

Kanchan Chowdhury

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RESEARCH INTERESTS

Machine Learning, Big Geospatial Data Analytics, and Database Systems

EDUCATION

- **Arizona State University** Tempe, Arizona
MS (completed) and PhD (ongoing) in Computer Science *Aug. 2018 – May 2024 (Expected)*
Advisor: Prof. Mohamed Sarwat & Prof. Jia Zou, CGPA: 4.00
- **Chittagong University of Engineering and Technology** Chittagong, Bangladesh
Bachelor of Science in Computer Science and Engineering *Mar. 2010 – Nov. 2014*
Advisor: Prof. Mohammed Moshikul Hoque, CGPA: 3.76

EXPERIENCE

- **Arizona State University** Tempe, Arizona
Research Assistant *Aug. 2018 - Present*
 - **Research Projects:**
 - 1) Co-optimization of machine learning and join queries based on model decomposition and join push-down.
 - 2) Designing and implementing a deep-learning and data processing framework for raster imagery and vector datasets.
 - 3) A benchmark to empirically evaluate raster image labeling approaches while proposing an unsupervised approach.
 - 4) Re-partitioning training data of a spatial model to reduce training time and memory usage.
 - 5) Evaluating state-of-the-art approaches for the synthesis of SQL queries from natural language questions.
 - 6) Evaluating machine learning models in predicting the next SQL query in a user-query session.
- **Wherobots Inc.** Scottsdale, Arizona, USA
Research and Development Intern *Jan. 2023 - Aug. 2023*
 - **Responsibilities:** Designing and developing spatial machine learning and deep learning tools, scalable map-matching, and geospatial data analytical algorithms. Integrating the developed tools into Wherobots cloud platform.
- **Gagagugu PTE LTD** Dhaka, Bangladesh
Software Engineer *Jan. 2017 - Jun. 2018*
 - **Responsibilities:** Developing Android Apps with social networking features such as calling, messaging, and posting.
- **Le Chef Plc** Dhaka, Bangladesh
Android Application Developer *Jan. 2015 - Dec. 2016*
 - **Responsibilities:** Developing Android Apps featuring online order and reservation services for restaurants in the UK.

PUBLICATIONS

- **Kanchan Chowdhury**, Mohamed Sarwat; Deep Learning with Spatiotemporal Data: A Deep Dive into GeotorchAI. *Accepted in 40th International Conference on Data Engineering (ICDE)*, 2024
- Lixi Zhou, Qi Lin, **Kanchan Chowdhury**, Saif Masood, Alexandre Eichenberger, Hong Min, Alexander Sim, Jie Wang, Yida Wang, Kesheng Wu, Binhang Yuan, Jia Zou; Serving Deep Learning Models from Relational Databases. *Accepted in 27th International Conference on Extending Database Technology (EDBT)*, 2024
- **Kanchan Chowdhury**, Mohamed Sarwat; A Demonstration of GeoTorchAI: A Spatiotemporal Deep Learning Framework. *ACM SIGMOD International Conference on Management of Data*, 2023
- **Kanchan Chowdhury**, Vamsi Meduri, Mohamed Sarwat; A Machine Learning-Aware Data Re-partitioning Framework for Spatial Datasets. *38th International Conference on Data Engineering (ICDE)*, 2022

- **Kanchan Chowdhury**, Mohamed Sarwat; GeoTorch: A Spatiotemporal Deep Learning Framework. *30th International Conference on Advances in Geographic Information Systems (SIGSPATIAL '22)*, 2022
- Vamsi Meduri, **Kanchan Chowdhury**, Mohamed Sarwat; Evaluation of Machine Learning Algorithms in Predicting the Next SQL Query From the Future. *ACM Transactions on Database Systems (TODS)*, 2021
- Jia Yu, **Kanchan Chowdhury**, Mohamed Sarwat; Tabula in Action: A Sampling Middleware for Interactive Geospatial Visualization dashboards. *46th International Conference on Very Large Databases (VLDB)*, 2020.
- Vamsi Meduri, **Kanchan Chowdhury**, Mohamed Sarwat; Recurrent Neural Networks for Dynamic User Intent Prediction in Human-Database Interaction. *22nd International Conference on EDBT*, 2019
- **Kanchan Chowdhury**, Lamia Alam, Shyla Sarmin, Safayet Arefin, Mohammed Moshiul Hoque; A Fuzzy Features Based Online Handwritten Bangla Word Recognition Framework. *18th ICCIT*, 2015

TECHNICAL SKILLS

- **Programming:** Python, Java, C, Scala, SQL, and HTML
- **Databases:** PostgreSQL, SparkSQL, and MySQL
- **Machine Learning:** PyTorch, Scikit-learn, Keras, TensorFlow, ML & DL Models, and ML Statistics
- **Data Analytics:** Apache Spark, Apache Sedona, PySpark, GeoPandas, Pandas, Matplotlib, and Plotly
- **OS:** Unix/Linux and Windows
- **Others:** AWS, Databricks, Feature Selection & Engineering, Distributed Computing, Git, and Rest API

