



# A General and Scalable Framework for Location based Social Networks (LBSN)



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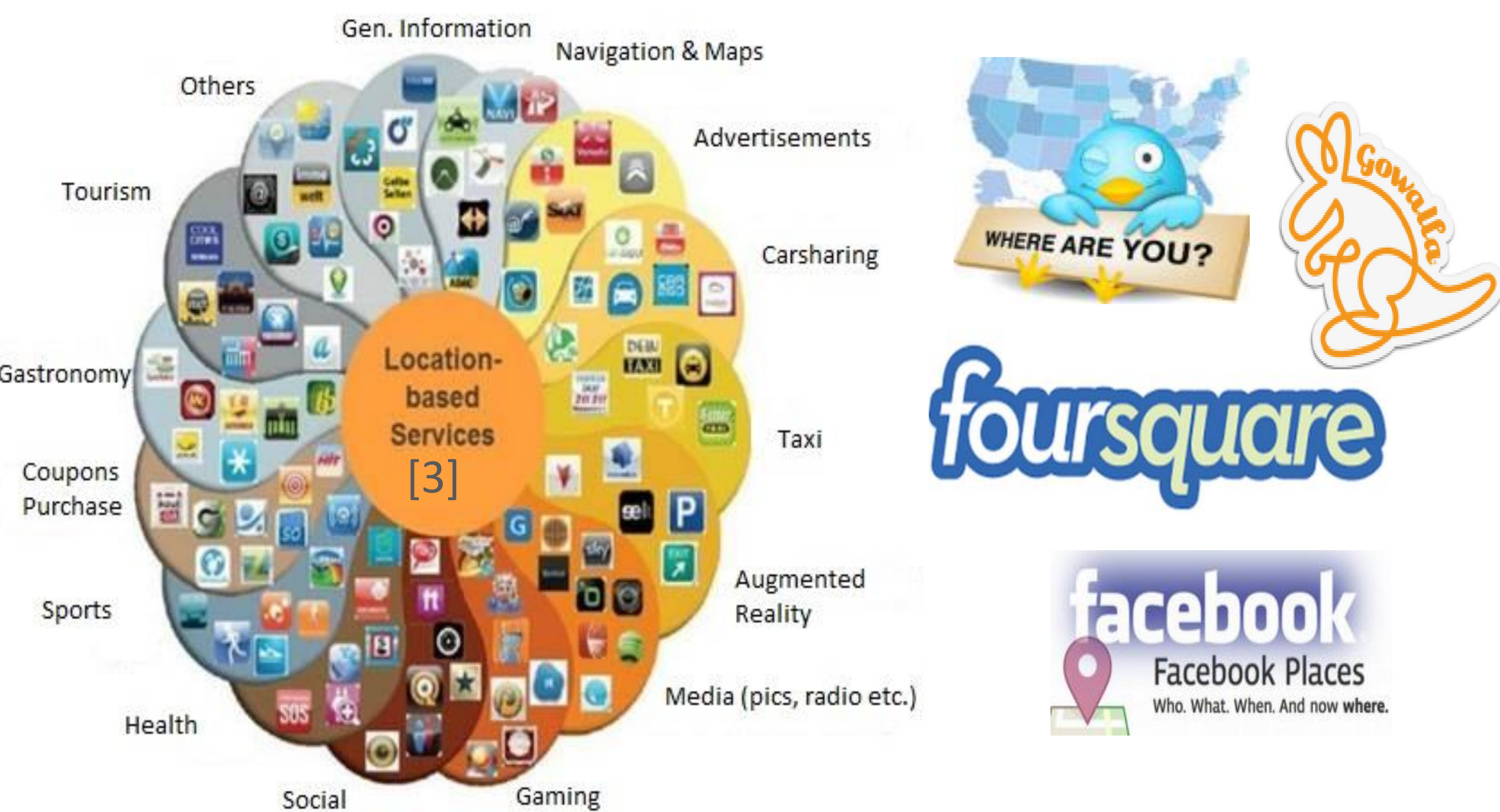
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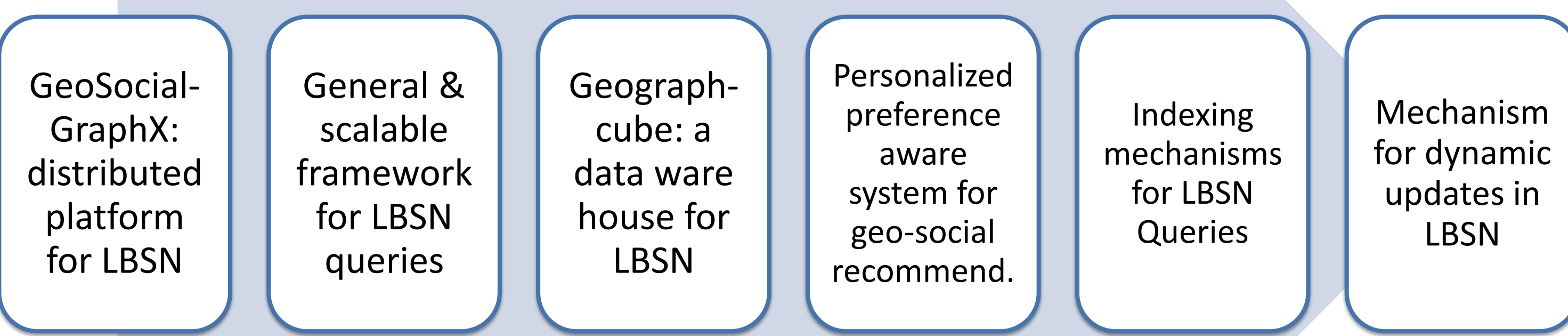
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## What is My Research About

