Shreya Ghosh

Postdoctoral Researcher
Penn State University, USA

https://shreyaghosh-2016.github.io/

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Interests

GIS, Mobility, Location-based Services

Data Mining, NLP, Social Media Analysis

Cloud Computing, Edge AI

Professional Services

- Reviewer in *Scientific Report, IEEE TNSE, IEEE ACCESS, IET Networks, IEEE CLOUD, Middleware, ICWSM, Software: Practice and Experience, Journal of Cloud Computing, Applied Psychology: Health and Well-Being, ACM SIGCOMM Artifact, CCGrid*
- Evaluator of *National Hackathon on Self-Reliance based Intelligent India Hackathon organized by Computer Society of India, Kolkata Chapter 2021*

References

Dr. Prasenjit Mitra

Professor, Penn State, USA

pmitra@psu.edu

Dr. Soumya K. Ghosh

Professor, IIT Kharagpur.

skg@cse.iitkgp.ac.in

Dr. Rajkumar Buyya

Redmond Barry Distinguished Professor, The University of Melbourne, Australia.

rbuyya@unimelb.edu.au

Education

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

2015 - 2016 **Masters (By Research)** — **Indian Institute of Technology (IIT) Kharagpur**
Score: 9.15/10 [*Selected and Converted to Direct PhD program*]

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: 93% (Best of 5) *[Top 10 in West Bengal State]*

2008 - 2009 **Secondary (X)** — **West Bengal Board Of Secondary Education**
Score: 92.80% (Best of 5)

Research Experience

2021 (Dec) - Present **Postdoctoral Researcher** — **The Pennsylvania State University, USA**

- Understanding misinformation propagation in social network and proposing mitigation techniques
- Exploring generative language model for cross-domain applications such as trajectory trace analysis
- Geospatial analytics to explore wildlife movement traces for identifying wildlife corridors across regions and nighttime light data analysis

2020 (Dec) - 2021 (Dec) **Senior Research Associate** — **Indian Institute of Technology (IIT) Kharagpur**

- Analysis of mobility and other contexts and predicting COVID-19 hotspots and assisting in zone-based lockdown strategy
- Socio-economical impacts of COVID-19 at India

2016 - 2020 **Ph.D. Research Fellow** — **Indian Institute of Technology (IIT) Kharagpur**

- Analysis of large scale GPS traces to explore human movement behaviours and Transferring mobility knowledge from source to target region to annotate trajectory trips and POI-classification
- *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)*

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

- *Decision Support System* for transportation of hazardous materials
- 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 chemical graph mining algorithm which extends *Ugi's scheme* and capable to classify a wide variety of chemical reactions

Awards

- ACM Hypertext 2023 (Travel Grant), ECML PKDD 2023 D&I award (free registration)
- Best presentation award on "Cloud-Fog-Edge Computing Framework for Combating Covid-19 Pandemic" from Computer Society of India, 2021.
- TCS PhD Research Scholarship (July 2017 - Dec 2020).
- CoDS COMAD 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, SUMO

GIS (PostgreSQL, PostGIS, QGIS)

Programming (Python, R, C)

Membership:
ACM Student Member, IEEE Student Member, AnitaB.org Member

Teaching and Mentoring Experience

2022 - 2023 **Mentoring (3 UG, 2 PhD, 1 MS)** **Penn State, USA**
Assisting students towards their dissertations on *nighttime light data analytics, opinion mining from social media and Question answering system.*

2017 - 2019 **Mentoring (6 UG, 5 PG students, 4 summer interns)** **IIT Kharagpur**
Successfully mentored final and pre-final year projects on *Internet of Health Things*, *hybrid path planning* and *crowd flow analysis*.

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) *Cloud Computing* (above 30,000 enrolled candidates)
(II) *Google Cloud Computing Foundations*
(III) *Spatial Informatics*

Research Funding

(I) How far are we in developing sustainable ecosystem: AI-based Wildlife data analytics [$34,000 Penn State Seed Grant]. PI/ Co-PI: Johnson Kinyua, **Shreya Ghosh**, Prasenjit Mitra, and Titus Adhola. **Lead the proposal development and submission**
(II) Unraveling the Impact of Human Activities on Wildlife: An AI-Powered Multimodal Data Analysis [$50,000 BIG (Big Ideas Grant) Seed Funding 2023]. PI/Co-PI: Prasenjit Mitra, **Shreya Ghosh**, Bing Pan, Peter Newman. **Lead the proposal development and submission**