PROJECTS

- **GeoTorchAI:** A spatiotemporal deep learning and data preprocessing framework on top of PyTorch and Apache Sedona, with **400+ GitHub Stars**. It enables spatiotemporal machine learning practitioners to easily and efficiently implement spatiotemporal deep learning models, besides supporting scalable data preprocessing.
- **Raster Image Labeling:** A benchmark for experimentally evaluating various satellite image labeling approaches. It also proposes an unsupervised approach to handle scenarios that lack labeled data.
- **NLIDB-Bench:** A benchmark for evaluating state-of-the-art approaches of SQL query generation from natural language queries. It proposes a set of evaluation metrics and conducts experiments with four datasets.
- **Named Entity Recognition:** This work tunes various steps of state-of-the-art methods for named entity recognition and performs evaluation with two popular datasets: CoNLL-2003 and OntoNotes-5.0.
- **Hotspot Analysis on Apache Sedona:** It performs spatial queries and range joins between two spatial datasets and calculates the Getis-Ord statistic of the NYC Taxi Trip dataset to perform hot-cell analysis.
- **Data Visualization in Python:** It performs statistical data analysis using useful visualization patterns with three Python libraries: Matplotlib, Seaborn, and Plotly Express.
- **Sentiment Analysis with BERT:** A PyTorch project to classify emotions using the Twitter smile dataset. It contains ML Engineering steps, such as data preprocessing, tokenization, encoding, training, and evaluation.

TEACHING

- **Instructor** Fall 2022
Spatial Data Science and Engineering (CSE 594) *Arizona State University*
 - **Responsibilities:**
 - 1) Preparing lecture slides and conducting lectures.
 - 2) Preparing assignments, projects, exam questions, and grading rubrics.
 - 3) Office hours to help students understand lectures and projects.

- **Teaching Assistant** Fall 2021, Spring 2021, Fall 2020, and Spring 2020
Distributed Database Systems (CSE 512) Arizona State University
- **Teaching Assistant** Fall 2019
Data Processing at Scale (CSE 511) Arizona State University
- **Teaching Assistant** Spring 2019
Object-Oriented Programming & Data Structure (CSE 205) Arizona State University
- **Teaching Assistant** Spring 2019
Principles of Programming with C++ (CSE 100) Arizona State University
- **Teaching Assistant** Fall 2018
Principles of Programming with Java & Python (CSE 100) Arizona State University

PARTICIPATION AND AWARDS

- Recipient of ACM SIGMOD 2023 student travel award to attend the conference and present a paper.
- Recipient of ACM SIGSPATIAL 2022 travel award to attend the conference and present a paper.
- Recipient of Arizona State University Graduate and Professional Student Association (GPSA) travel grant to attend ACM SIGSPATIAL 2022 and present a paper.
- Recipient of CIDSE Doctoral Fellowship at Arizona State University for the academic year 2018-2019.
- 2nd Runner-up at National Hackathon organized by ICT Division of Bangladesh in 2014. The challenge of the hackathon was to design a project-based solution to solve a national problem of the country.
- 2nd Runner-up at National Mobile Application Code Hub organized by BUET, Bangladesh in 2014.
- 6th at Inter-University Programming Contest organized by CUET, Bangladesh in 2012.
- Recipient of Honors award from my undergraduate university for maintaining academic excellence.

ADDITIONAL SERVICES

- **Paper Reviewer:** Served as a reviewer for the journal IEEE TKDE and the conference ICCAD 2023.
- **External Reviewer:** Reviewed papers as an external reviewer for the following conferences and journals - SIGMOD 2020 & 2022, VLDB 2019-2022, ICDE 2020, SIGSPATIAL 2021, VLDB Journal, and TSAS Journal
- **Grant Reviewer:** Served as a travel grant reviewer for the Graduate and Professional Student Association (GPSA) at Arizona State University from May 2022 to August 2023.
- **Conference Volunteer:** Volunteered to organize two conferences - SIGSPATIAL 2022 and SIGMOD 2023.
- **Open Source Contribution:** Contributed to Apache Sedona, an open-source geospatial cluster computing framework with 1.6k+ GitHub Stars, by adding support for two new spatial data types.

MENTOR & TRAINER

- Mentored a Ph.D. student and an MS student in the Data Systems Lab at Arizona State University.
- Trained more than 75 undergraduate students in Bangladesh on Android Application Development from Feb. 2015 to May 2015 under the ICT Division of Bangladesh.

IMPORTANT COURSEWORKS

- **AI:** Statistical Machine Learning, Fundamentals of Statistical Learning, Data mining, Data Intensive Systems for Machine Learning, Deep Neural Networks with PyTorch, & Artificial Intelligence
- **DBMS:** Distributed Database Systems, Big Data Analysis with Scala and Spark, & Database Management Systems
- **Core:** Discrete Mathematics, Software Engineering, Operating Systems, Data Structure, & Algorithms