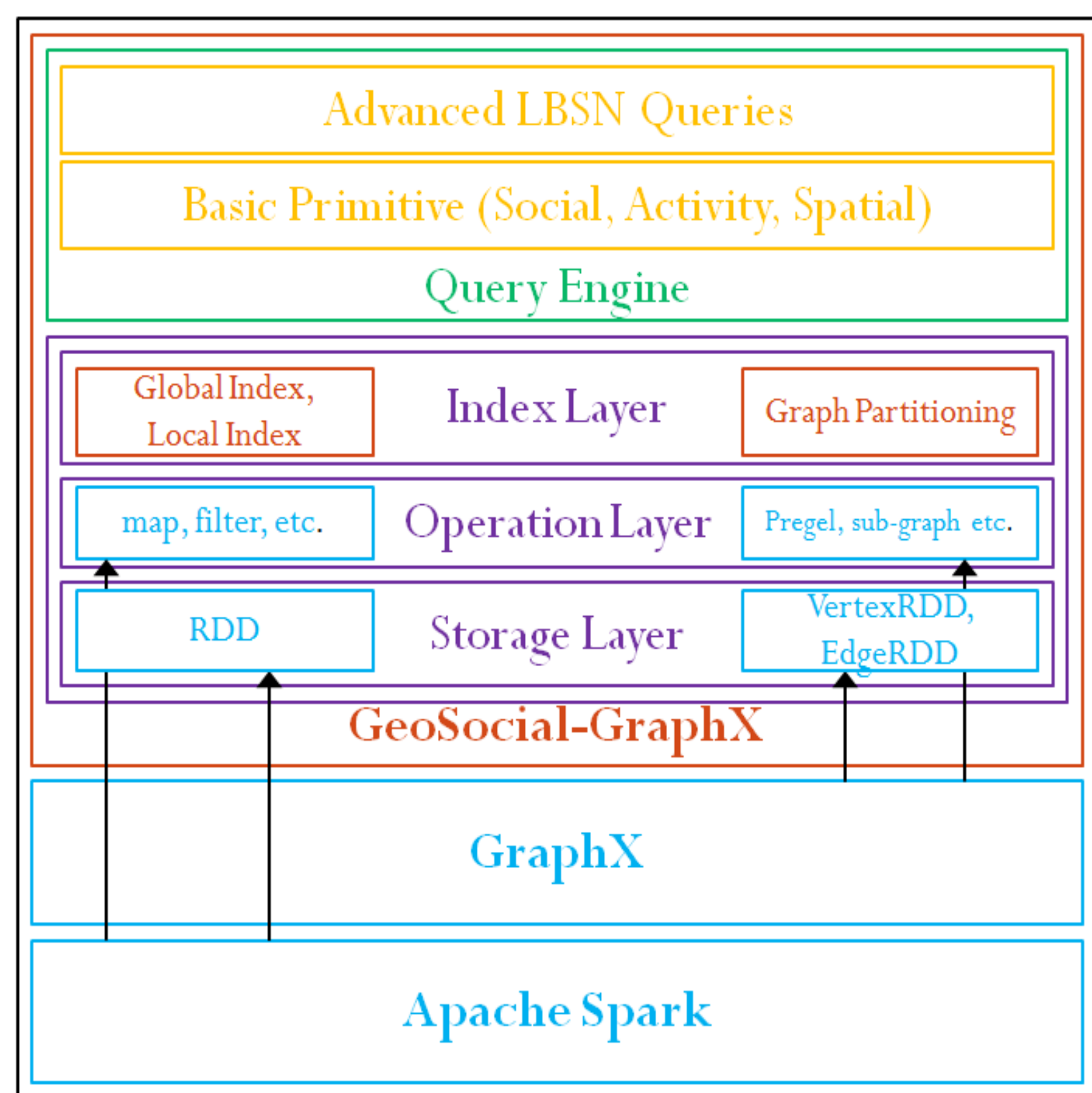


## Project Objectives



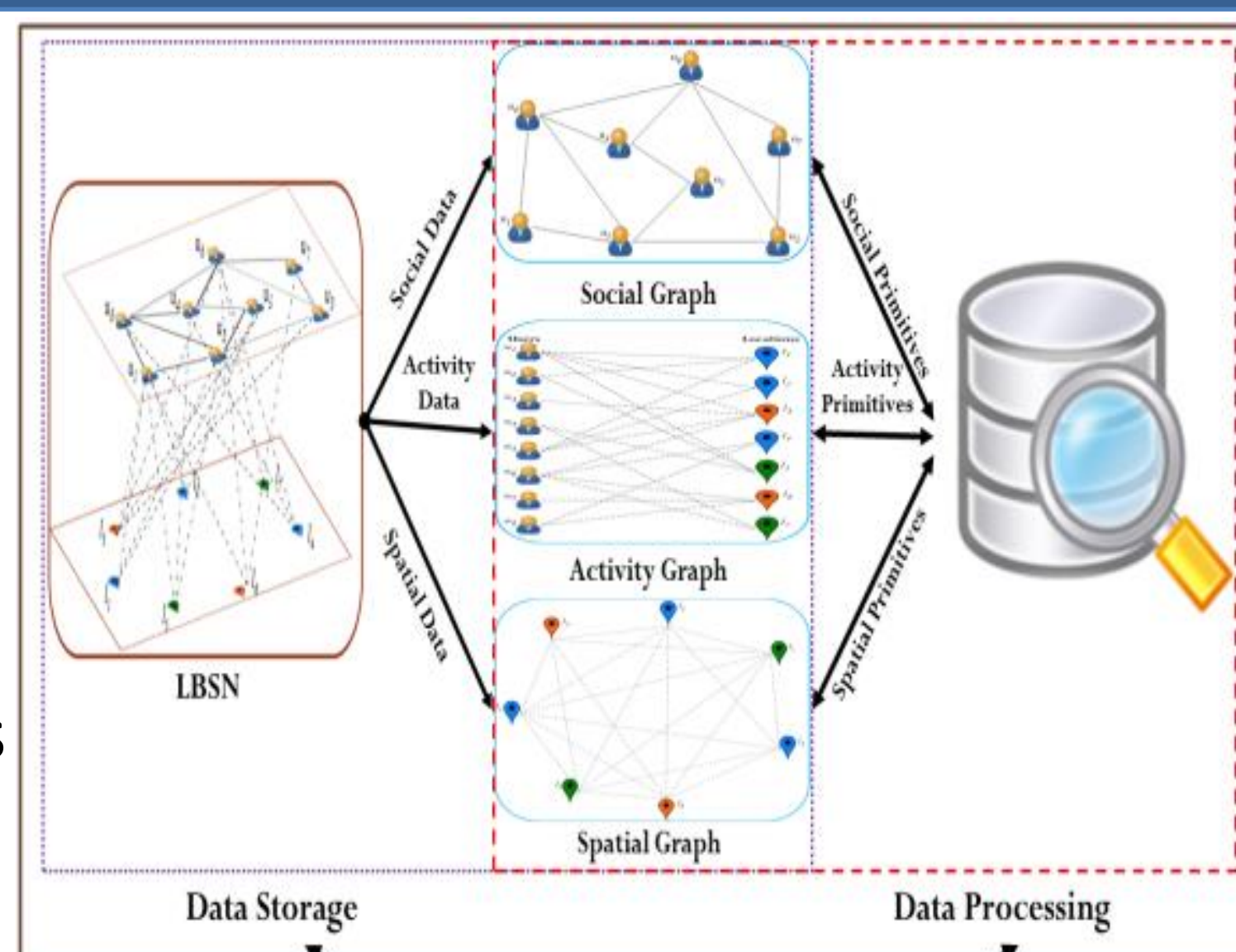
## Architecture of GeoSocial-GraphX

- Underlying Framework
  - ❖ Spark[1]
  - ❖ GraphX[2]
  - ❖ Lack of spatial support