Conferences and Workshops

Paper Presentation
(I) *World Wide Web Conference (WWW)'16, '17 and '18*
(II) *25th International Conference on Pattern Recognition, (ICPR)'18*
(III) *International Conference on COMmunication Systems & NETworkS (COMSNETS)'19,'20*
(IV) *20th IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGrid)'20*
(V) *IEEE International Conference on Computer Communications (IEEE INFOCOM)'22*

Workshop and Tutorial Organization

1. **1st ACM SIGSPATIAL International Workshop on AI-driven Spatio-temporal Data Analysis for Wildlife Conservation (GeoWildLife 2023). SigSpatial'2023** (Workshop Co-Chair with Prasenjit Mitra, Bistra Dilkina, Thomas Müller). **Lead the proposal development and website preparation** [LINK]
2. **1st ACM SIGSPATIAL International Workshop on Geocomputational Analysis of Socio-Economic Data (GeoSocial 2023). SigSpatial'2023** (Workshop Co-chair with Soumya K Ghosh, Budhendra Bhaduri, Alexander Zipf) [LINK]
3. **Info-Wild: Knowledge Extraction and Management for Wildlife Conservation. CIKM 2023** (Workshop Co-Chair with Prasenjit Mitra, Bistra Dilkina, Thomas Müller). **Lead the proposal development and website preparation** [LINK]
4. **Misinformation and Disinformation in Social Media: Where we are and the Path Ahead** [16th International Conference on Web and Social Media (AAAI ICWSM 2022), 06-June-2022, Atlanta] [LINK] (Tutorial co-organized with Prasenjit Mitra) **Lead the tutorial material preparation and presentation**

Selected Publications

Full publication list: See here. ◇ Joint primary author, ‡ Corresponding author.
J*: Journal, C*: Conference, D*: Demo, P*: Poster.

(J1) **FEEL: FEderated LEarning Framework for ELderly Healthcare using Edge-IoMT**
Shreya Ghosh‡, and Soumya K. Ghosh. IEEE Transactions on Computational Social Systems. **[I.F.: 4.747]** (Accepted, Oct 2022) [PDF]

(J2) **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.: 5.03]** [PDF]

(J3) **LYRIC: Deadline and Budget Aware Spatio-Temporal Query Processing in Cloud**
Jaydeep Das◇, ***Shreya Ghosh***◇, Soumya K. Ghosh and Rajkumar Buyya. IEEE Transactions on Services Computing, 2021. doi: 10.1109/TSC.2021.3073006. **[I.F.: 11.019]** [Accepted, in Press] [PDF]

(J4) **MCG: Mobility-aware Computation Offloading in Edge using Weighted Majority Game**
Anwesha Mukherjee, ***Shreya Ghosh***‡, Debashis De, and Soumya K. Ghosh. IEEE Transactions on Network Science and Engineering, 2022. **[I.F.: 5.033]** [Accepted, in Press] [PDF]

(J5) **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.: 7.574]** [PDF]

Conference ranking: `http://portal.core.edu.au/conf-ranks/`

(C6) **Clock Against Chaos: Dynamic Assessment and Temporal Intervention for Reducing Misinformation Propagation**
Shreya Ghosh, Prasenjit Mitra and Preslav Nakov. The 18^{th} International AAAI Conference on Web and Social Media (ICWSM) 2024 (accepted, to appear)

(C7) **Catching Lies in the Act: A Framework for Misinformation Detection on Social Media**
Shreya Ghosh and Prasenjit Mitra. ACM Hypertext 2023 (accepted, to appear) **[A rank]**

(C8) **How Early can we Detect? Detecting Misinformation on Social Media Using User Profiling and Network Characteristics**
Shreya Ghosh and Prasenjit Mitra. ECML PKDD 2023 (accepted, to appear) **[A rank]**

(C9) **Analysis of Elephant Movement in Sub-Saharan Africa: Ecological, Climatic, and Conservation Perspectives**
Matthew Hines, Gregory Glatzer, ***Shreya Ghosh*** and Prasenjit Mitra. ACM SIGCAS/SIGCHI Conference on Computing and Sustainable Societies (COMPASS 2023) [Accepted, to appear]

(C10) **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]** [PDF]

(C11) **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]** [PDF]

(C12) **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]** [PDF]

(D13) **Lumos in the Night Sky: AI-enabled Visual Tool for Exploring Night-Time Light Patterns**
Jakob Hederich, ***Shreya Ghosh***, Zeyu He and Prasenjit Mitra. ECML PKDD 2023 (accepted, to appear) (Demo Track) **[A rank]** [PDF]

