

Protik Bose Pranto

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SUMMARY

Geospatial Machine Learning researcher focusing on computer vision and NLP with geospatial applications. Experienced in PyTorch and scikit-learn for segmentation, transformer-based text classification, and end-to-end ML pipelines. My research uses LiDAR, aerial and street-level imagery, and AI-driven geospatial analysis to map pedestrian infrastructure, inventory urban trees, and assess shade and heat exposure for more sustainable, people-centered urban planning.

RESEARCH AREA

Geospatial Machine Learning, Computer Vision, Remote Sensing, Spatial Statistics, Urban Informatics

EDUCATION

Arizona State University Expected December 2027
Ph.D. in Computer Science

Arizona State University December 2025
M.S. in Computer Science

Relevant Coursework: Data Mining, Statistical Machine Learning, ML for Remote Sensing

Bangladesh University of Engineering and Technology February 2021
Bachelor's in Computer Science and Engineering

TECHNICAL SKILLS

- **Programming Languages:** Python, R, SQL, C++, Java, Dart, Typescript, F#, Flutter.
- **ML & Data Science:** Keras, PyTorch, Scikit-learn, Statistics, Time-series analysis, NLP, Feature extraction, SHAP, Image segmentation, Regression/Classification, Reproducibility (Weights & Biases), Data visualization.
- **Geospatial & Computer Vision:** OpenCV, CUDA, Geemap, GDAL, Rasterio, GeoPandas, Shapely, PyProj, White-Box Geospatial, Spatial analysis, LiDAR analysis.
- **Tools & Platforms:** Docker, QGIS, Git, Docker, Jupyter, LAStools, Cyberduck.

INDUSTRY EXPERIENCE

Consultant Mar 2022 – Jul 2022
Start Network

Contributed to the Forecast-based Warning, Analysis, and Response Network (**FOREWARN**) project by developing data science workflows, applying advanced analytics, and providing technical expertise to support a peer-reviewed publication.

Software Engineer Mar 2021 – Feb 2022
Chaldal Engineering

An online grocery and food delivery platform. Enhanced customer-facing platforms (website, mobile app, APIs, search catalog) and optimized order management systems. Contributed to the development of the **EggShell** frontend framework, integrating F#, React, Fable, and ReactXP, enabling unified and faster development for both web and Android platforms.

CURRENT ROLE

Graduate Research and Teaching Associate Aug 2022 - Present
Arizona State University Tempe, Arizona

- Graduate Student Associate at the SHaDE Lab, supervised by Dr. Ariane Middel
- Currently involved in projects on urban infrastructure, planning, and mapping, focusing on data validation, feature analysis, and framework development.
- Served as a TA for Software Engineering (CSE360), Capstone Project (CSE485, CSE486), and Computer Graphics (CSE470), assisting with course design, supervising graders, and supporting students with assignments and projects.

SELECTED RESEARCH EXPERIENCE

- **Cultural Accessibility Analysis:** Integrated open city data, socio-economic datasets, and cultural infrastructure information to map cultural hubs and deserts across New York City. Developed a novel "Socio-Cultural Accessibility Score" using statistical analysis, machine learning (R^2 of 0.91), a weight-decaying algorithm, and an interpretable model (SHAP) to identify and explain underserved and overserved regions from cultural, economic, and health perspectives.

