

## Biographical Sketch for Shashi Shekhar

**Affiliation:** University of Minnesota, Dept. of Computer Science and Eng.  
**Mailing Address:** 200 Union Street S.E., #4-192, Minneapolis, MN 55455  
**Email:** [shekhar@cs.umn.edu](mailto:shekhar@cs.umn.edu) **URL:** <http://www.cs.umn.edu/~shekhar>  
**Telephone:** 612-624-8307 **Fax:** 612-625-0572

### Professional Preparation

Indian Inst. of Technology, Kanpur, India,	Computer Science,	B. Tech., 1985
University of California, Berkeley	Computer Science	M.S. 1987
University of California, Berkeley	Business Administration	M.S. 1989
University of California, Berkeley	Computer Science	Ph.D. 1989

### Appointments

2015 – Distinguished University Teaching Professor, University of Minnesota, Minneapolis, MN  
2005 - McKnight Distinguished University Professor, University of Minnesota, Minneapolis, MN  
2001 - Professor, University of Minnesota, Minneapolis, MN  
1995-2000 Assoc. Professor, University of Minnesota, Minneapolis, MN  
1989-1995 Asst. Professor, University of Minnesota, Minneapolis, MN

### Five Closely Related Products

1. [\*Theory-Guided Data Science: A New Paradigm for Scientific Discovery from Data\*](#), IEEE Transactions on Knowledge and Data Mining, 29(10):2318-2331, June 2017. (w/ A. Karpatne et al.).
2. *Physics-guided energy-efficient path selection: a summary of results*, 26th ACM SIGSPATIAL Intl. Conf. on Adv. in Geographic Info. Systems, pp 99-108, 2018. (with Y. Li, P. Wang, and W. Northrop).
3. [\*Discovering non-compliant window co-occurrence patterns\*](#), GeoInformatica, 21 (4):829-866, Springer, 2017. (w/ R. Ali, V. Gunturi, A. Kotz, E. Eftelioglu, W. Northrop), A Summary in the Proc. Intl. Symp. on Adv. in Spatial and Temporal Databases, 2015, Springer LNCS 9239 (Selected among best papers).
4. *Future Connected Vehicles: Challenges and Opportunities for Spatio-temporal Computing*, Proc. 23rd ACM SIGSPATIAL Intl. Conf. on Adv. in Geographic Info. Systems, 2015. (w/ R. Ali, V. Gunturi, A. Eldawy, M. Mokbel, A. Kotz, and W. Northrop). (Awarded second best vision and challenges paper).
5. *Significant Linear Hotspot Discovery*, IEEE Transactions on Big Data (Special Issue on Urban Computing), 3(2):140-153, 2017. (w/ X. Tang, E. Eftelioglu, and D. Oliver).

### Five Other Significant Products

1. *Spatial Computing*, Communications of the ACM, 59(1): 72-81, January, 2016 (cover article). (w/ S. K. Feiner, and W. G. Aref). (This article summarizes the findings of the 2012 Computing Community Consortium visioning workshop titled “From GPS and Virtual Globes to Spatial Computing 2020” with over a hundred participants across academia, industry, and government.)
2. *Spatiotemporal Data Mining: A Computational Perspective*, Special Issue on Advances in Spatio-Temporal Data Analysis and Mining, ISPRS International Journal of Geo-Information, 4(4), 2306-2338, 2015. (w/ Z Jiang, R. Ali, E. Eftelioglu, X. Tang, V. Gunturi, and X. Zhou)
3. [\*Transdisciplinary Foundations of Geospatial Data Science\*](#), ISPRS International Journal of Geo-Informatics, 6(12), 2017. doi:10.3390/ijgi6120395. (with Y. Xie, E Eftelioglu, RY Ali, X Tang, Y Li, R Doshi).
4. *Encyclopedia of GIS* (2nd Ed.), Springer, 2017, isbn 978-3-319-17884-4. (Co-Ed. w/ H. Xiong, and X. Zhou). (1st Edition in 2008, isbn 978-0-387-30858-6).
5. *A Tour of Spatial Databases*, Prentice Hall, 2003, isbn 013-017480-7. (w/ S. Chawla).