(D14) **Understanding the Night-Sky? Developing AI-Enabled System for Exploring Night-Light Usage**
Jakob Hederich, ***Shreya Ghosh***, Zeyu He and Prasenjit Mitra. The 32nd International Joint Conference on Artificial Intelligence (IJCAI 2023) (accepted, to appear) (Demo Track) **[A* rank]**

(P15) **Can You Answer This? Exploring Zero-Shot QA Generalization Capabilities in Large Language Models**
Saptarshi Sengupta, ***Shreya Ghosh***, Preslav Nakov and Prasenjit Mitra. Thirty-Seventh AAAI Conference on Artificial Intelligence (Accepted, to appear) (AAAI 2023 Poster track) **[A* rank]**

(P16) **MANTRA: Semantic Mobility Knowledge Analytics Framework for Trajectory Annotation**
Shreya Ghosh, and Soumya K. Ghosh. IEEE International Conference on Computer Communications (IEEE INFOCOM), 02-05 May, 2022 (Poster) **[A* rank]** [PDF]

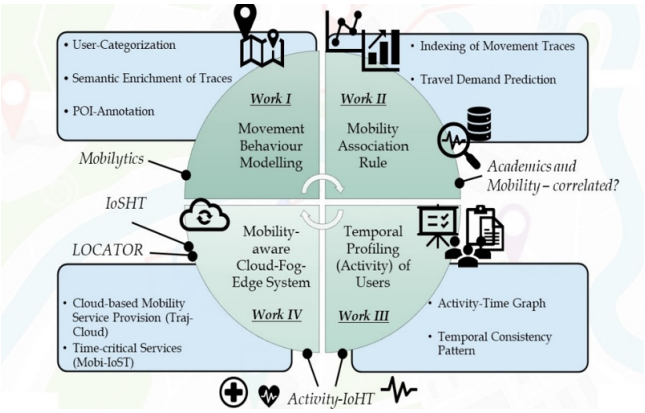
(P17) **THUMP: Semantic Analysis on Trajectory Traces to Explore Human Movement Patterns**
Shreya Ghosh, Soumya K. Ghosh. 25^{th} *International World Wide Web Conference (WWW)*, pp. 35-36, ACM, Montreal, Canada, Apr 11-15th, 2016. (Poster Paper) **[A* rank]** [PDF]

Google Scholar Profile: `https://scholar.google.co.in/citations?user=a5OKo7wAAAAJ&hl=en`

Brief Research Summary and Interests

Research Interests: Natural Language Processing, Social Computing Analysis, Spatio-temporal Data Mining, Mobility on Demand, Cloud-Edge computing paradigm.

- **PhD Research Summary:** My PhD research work is motivated by the fact that human moves with an intent, and mapping the intent of the move with raw GPS log provides usable knowledge to build an effective system. In this regard, the major objectives of this work are (i) extracting and modelling semantic knowledge of human movement behaviours, and (ii) finding the correlations among movement behaviour of people and other contexts by retrieving mobility association rules, (iii) deploying mobility-aware hierarchical and collaborative cloud-fog-edge-IoT architecture and provisioning mobility-as-a-service.



- **Understanding Public Perception and Identifying Misinformation Flow in Social Media** Social media plays a pivotal role in information acquiring, exchanging and expressing public opinions and perceptions in a unprecedented scale. Our aim is to develop a end-to-end social media data analytics framework to understand public opinion and public action effectively leveraging natural language processing and novel machine learning methods. Further, we attempt to identify misinformation propagation and echo-chamber effects in social network effectively.

- **Leveraging Generative Models for Semantic Trajectory Analysis** Leveraging the advancements in deep learning, as evident by progress in the field of natural language processing (NLP), computer vision, etc. we intend to cre- ate intelligent models that can study the semantic trajectories in various contexts, predicting future trends, increasing machine un- derstanding of movement of animals, humans, goods, clouds, etc. enhancing human-computer interactions, and contributing to an array of applications ranging from urban-planning to personalized recommendation engines and business strategy.

- **Wildlife Mobility Pattern Analysis**
Our goal is to analyse trajectory traces of wildlife and extracting traits and shape-based characteristics of mobility patterns of different animal species. Apart from spatio-temporal data (wildlife movement, landuse etc.) analysis, we aim to explore text-based survey and news data for understanding the perception of local community regarding human wildlife conflicts.

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