

# Kanchan Chowdhury

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## RESEARCH INTERESTS

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Machine Learning, Big Geospatial Data Analytics, and Database Systems

## EDUCATION

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- **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

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- **Arizona State University** Tempe, Arizona  
*Research Assistant* *Aug. 2018 - Present*
  - **Current Research Project:**  
When features in a machine learning inference application come from multiple datasets, joining the datasets to create feature vectors becomes a bottleneck before performing the actual inference. In my current research project, I am working on decomposing models into multiple parts and pushing the join operation down the decomposed models in a way that reduces the runtime and memory consumption of the overall flow.
  - **Past Research Projects:**
    - 1) Designing and implementing a deep learning and data processing framework for raster imagery and vector datasets.
    - 2) Re-partitioning training data of a spatial model to reduce training time and memory usage.
    - 3) Evaluating state-of-the-art approaches for the synthesis of SQL queries from natural language questions.
    - 4) Contributing to a geospatial entity matching framework and a satellite image labeling framework.
- **Wherobots Inc.** Scottsdale, Arizona, USA  
*Research and Development Intern* *Jan. 2023 - Aug. 2023*
  - **Responsibilities:** 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 UK.

## PUBLICATIONS

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- **Kanchan Chowdhury**, Mohamed Sarwat; Deep Learning with Spatiotemporal Data: A Deep Dive into GeotorchAI. *40th International Conference on Data Engineering (ICDE)*, 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

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## 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

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## 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.
- **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:** This work performs spatial queries and range joins between two spatial datasets and calculates Getis-Ord statistic of NYC Taxi Trip dataset to perform hot-cell analysis.
- **Climate Change Forecasting:** A data science project to perform data cleaning, feature engineering, and data preprocessing operations on raw temperature data and predict temperature trend with LSTM model.
- **Fake News Detection:** A data science project to perform data cleaning, feature engineering, and data preprocessing operations on news datasets and classifying fake and real news with Bidirectional LSTM model.
- **Data Visualization in Python:** It performs statistical data analysis using useful visualization patterns with three Python libraries: Matplotlib, Seaborn, and Plotly Express.

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## TEACHING

- **Spatial Data Science and Engineering (CSE 594)**

*Instructor*

Fall 2022

*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.

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

#### PARTICIPATION AND AWARDS

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- 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

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- **Paper Reviewer:** Served as a reviewer for the conference IEEE/ACM ICCAD 2023 and reviewed three papers.
- **Secondary Paper Reviewer:** Reviewing papers as a secondary reviewer of my Ph.D. supervisor for the conferences ACM SIGMOD, ACM VLDB, ACM SIGSPATIAL, and IEEE ICDE since 2018.
- **Grant Reviewer:** Served as a travel grant reviewer for the Graduate and Professional Student Association at Arizona State University from May 2022 to August 2023.
- **Conference Volunteer:** Volunteered to organize two conferences - ACM SIGSPATIAL 2022 and ACM SIGMOD 2023.
- **Open Source Contribution:** Contributed to Apache Sedona, an open-source geospatial cluster computing framework, by adding support for two new spatial data types. I am also serving as a PPMC member of Apache Sedona.

#### IMPORTANT COURSEWORKS

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- **AI:** Statistical Machine Learning, Fundamentals of Statistical Learning, Data mining, 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