Shreya Ghosh

Doctoral Fellow
Spatial Informatics

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Interests

Mobility, Location-based Services

Machine Learning, Information Retrieval

Cloud Computing

Health Informatics

Professional Services

- Reviewer in *IEEE TNSE, IEEE ACCESS, IET Networks, Software: Practice and Experience, Journal of Cloud Computing*
- Evaluator of *National Hackathon on Self-Reliance based Intelligent India Hackathon organized by Computer Society of India, Kolkata Chapter 2021*

References

Prof. Soumya K. Ghosh

Professor, Department of Computer Science and Engineering (IIT Kharagpur). National Geospatial Chair Professor (DST, India).

skg@cse.iitkgp.ac.in

Prof. Rajkumar Buyya

Director (CLOUDS Lab). Redmond Barry Distinguished Professor (The University of Melbourne, Australia).

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Education

2016 - 2021 (Expected) **Ph.D.** — **Indian Institute of Technology (IIT) Kharagpur**
Kharagpur, India
Specialization: Spatio-temporal Data Analytics
Advisor: Prof. Soumya K. Ghosh

2011 - 2015 **B.Tech** — **Indian Institute of Engineering Science and Technology, Shibpur (IIEST)**
Specialization: Computer Science and Engineering
Score: 8.90/10 *[Top 5 in Department]*

2009 - 2011 **Higher Secondary (XII)** — **West Bengal Council of Higher Secondary Education**
Score: 95.25% *[Top 10 in State & Top scorer in District]*

2008 - 2009 **Secondary (X)** — **West Bengal Board Of Secondary Education**
Score: 92.60%

Research Experience

2016 - 2021 **Ph.D. Research Fellow** — **Indian Institute of Technology (IIT) Kharagpur**

- Analysis of large scale GPS traces to explore human movement behaviours
- Transferring mobility knowledge from source to target region to annotate trajectory trips and POI-classification
- *Mobility Association Rule Mining* framework from trajectory Traces to infer interestingness of trajectory patterns
- *Temporal fingerprinting of individuals* by modelling and analysing their activity patterns
- Cloud-fog-edge-IoT based collaborative framework to facilitate applications related to improved health-care, transportation and urban planning in less delay along with less energy consumption
- Developed *Activity-aware Internet of Health Things (IoHT)*, and *Mobility-aware Internet of Spatial Things (Mobi-IoST)* for assisting users in the time of emergency

2015 - 2016 **Research Project Assistant** — **Indian Institute of Technology (IIT) Kharagpur**

- *Decision Support System* for transportation of hazardous materials in city region of Kolkata
- Designed a SDI (Spatial Data Infrastructure) to assist in routing decisions regarding transportation of hazardous materials

2014 - 2015 **Undergraduate Research** — **Indian Institute of Engineering Science and Technology, Shibpur (IIEST)**

- *Efficient data analysis and classification in Chemoinformatics*
- Developed novel chemical graph mining algorithm for classification of chemical reactions. This work extends *Ugi's scheme* and capable to classify a wide variety of chemical reactions

Teaching and Mentoring Experience

Jul 2017 - Dec 2019 **Mentoring (3 UG, 4 PG students, 4 summer interns)** — **IIT Kharagpur**

- Successfully completed final and pre-final year projects on *Internet of Health Things*, *hybrid path planning* and *crowd flow analysis*. The project works have been published in conference proceedings and journal.

Awards

- TCS PhD Research Scholarship (July 2017 - Oct 2020).
- CoDS COMAD Student Travel Grant 2020.
- International Travel Scheme Award, SERB, DST for presenting paper in IEEE International Conference on Systems, Man and Cybernetics (IEEE SMC) 2018.
- IEEE Student Travel Grant for presenting paper in IEEE International Conference on Systems, Man and Cybernetics (IEEE SMC) 2018.
- ICPR/IAPR Travel Grant for presenting paper in International Conference on Pattern Recognition (ICPR) 2018.
- Microsoft Research Travel Grant for presenting paper in World Wide Web Conference (WWW) 2017.
- 3rd rank, Demo competition in IBM Day 2016, IIT Kharagpur. Title: *Mobility Summary and User Categorization based on Semantic Analysis of Human Movement Patterns*.
- 2nd rank in Cognizant CIO's Challenge for Students, Selected in IT foundation of Cognizant Certified Student Program 2015. Developed an web-application titled *SQL-VAL: Validate your SQL queries without executing!* to upload and validate SQL query syntax without execution.
- Government Merit Scholarship for Graduate Study for Outstanding performance in Higher Secondary Examination 2011.

Skills

Tensorflow

Google Cloud Platform, SUMO

GIS (PostgreSQL, PostGIS, QGIS)

Programming (Python, R, C)

Future Research Interests

Autonomous Mobility, Mobility on Demand, Urban Aerial Mobility, Distributed Deep Learning, Graph Analytics

Jul'16 - Dec'16 **Teaching Assistant** **Indian Institute of Technology (IIT) Kharagpur**
Programming and Data structure of 120 students. Conducting tutorial class (3 hours/ week) and help students to understand the basic concepts and how to solve problems using computer programmes.

