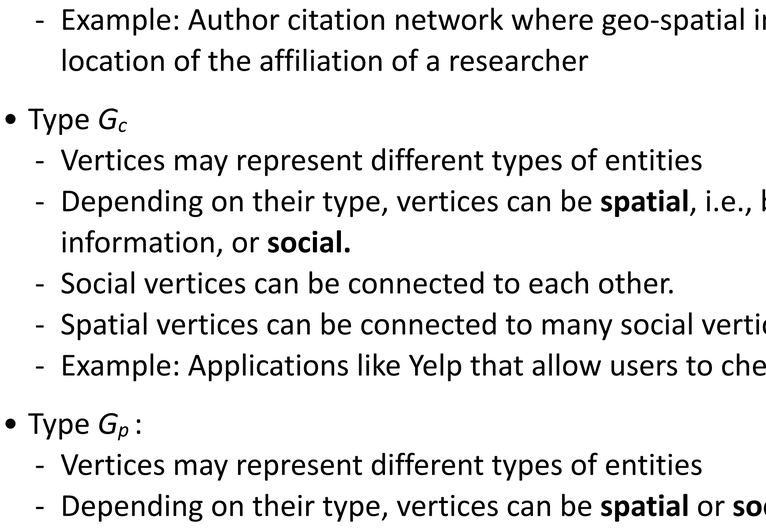


Frontend/Visualization and Analysis:

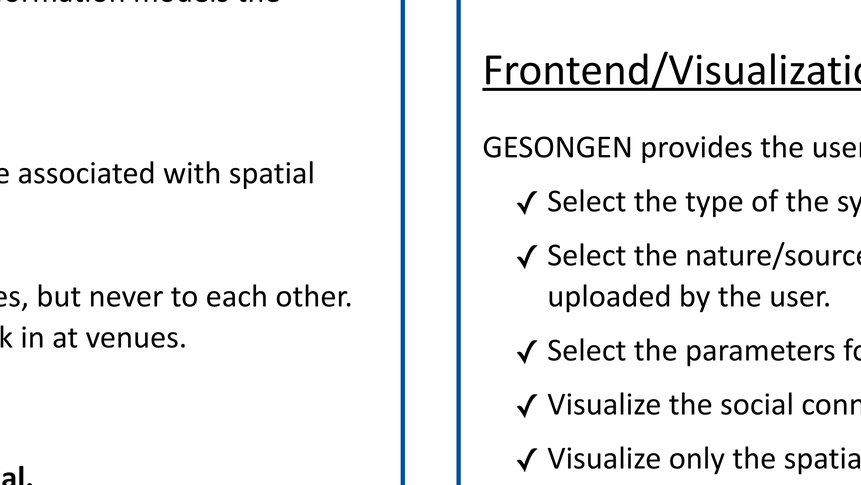
GESONGEN provides the users with the following options:

- ✓ Select the type of the synthetic network between G_s, G_c, and G_p.
- ✓ Select the nature/source of the social and the spatial component, i.e., generated or uploaded by the user.
- ✓ Select the parameters for the combiner of the social and the spatial components.
- ✓ Visualize the social connections between the nodes of the network.
- ✓ Visualize only the spatial component showing only vertices associated with spatial information (coordinates or polygons).
- ✓ Visualize the entire generated geo-social network using a combined view of the social and the spatial component.
- ✓ Compute and show statistics of the generated geo-social network

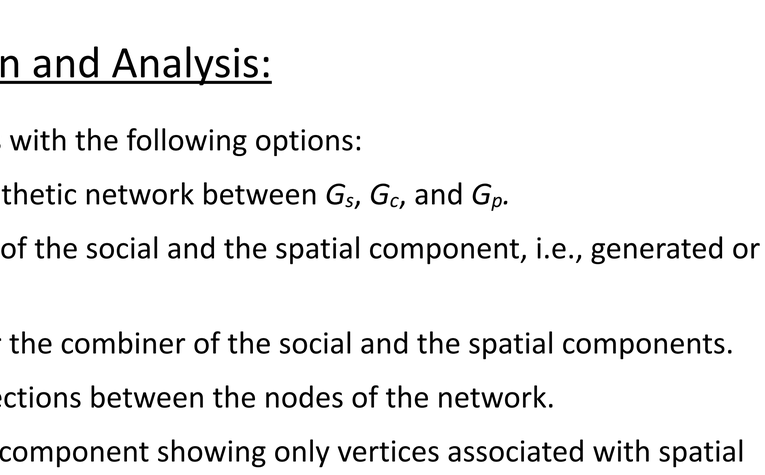
Geosocial Network Visualization



Social view



Spatial view



Combined view

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