## Synergistic Activities

- Technical contributions in computational methodologies: Received the IEEE-CS Technical Achievement Award (2006) and was elected an IEEE fellow (2003) as well as an AAAS Fellow (2008) for contributions to spatial database storage methods, data mining, and geographic information systems (GIS). Technical contributions include scalable algorithms for evacuation route planning, connectivity clustered access methods for storage of roadmaps, colocation patterns for mining spatial data, etc.
- Innovations at teaching and training: Led a NSF IGERT on interdisciplinary graduate education (2007-2012); Developed and taught a massively open online course titled “From GPS and Google Maps to Spatial Computing” in 2014 with over 21,000 students across 182 countries. Developed one of the first courses on Spatial Databases; Co-authored a popular textbook on Spatial Databases (Prentice Hall, 2003); co-edited an Encyclopedia of GIS (Springer, 2<sup>nd</sup> edition 2017, 1<sup>st</sup> edition 2008), which was recommended highly by a review in ACM Computing Reviews (Nov. 2008); Presented tutorials on spatial data mining in conferences; Chaired curriculum committee of Computer Science & Eng. department at the University of Minnesota (1998-2000); Served as a Computer Science representative on UCGIS curriculum committee (1998-99); Served on IEEE-Computer Society Computer Sc. and Eng. Practices Publication Board (1995-97). Received the University Consortium on GIS Education Award (2015), the University of Minnesota Graduate Education Award (2015), and the UCGIS Top Educator Honor (2016).
- Broadening participation of underrepresented groups in STEM: Supervised Ph.D. thesis of over half a dozen members from underrepresented groups. Supervising over two dozen undergraduate (UG) students from historically black colleges in Expedition (2009-2014) and Army High Performance Computing Research Center annual summer workshops (1997-2006), NSF Research Experience for UGs, and UG Research Opportunity Program. Mentored high school students (2 current, 2 completed).
- Research Team Management and community building: Directed the Army High Performance Computing Research Center (2005-2007) with about 50 faculty members across 6 universities with an annual budget of \$5M/year. Recently directed an NSF IGERT (2006-2012) project with two dozen faculty members across half a dozen departments. Currently leading a large NSF Smart and Connected Communities (2017-2020) project with about ten faculty members across 4 universities and 6 disciplines.

Organized a Computing Community Consortium workshop titled “From GPS and Virtual Globes to Spatial Computing-2020” in 2012. It identified research directions for spatial computing and a summary was published as the cover article in the Communications of the ACM, January 2016.

Organized an NSF workshop to identify interdisciplinary data science approaches and challenges to enhance understanding of interactions of food systems with energy and water systems, October 2015. The workshop built a research agenda for next generation data science for understanding interactions of food systems with energy and water systems, in an effort to stimulate innovation from opposing directions: pull (i.e., FEW Nexus data science needs) and push (i.e., disruptive Data Science technology). It identified a need to build a FEW nexus data community. Organized follow-on workshops at the ACM SIGKDD (2016, 2017), and session (S-E2) at 2016 National Conference and Global Forum on Science, Policy, and the Environment, 2016.

- Service to community: Serving as a member of the *Computing Research Association Board* (2016-19), co-Editor-in-Chief of Springer *Geo-Informatica: An Intl. Journal on Advances in Computer Sc. for GIS*. Served as the president of the *University Consortium on GIS* (2016-17). Served as a member of the *Computing Community Consortium Council* (2012-2015), multiple National Academies committees (e.g., *From Maps to Models: Augmenting the Nation’s Geospatial Intelligence Capabilities* (2015-16), *Geo-targeted Alerts & Warnings* (2012), *GEOINT Workforce* (2011), *Mapping Science Committee* (2003-9), *Priorities for GEOINT Research* (2006), etc.) and the Board of Directors of *University Consortium of Geographic Information Systems* (2003-2004). Also served as a program co-chair for *international conference on geographic information science* (2012), and a general co-chair for the *Symposium on Spatial and Temporal Databases* (2011), etc. Invited plenary speaker on spatial big data, spatial computing and spatial data mining at many forums, e.g., *GeoComputation* (2015), *NIST Data Science Conference* (2014), *ACM SIG-Spatial Big-Spatial Workshop* (2012), *SIGMOD MoBiDE Workshop* (2012), *ESRI Space-Time Modeling Workshop* (2010), *IBM T.J. Smarter Planet summit* (2009), etc.