- Distributed Framework
  - ❖ Data structures
    - RDD
    - VertexRDD, EdgeRDD
  - ❖ Data Operations
    - Tabular: filter, aggregate etc.
    - Graph: pregel, sub-graph, reverse etc.



## Data Management

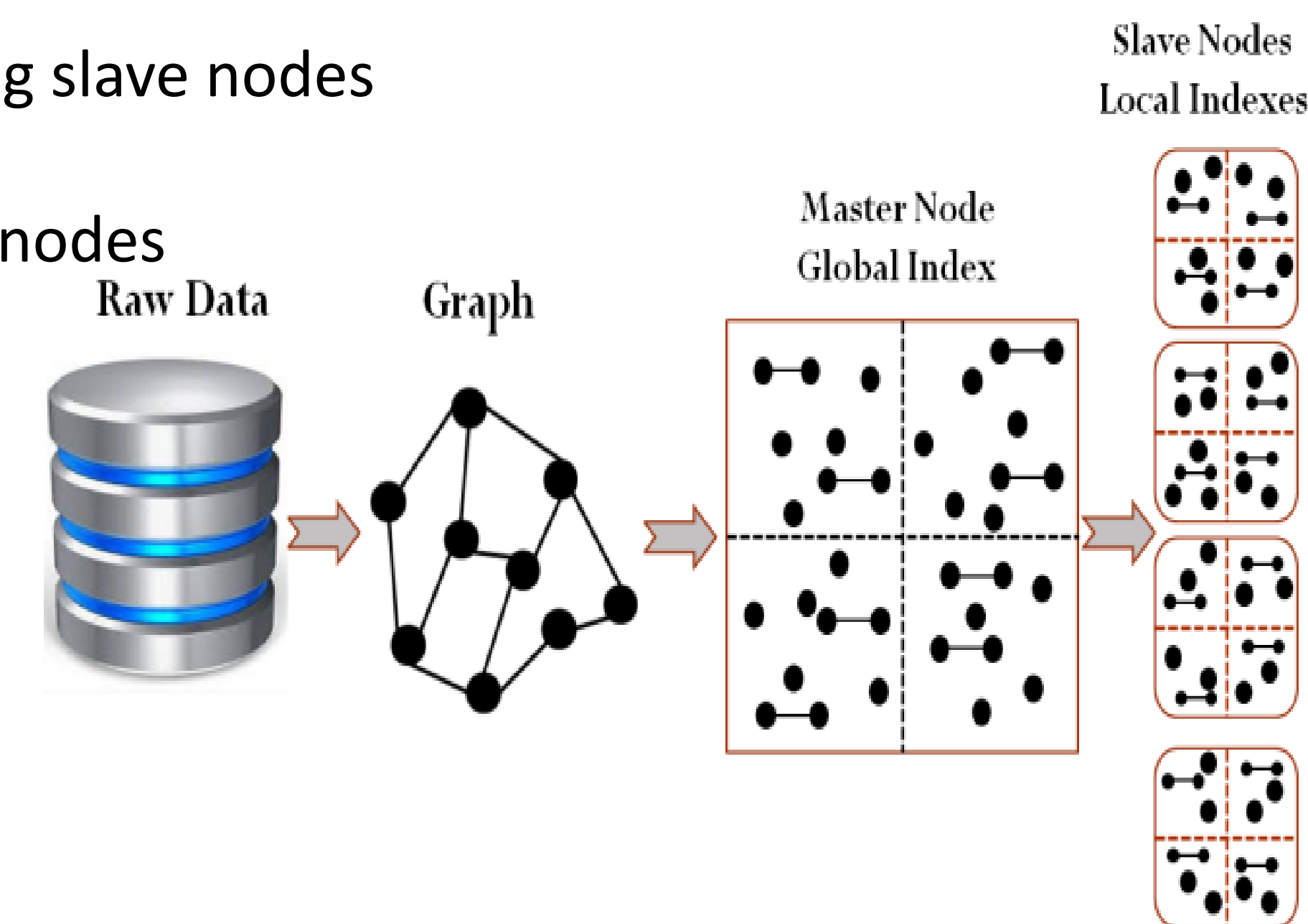
- Segregation of LBSN data
  - ❖ Social Graph
  - ❖ Activity Graph
  - ❖ Spatial Graph
- Processing of Queries
  - ❖ Segregate into basic primitives
  - ❖ Process on corresponding graphs
  - ❖ Merge results



