

NSF IIS-GEO Workshop Position Paper: Issues in Spatial Search*

Hanan Samet
Department of Computer Science
Center for Automation Research
Institute for Advanced Computer Studies
University of Maryland at College Park
College Park, MD 20742 USA
hjs@cs.umd.edu

1. BIG IDEAS:

1. Given the prevalence of mobile devices ranging in size from smartphone to tablets, many of the decisions that we make in our daily lives are influenced by our location which can be obtained easily when GPS-enabled capabilities are added to the devices.
2. Location is becoming a first class citizen in a database. Efficient retrieval of the data requires the ability to sort it (e.g., [3–5]).
3. We are used to express location geometrically (e.g., latitude-longitude pairs) which is explicit. Increasingly, we are using implicit location specification methods such as using touch or text.

2. RESEARCH TRENDS:

1. How to resolve the ambiguity of the non-geometric location specification methods. For example, whether “London” is a location or not [1, 6], and if it is a location, which one is it [2]?
2. Approximate results are becoming increasingly important. Examples include computing spatial queries that involve distance along a road network rather than as the crow flies. The inability of conventional search engines to understand synonyms thereby permitting approximately similar query responses, can be overcome in the case of spatial queries when using touch interfaces where the ability to pan and zoom are analogous to enabling the use of spatial synonyms (e.g., [9]).
3. The small form factor of mobile devices is a constraint in developing applications that involve spatial data. The queries are increasingly posed using a map and so are the results that are produced. Maps are dynamic rather than static. We need to decide what data to present to users in a consistent way (e.g., [8]). There is also the issue of speed in processing the queries and approximations must invariably be used due to the surface area that we have to present results (e.g., a smartphone [7, 10]), while also being able to hold the device in one hand as well as store the device!

3. REFERENCES

- [1] M. D. Lieberman and H. Samet. Multifaceted toponym recognition for streaming news. In *SIGIR*, pages 843–852, Beijing, China, July 2011.
- [2] M. D. Lieberman and H. Samet. Adaptive context features for toponym resolution in streaming news. In *SIGIR*, pages 731–740, Portland, OR, August 2012.
- [3] H. Samet. A sorting approach to indexing spatial data. *International Journal on Shape Modeling*, 14(1):15–37, Jun. 2008.
- [4] H. Samet. *Foundations of Multidimensional and Metric Data Structures*. Morgan-Kaufmann, San Francisco, 2006. (Translated to Chinese ISBN 978-7-302-22784-7).
- [5] H. Samet. Sorting spatial data. In *The International Encyclopedia of Geography*. John Wiley and Sons, Oxford, UK, 2016.
- [6] H. Samet. Using minimaps to enable toponym resolution with an effective 100% rate of recall. In *Proceedings of 8th ACM SIGSPATIAL Workshop on Geographic Information Retrieval (GIR’14)*, Dallas, TX, Nov. 2014.
- [7] H. Samet, M. D. Adelfio, B. C. Fruin, M. D. Lieberman, and B. E. Teitler. Porting a web-based mapping application to a smartphone app. In *Proceedings of the 19th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, pages 525–528, Chicago, Nov. 2011.
- [8] H. Samet, B. C. Fruin, and S. Nutanong. Duking it out at the smartphone mobile app mapping API corral: Apple, Google, and the competition. In *Proceedings of the 1st ACM SIGSPATIAL International Workshop on Mobile Geographic Information Systems (MobiGIS 2012)*, Redondo Beach, CA, Nov. 2012.
- [9] H. Samet, J. Sankaranarayanan, M. D. Lieberman, M. D. Adelfio, B. C. Fruin, J. M. Lotkowski, D. Panozzo, J. Sperling, and B. E. Teitler. Reading news with maps by exploiting spatial synonyms. *Communications of the ACM*, 57(10):64–77, Oct. 2014. See video specially made by ACM at <http://vimeo.com/106352925>.
- [10] H. Samet, B. E. Teitler, M. D. Adelfio, and M. D. Lieberman. Adapting a map query interface for a gesturing touch screen interface. In *Proceedings of the Twentieth International Word Wide Web Conference (Companion Volume)*, pages 257–260, Hyderabad, India, March–April 2011.

*This work was supported in part by the National Science Foundation under Grants IIS-10-18475, IIS-12-19023, and IIS-13-20791.