Jan'17 - May'17 **Teaching Assistant** **Indian Institute of Technology (IIT) Kharagpur**
Cloud Computing Course of above 80 students. Served as a TA in three semesters, where I was mainly involved in taking tutorial (on MapReduce, public cloud platforms) and demo sessions (1 hour/ week), finalizing the question paper of final exams and evaluating and conducting the quizzes, demo presentations in small group of students.

Jul'17 - Dec'17 **Teaching Assistant** **Indian Institute of Technology (IIT) Kharagpur**
Geographical Information System Course. Served as a TA in three semesters, where my major responsibility was finalizing and formatting the course materials and taking tutorial classes to illustrate spatial database namely Oracle Spatial and Graph, PostGIS, spatial processing tool QGIS.

Jul'17 - Dec'20 **Teaching Assistant** **Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM), Government of India**
(I) *Online Cloud Computing* (above 30,000 enrolled candidates)
(II) *Google Cloud Computing Foundations*
(II) *Spatial Informatics*
Responsibility: Preparing and formatting the course contents, creating the assignments and resolving the forum queries of the registered students. Demonstrated several components of Google Cloud Platform (GCP) by creating simple web-apps in GCP using the computing and storage services.

Conferences and Workshops

Paper Presentation
(I) *26th International World Wide Web Conference (WWW)*, 3rd - 7th Apr 2017, Perth, Australia.
(II) *25th International Conference on Pattern Recognition, IEEE (ICPR)*, 20-24th Aug 2018, Beijing, China.
(III) *IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, 7-10th Oct, 2018, Miyazaki, Japan.
(IV) *17th International Conference on Intelligent Systems Design and Applications (ISDA)*, 14-16th December, 2017, Delhi, India.
(V) *11th International Conference on COMmunication Systems & NETworkS (COMSNETS)*, 8-10th Jan, 2019, Bengaluru, India.
(VI) *12th International Conference on COMmunication Systems & NETworkS (COMSNETS)*, 7-11th Jan, 2020, Bengaluru, India.

2016 - 2020 **Workshop Organization** **Indian Institute of Technology (IIT) Kharagpur, Department of Science and Technology (DST), Govt. of India**
(I) *Geospatial Data Modeling from Spatial Data to Web Services*
(II) *Geospatial Data Modeling and Mobile Apps for GI Application*
(III) *DST symposium on National Geospatial Science and Technology Development* [Kolkata Campus]
(IV) *Geospatial Cloud: Enabling Data and Application Services*
(V) *Coordinated Preparation of High Resolution National Foundation Spatial Data (NFSD) for Gram-Panchayat and Ward Level Mapping* (Speaker, Organized by Odisha Space Application Center (ORSAC))
(VI) *Use of geospatial cloud-based platform for development of data services and registers* (Speaker, Organized by Indian Institute of Surveying Mapping (IISM) and DST)
(VII) *Bio-inspired Computing and Its Applications in Mobile Network* (Speaker, Organized by Mahishadal Raj College, Vidyasagar University, India)

Publications

(a) **MARIO: A Spatio-temporal Data Mining Framework on Google Cloud to Explore Mobility Dynamics from Taxi Trajectories**
Shreya Ghosh, Soumya K. Ghosh and Rajkumar Buyya. Journal of Network and Computer Applications (JNCA), ISSN: 1084-8045, Elsevier, Amsterdam, The Netherlands Press, 2020. **[I.F.: 5.57]**
https://doi.org/10.1016/j.jnca.2020.102692

(b) **Mobi-IoST: Mobility-aware Cloud-Fog-Edge-IoT Collaborative Framework for Time-Critical Applications**
Shreya Ghosh, Anwesha Mukherjee, Soumya K. Ghosh, and Rajkumar Buyya. IEEE Transactions on Network Science and Engineering (TNSE), Volume 7 (4), pp. 2271-2285, IEEE 2020 **[I.F.: 5.21]**
https://ieeexplore.ieee.org/abstract/document/8711428/

(c) **Internet of Health Things (IoHT) for Personalized Health Care using Integrated Edge-Fog-Cloud Network** Anwesha Mukherjee, ***Shreya Ghosh***, Aabhas Behere, Soumya K. Ghosh and Rajkumar Buyya. Journal of Ambient Intelligence and Humanized Computing, ISSN: 1868-5137, Springer Science+Business Media, Berlin, Germany, 2020. **[I.F.: 4.59]**
https://doi.org/10.1007/s12652-020-02113-9

(d) **Exploring Mobility Behaviours of Moving Agents from Trajectory traces in Cloud-Fog-Edge Collaborative Framework**
Shreya Ghosh, and Soumya K. Ghosh. 20^{th} IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGrid 2020, IEEE CS Press, USA), pp. 893-897, Melbourne, Australia, May 11-14, 2020. (Doctoral Symposium) **[A rank]**
https://ieeexplore.ieee.org/abstract/document/9139605

