Afshin Shafei

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Born: March 27, 1991—Tabriz, Iran Nationality: Iranian

Degree Objective

Final Year PhD Candidate in Designing a High-Resolution Early Warning System Using Deep-Learning Methods.

Fields of Interest

Weather Forecasting, AI, Water Resources and Management; Environmental Sciences/Engineering; Flood Risk Management; Climate Change; Remote Sensing; Machine Learning

Education

 BACHELOR OF SCIENCE IN CIVIL ENGINEERING, Istanbul Technical University, Istanbul, Turkey
 MASTER OF SCIENCE IN ENVIRONMENTAL ENGINEERING, University of Bologna, Bologna, Italy

> Thesis title: Geomorphological characterization of fluvial flood hazard across the island of Oahu, Hawaii; Supervisor: Professor Attilio Castellarin

present **PH.D. IN ENVIRONMENTAL AND HYDRAULIC ENGINEERING**, Sapienza University of Rome, Rome, Italy

> Research Title: Designing an Early-Warning System to Forecast Extreme Climate Conditions Using Data-Driven Approaches with Machine-Learning and Deep-Learning Methods; Supervisor: Professor Francesco Cioffi

M.Sc. Thesis Research

During my Master's degree research, geomorphological characterization of fluvial flood hazards was carried out using machine-learning modeling as part of the SaferPLACES project, which integrates climate, hydrological, hydraulic, topographic, and economic models to identify flood hazards and risks across pluvial, fluvial, and coastal environments. Flood hazard mapping was produced across large geographical areas by applying digital elevation models (DEMs). Improvements were investigated by coupling two separate algorithms, Safer_RIVER and Safer_RAIN, to analyze both fluvial and pluvial floods within the study area. The accuracy of the outputs was assessed across various models and scenarios to ensure robust flood hazard assessments.

Ph.D. Research

An advanced early warning system was developed during my PhD research, integrating the E-TEPS model, which utilizes a Super-Resolution Generative Adversarial Network to enhance climate downscaling for temperature and precipitation with elevation data, and the FourCastNet global forecasting model. The accuracy and spatial resolution of high-resolution climate predictions were significantly improved, allowing for rapid and precise forecasts of extreme weather events in Italy. This system supports more effective climate-related decision-making and disaster preparedness by providing timely and detailed insights into critical climate variables.

Conference Presentations

• EGU2024, Vienna, Austria

Title of the Presentation: Designing an Early-Warning System to Forecast Extreme Climate Conditions Using Data-Driven Approaches with Machine-Learning and Deep-Learning Methods

• PhD Days 2023, Matera, Italy

Title of the Presentation: Introducing an Enhanced Early-Warning System Focused on Downscaling Models Using Deep Learning Methods

Publications

- Shafei, A.; Cioffi, F. High-Resolution Early Warning Systems Using DL: Part I Elevation-Integrated Temperature and Precipitation SRGAN Downscaling (E-TEPS). *Preprints* 2024, 2024081420. https://doi.org/10.20944/preprints202408.1420.VI
- Shafei, A.; Cioffi, F. High-Resolution Early Warning Systems Using DL: Part II Combining FourCastNet and E-TEPS for High-Resolution Climate Forecasting. *Preprints* 2024, 2024081322. https://doi.org/10.20944/preprints202408.1322.v1

Computer Skills

- Software: LATEX, MATLAB, QGIS, AQUASIM, AUTOCAD, WordPress, SWMM, EPANET, Adobe Perimeter Pro
- Microsoft Office and professional applications (Excel, Word, PowerPoint)
- Programming Language: Python, R

Language Skills

English (Fluent): IELTS 7.5: Listening 9, Reading 7.5, Writing 6, Speaking 6.5, Azerbaijani (Mother Tongue), Farsi (Fluent), Turkish (Fluent), Arabic (Basic)

Extracurricular Activities

Web design, Logo design, Video editing, Music mixing

References

Francesco Cioffi
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Relationship: Ph.D. Supervisor

Attilio Castellarin
 Professor of Hydraulic Infrastructures, Hydrological Modeling, and Flood and Drought
 Risk Management
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