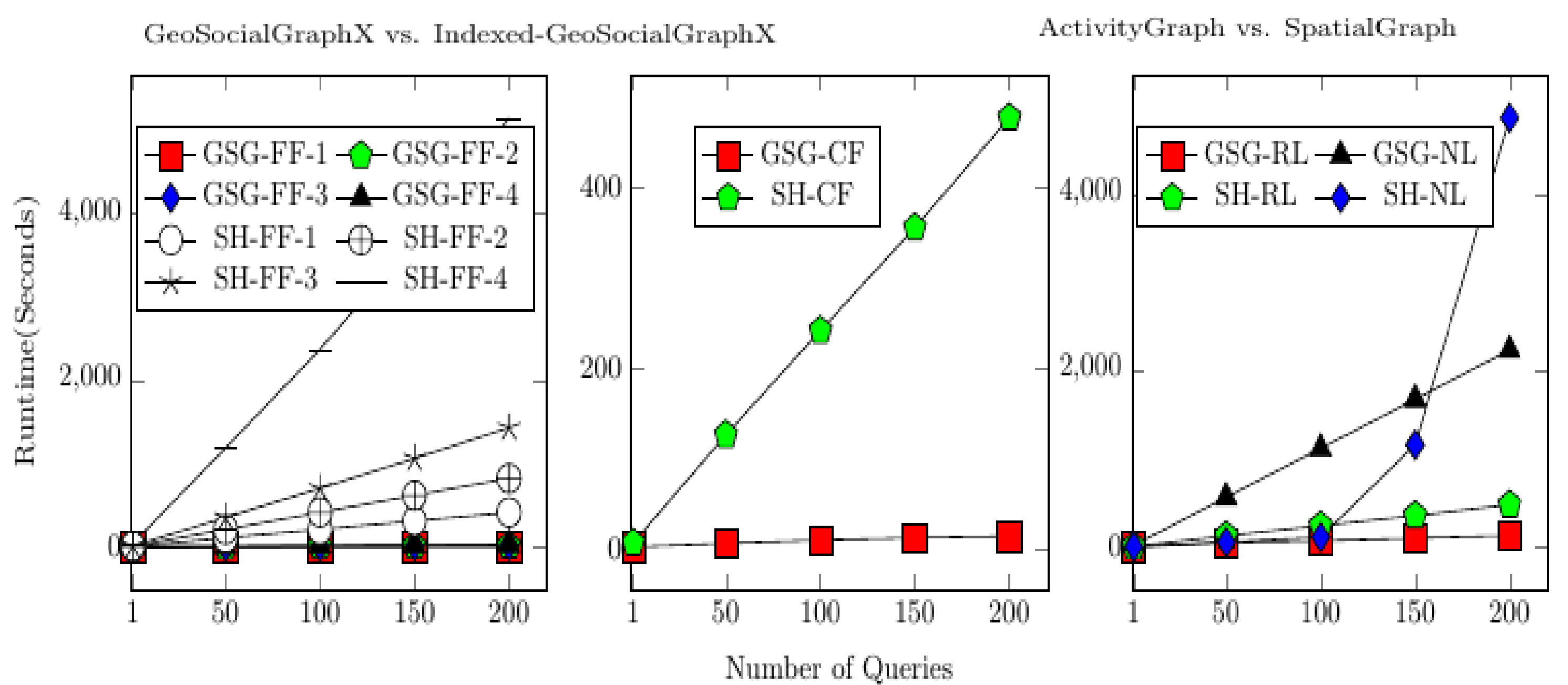
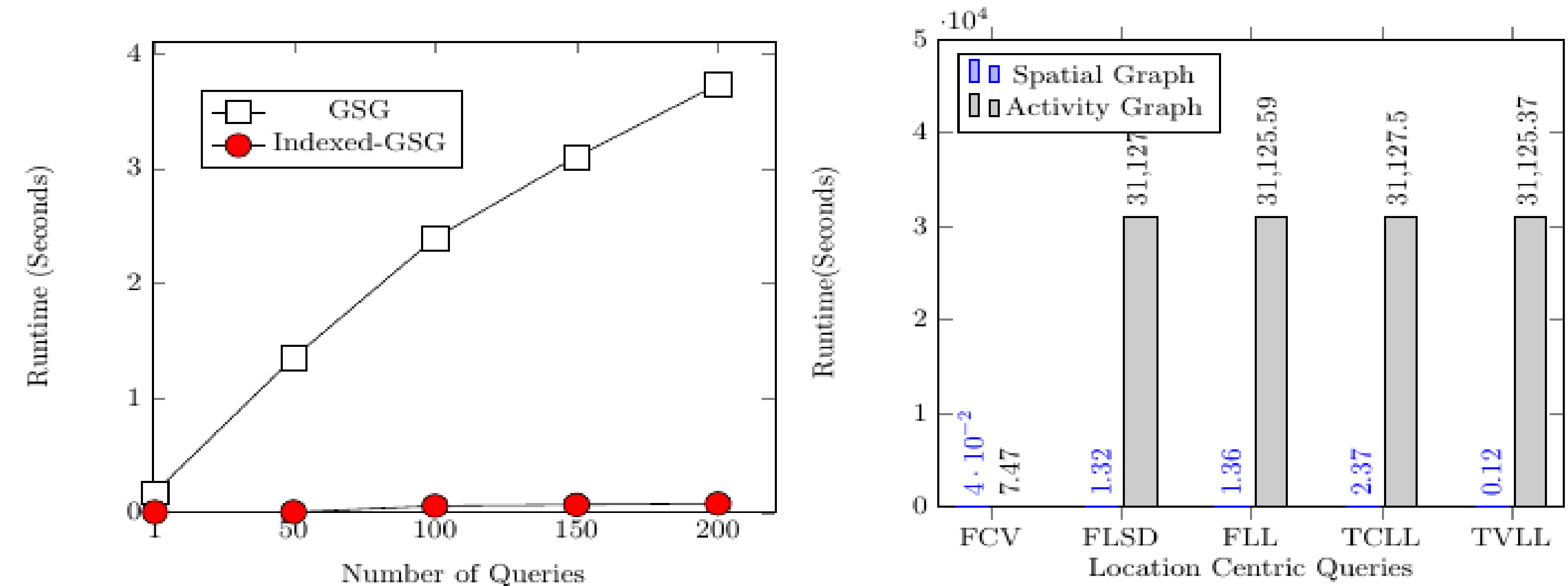
- Example: Find Common Visitor Friends
  - ❖ Find friends on Social Graph
  - ❖ Find user locations on Activity Graph
  - ❖ Find common Visitors on Spatial Graph