(e) **CLAWER: Context-aware Cloud-Fog based Workflow Management Framework for Health Emergency Services**
Shreya Ghosh, Jaydeep Das, Soumya K. Ghosh and Rajkumar Buyya. 20^{th} IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGrid 2020, IEEE CS Press, USA), pp. 810-817, Melbourne, Australia, May 11-14, 2020. **[A rank]**
https://ieeexplore.ieee.org/abstract/document/9139714

(f) **LOCATOR: A CLoud-FOg-enabled Framework for Facilitating Efficient LoCATiOn based SeRvices**
Shreya Ghosh, Jaydeep Das, and Soumya K. Ghosh. 12^{th} International Conference on COMmunication Systems & NETworkS (COMSNETS 2020), pp. 87-92. IEEE, 2020. Jan 07-11, 2020, Bengaluru, India
https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9027345

(g) **MovCloud: A Cloud-enabled Framework to Analyse Movement Behaviours**
Shreya Ghosh, Soumya K. Ghosh and Rajkumar Buyya. 11^{th} *IEEE International Conference on Cloud Computing Technology and Science (CloudCom 2019)*, pp. 239-246, Sydney, Australia, Dec 11-13, 2019.
https://ieeexplore.ieee.org/document/8968847

(h) **Traj-Cloud: A Trajectory Cloud for enabling Efficient Mobility Services**
Shreya Ghosh, Soumya K. Ghosh. 11^{th} *International Conference on COMmunication Systems & NETworkS (COMSNETS 2019)*, pp. 765-770, IEEE, Bangalore, India, Jan 7-11, 2019.
https://ieeexplore.ieee.org/abstract/document/8711428/

(i) **Exploring the Association between Mobility Behaviours and Academic Performances of Students: A Context aware Traj-Graph (CTG) Analysis**
Shreya Ghosh, Soumya K. Ghosh. Progress in Artificial Intelligence, Springer Journal, 7(4), pp.307-326, 2018. **[I.F.: 3.08]**
https://link.springer.com/article/10.1007/s13748-018-0164-6

(j) **Activity-Based Mobility Profiling: A Purely Temporal Modeling Approach**
Shreya Ghosh, Soumya K. Ghosh, Rahul Deb Das, and Stephan Winter. 27^{th} *International World Wide Web Conference (WWW)*, pp. 409-416, ACM, Lyon, France, Apr 23-27 2018. **[A* rank]**
https://dl.acm.org/citation.cfm?id=3186356

(k) **Modeling Individuals Movement Patterns to infer Next Location from Sparse Trajectory Traces**
Shreya Ghosh, Soumya K. Ghosh. 24^{th} *IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, pp. 693-698, IEEE, Miyazaki, Japan, Oct 7-10, 2018. **[B rank]**
https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8616122

(l) **Hybrid Path Planner for Efficient Navigation in Urban Road Networks through Analysis of Trajectory Traces**
Sayan Sinha, Mehul Nirala, ***Shreya Ghosh***, Soumya K. Ghosh. 25^{th} *International Conference on Pattern Recognition (ICPR)*, pp. 3250-3255, IEEE, Beijing, China, Aug 20-24, 2018. **[B rank]**
https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8546101

(m) **Modeling of Human Movement Behavioural Knowledge from GPS Traces for Categorizing Mobile Users**
Shreya Ghosh, Soumya K. Ghosh. 26^{th} *International World Wide Web Conference (WWW)*, pp. 51-58, ACM, Perth, Australia, Apr 3-7, 2017. **[A* rank]**
https://dl.acm.org/citation.cfm?id=3054150

(n) **Exploring Human Movement Behaviour based on Mobility Association Rule Mining of Trajectory Traces**
Shreya Ghosh, Soumya K. Ghosh. 17^{th} *International Conference on Intelligent Systems Design and Applications (ISDA 2017)*, pp. 451-463, Springer, Delhi, India, Dec 14-16, 2017.
https://link.springer.com/chapter/10.1007/978-3-319-76348-4_44

(o) **A Machine Learning Approach to Find Optimal Routes analyzing GPS traces of Mobile City Traffic**
Shreya Ghosh, Soumya K. Ghosh and Abhisek Chowdhury. 5^{th} *International Conference on Advanced Computing Networking, and Informatics (ICACNI 2017)*, pp. 59-67, Springer, Goa, India, June 1-3, 2017.
https://link.springer.com/chapter/10.1007/978-981-10-8636-6$_7$

(p) **THUMP: Semantic Analysis on Trajectory Traces to Explore Human Movement Patterns**
Shreya Ghosh, Soumya K. Ghosh. 25^{th} *International World Wide Web Conference (WWW)*, pp. 35-36, ACM, Montreal, Canada, Apr 11-15th, 2016. (Poster Paper) **[A* rank]**
http://dl.acm.org/citation.cfm?id=2893188

(q) **Mobility driven Cloud-Fog-Edge Framework for Location-aware Services: A Comprehensive Review**
Shreya Ghosh, Soumya K. Ghosh. *Introduction to Mobile Edge Computing, Mobile Edge Computing (MEC)*, Springer, USA (in press). [Book Chapter]

Google Scholar Profile: https://scholar.google.co.in/citations?user=a5OKo7wAAAAJhl=en [*Citations: 134, H-index:7*]