- **Paper:** Protik Bose Pranto, Minhazul Islam, and Ripon Saha. "From Hubs to Deserts: Mapping and Explaining Urban Cultural Accessibility". Accepted at **Urban AI (ACM SIGSPATIAL), 2025**.
- **Award:** Secured runners-up at **SpaceHACK for Sustainability Hackathon'25**
- **Pedestrian Network Mapping:** Developed a scalable framework to generate detailed pedestrian networks (sidewalks, crosswalks, public access paths), integrating sidewalk width and road type, using vision-based segmentation models, street-level imagery, and open geospatial data. Applied it to Phoenix, Arizona, achieving 78.2% classification accuracy.
 - **Presentation:** Protik Bose Pranto, Isaac Buo, and Ariane Middel. "WalkNet: A Vision-Based Framework for Mapping Urban Pedestrian Infrastructure". Accepted at **American Geophysical Union (AGU), 2025**.
 - **Paper:** Protik Bose Pranto, Isaac Buo, and Ariane Middel. "WayNet: A Semi-Automated Framework for Mapping Urban Pedestrian Infrastructure Using Street-Level Imagery". In Review at **Journal of Transport Geography**.
- **Literature Review on Urban Climate Informatics:** A comprehensive systematic literature review examining the intersection of urban climate and computer science, with a focus on how computational methods and data-driven approaches are used to address urban climate challenges. Also, we identified and analyzed existing gaps in the field.
 - **Poster:** Protik Bose Pranto, Waqar Hassan Khan, and Ariane Middel. "A Systematic Literature Review on Urban Climate Informatics". Accepted at **Urban Climate Research Center Poster Event (UCRC), 2025**.
 - **Award:** Won 3rd place in the graduate category at the **UCRC Poster Event (UCRC), 2025**
- **LiDAR-Based Urban Tree Mapping:** Developed an automated pipeline using LiDAR and ML to create a detailed, georeferenced tree inventory. The process involved classifying LiDAR data with NDVI, building, and land cover data, followed by individual tree segmentation using GDAL polygonization, statistical, and clustering methods (86% accuracy). Morphological metrics were calculated for each tree, and using U-Net, trees were classified into mesic and xeric types.
 - **Award:** Won the CAP-LTER (Central Arizona–Phoenix Long-Term Ecological Research) Graduate Grant, an NSF-funded award, to support my work on this project.
- **Fake News and Misinformation Detection:** Developed and evaluated ML models, including traditional algorithms and transformer-based models (e.g., BERT, XLM-RoBERTa), for fake and misleading news detection across various domains. Applied data preprocessing techniques to optimize model performance, with SVM achieving the best results on small datasets (86% accuracy). Used novel text augmentation strategies to enhance model accuracy, achieving 97% accuracy with XLM-RoBERTa. Additionally, applied BERT for misinformation detection in a regional language (Bengali), obtaining a 97% F1-score.
 - **Paper:** Protik Bose Pranto. "Satire or Fake News? Machine Learning-Based Approaches to Resolve the Dilemma". Accepted at **International Conference on Electrical, Computer, Communications and Mechatronics Engineering (ICECCME), 2024**.
 - **Paper:** Protik Bose Pranto, Waqar Hassan Khan, Sahar Abdelnabi, Rebecca Weil, Mario Fritz and Rakibul Hasan. "From Bad to Worse: Using Private Data to Propagate Disinformation on Online Platforms with a Greater Efficiency". Accepted at **Design x Policy (CHI Workshop), 2023**.
 - **Poster:** Protik Bose Pranto, Waqar Hassan Khan, Sahar Abdelnabi, Rebecca Weil, Mario Fritz, and Rakibul Hasan. "Understanding the Effect of Private Data in Disinformation Propagation". Accepted at **Symposium on Usable Privacy and Security (SOUPS), 2023**.
 - **Award:** Received a \$700 grant to attend the **USENIX'23 conference** and present my work, and was also accepted into the **post-CHI Summer School** for this project.

Contributed as **Peer Reviewer** (ML4RS'26, ICECCME'25, ICECET'25, ACDSA'25), **Session Chair** (ICECCME'24).

SELECTED ACADEMIC PROJECTS

Vasha-Sikkha

Tech Stack: Dart, Flutter, Firebase

Developed a mobile application for interactive English learning with speaking, reading, listening, and writing modules. Implemented score tracking, progress monitoring, and a real-time leaderboard using a Firebase backend.

CovidLife

Tech Stack: Dart, Flutter, REST APIs

Built a health monitoring application displaying COVID-19 data for Bangladesh. Integrated two REST APIs for district-level and daily statistics, and added appointment scheduling, in-app calling, and messaging features.

Gesture Sensed Snake Game

Tech Stack: C, C++, Embedded Systems, Atmega32, Accelerometer

Designed an embedded motion-controlled game using an Atmega32 microcontroller and accelerometer. Controlled 8x8 RGB matrices through decoder circuits for real-time rendering.