## Indexing

- For Activity Graph and Spatial Graph
  - ❖ Global Index
    - Partition data among slave nodes
  - ❖ Local Index
    - Index data on slave nodes
- Indexing Techniques
  - ❖ Quad-tree
  - ❖ Octree
  - ❖ K-d tree
  - ❖ Grid index



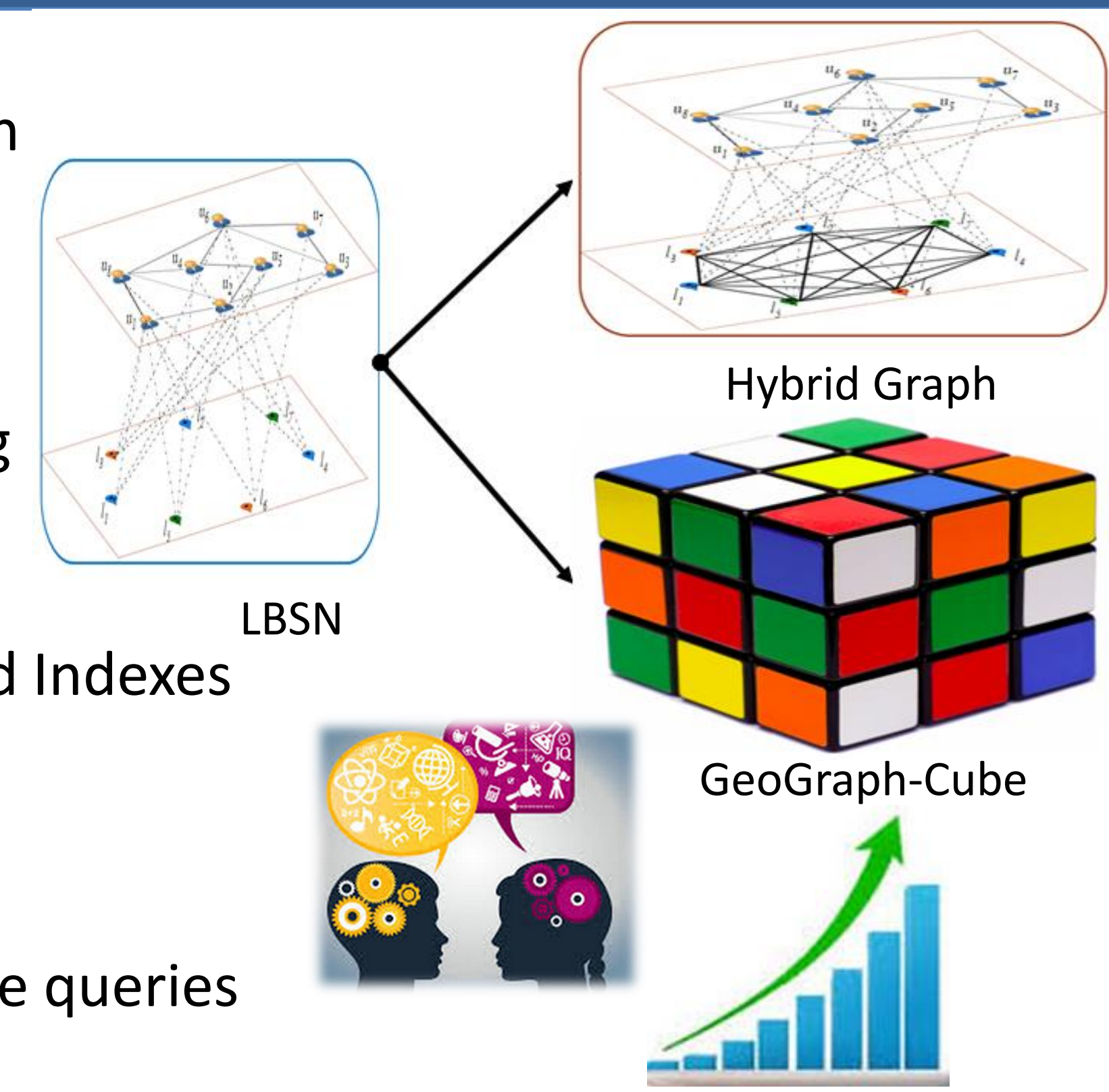
## Results



Comparison of GeoSocial-GraphX and SpatialHadoop

## Future Directions

- Data Management approaches
  - ❖ Hybrid aggregated LBSN graph
  - ❖ Geo-graph cube
- Data Partitioning
  - ❖ Aggregated graph partitioning
- Indexes
  - ❖ Map-reduce based distributed Indexes
  - ❖ Aggregated Indexes
- LBSN Queries
  - ❖ Personalized preference aware queries
  - ❖ Trend analysis queries etc.



## References

1. Spark. <https://spark.apache.org/>. Accessed: 2015-01-13.
2. [Apache API for graph and graph-parallel computation. <http://spark.apache.org/graphx/>. Accessed: 2015-01-13.
3. <http://www.radiozentrale.de/studien-und-daten/studien-pool/studien-deutschland/location-based-services2013/>. Accessed: 2015-07-03