Faruk Gürbüz

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About

I have a diverse background spanning data science, geospatial technologies, data visualization, and environmental modeling. My experience includes developing analytical workflows in Python, working with satellite and spatial datasets, contributing to decision-making processes, and both building tools and producing information to support data-driven strategies.
In addition to technical roles, I've been actively involved in planning, coordination, and reporting processes, contributing to project execution and communication. I enjoy supporting efforts that bridge domain expertise with practical outcomes.

Education

- **The University of Iowa** — *January 2019 - December 2020*
  Master of Science - Civil and Environmental Engineering (Water Resources) — Iowa City IA, USA
  - GPA: 3.61/4.00
  - Thesis Title: *Exploration of Flood Forecasting and Flood Mitigation*
- **Rice University** — *April 2018 - September 2018*
  ESL English as a Second Language — Houston TX, USA
- **İstanbul Technical University** — *September 2011 - February 2016*
  Bachelor of Science - Civil Engineering — İstanbul, Türkiye
  - GPA: 3.19/4.00
  - Completed degree with Honors in 3.5 years (early graduation)

Experience

- **Turkish Water Institute (SUEN) [🌐]** — *January 2024 - present*
  Engineer — İstanbul, Türkiye
  - Processed high-volume datasets using open-source tools and custom workflows
  - Gained hands-on experience with remote sensing applications for hydrological and agricultural analysis
  - Demonstrated proficiency in analysis-ready datasets such as FAO's WaPOR for evapotranspiration assessments
  - Applied analytical thinking to design scalable geospatial data workflows
  - Collected, produced and maintained environmental GIS vector datasets
  - Created scientific and print-quality maps and visualizations for communicating geospatial analysis results
  - Participated in the editorial review of two publications: one on green infrastructure and another on remote sensing
  - Prototyped UX/UI for institutional academy platform using Figma
- **Turkish State Hydraulic Works (DSI) [🌐]** — *February 2021 - December 2023*
  Engineer — Ankara, Türkiye
  - Coordinated nationwide studies for establishing an observation-based flood early warning system and led routine reporting activities
  - Utilized GIS tools for spatial analysis and reporting routines in support of national streamflow monitoring
  - Developed custom tools for data parsing, watershed delineation, and geomorphological analysis
  - Participated in the organization of workshops and seminars on flood management; delivered technical presentations on hydrological modeling, flood early warning and GIS applications
- **University of Iowa, IIHR-Hydroscience&Engineering [🌐]** — *January 2019 - February 2021*
  Research Assistant — Iowa City IA, USA
  - Conducted hydrological modeling for flood prediction using physically based and data-driven approaches
  - Developed and validated AI-driven models for flood forecasting
  - Performed large-scale geospatial processing and model evaluation on HPC clusters
  - Utilized GIS and remote sensing to extract analyze, and visualize environmental big data
  - Designed and implemented reproducible workflows for statistical analysis of hydrological and climatic variables
- **Erzurum Technical University [🌐]** — *March 2017 - March 2018*
  Researcher — Erzurum, Türkiye
  - Conducted research on rainfall and flood frequency analysis using historical observation data
  - Developed pipelines for statistical analysis of hydro-meteorological time series
  - Participated in a project "Multivariate Flood Frequency Analysis using Copulas; a case study for The Euphrates Basin" funded by Scientific and Technological Research Council of Türkiye (TÜBİTAK) - Grant Number: 115Y673

SKILLS

*** EXPERT, ** PROFICIENT, * NOVICE

- **Programming Languages:** Python ***, JavaScript **
- **Web Technologies:** CSS3 ***, Bootstrap **, Tailwind CSS **
- **Markup & Typesetting:** LaTeX **, Markdown ***, HTML5 ***
- **Operating Systems:** Windows **, Linux **
- **Database Systems:** PostgreSQL *
- **Data Science & Machine Learning:** TensorFlow **, scikit-learn **, pandas ***, NumPy ***, Matplotlib***
- **High-Performance Computing:** UIowa Argon HPC **, Parallel Computing **, Job Scheduling **, Bash Scripting *
- **DevOps & Version Control:** Git **, Docker *, GitHub **
- **Geographic Information Systems (GIS):** Desktop GIS: QGIS ***, ArcGIS ** | Web GIS: Leaflet ** | Geospatial Libraries: GDAL **, PyProj **, Rasterio ***, PyQGIS ***, geopandas ***
- **Remote Sensing:** Google Earth Engine **
- **Design & Prototyping:** Figma ***, Adobe Illustrator **, Adobe Premiere Pro *
- **Other Tools & Technologies:** VS Code ***, Jupyter Notebook ***, Mendeley ***
- **Research Skills:** Literature Review, Data Analysis, Experimental Design, Statistical Modeling, Scientific Writing, Presentation

PROJECTS

- **Interactive Web App for Server-Side Watershed Delineation & Flow Path Tracking** *2025*
  Tools: Leaflet, JavaScript, HTML, CSS
  - Developed a client-side GIS web application enabling real-time watershed delineation and downstream flow path analysis from user-defined points
  - Implemented custom algorithm to polygonize raster-derived watershed extents into vector format
- **WATT - Python Library for Batch Watershed Delineation** *2024*
  Tools: Python, GDAL, Geopandas, NumPy
  - A tool for batch processing of pour points, allowing for the on-demand extraction of drainage areas for multiple locations.
  - Implemented GDAL and NumPy for batch watershed delineation from GeoTIFF-based Digital Elevation Models(DEMs) and vectorized pour points
  - Developed a modular, command-line-driven Python pipeline for automated data processing
- **doc2xlsx - Report Parser and docx to xlsx Automation Tool** *2023*
  Tools: Python, openpyxl, pandas, regular expressions, file I/O automation
  - Developed a Python-based converter to extract structured tabular data from Word (.doc-.docx) reports and export to Excel format (.xlsx)
  - Utilized python-docx and openpyxl libraries to automate the transformation of semi-structured hydrological documents into analyzable spreadsheet format
- **GRU-based-Seq2seq-Attention-Model** *2023*
  Tools: Python, Keras, Tensorflow
  - Developed a neural-network-based predictive model for flood prediction
- **reservoir_creator - A QGIS Plugin for Reservoir Inundation Mapping** *2021*
  Tools: Python, Qt Designer, PyQGIS
  - Developed a Python tool for on-the-fly calculation of inundated areas caused by real or hypothetical dams
- **pyHLM – Hillslope-Link Hydrological Model** *2020*
  Tools: Python, NumPy, SciPy, RK45, Genetic Algorithm, OOP, Hydrological Modeling
  - Developed a modular Python package for a physics-based, distributed hillslope-link hydrological model (HLM) using object-oriented design
  - Integrated SciPy's RK45 solver to numerically solve ordinary differential equations governing water storage and flow dynamics
  - Implemented a Genetic Algorithm module to optimize spatially distributed small reservoir operations under hydrological constraints
  - Included example workflows demonstrating hydrological simulations and GA-based optimization for water resource planning

PUBLICATIONS

C=CONFERENCE, J=JOURNAL, S=IN SUBMISSION, T=THESIS

[S.2] Mantilla R., Barco J., Lewkebandara K., Mehboob M. S., Perez G., **Gurbuz F.**, Xiao S. (2025). **What Can We Learn from High-Resolution Hydrologic Simulations About: Interpolation vs. Extrapolation in Flood Forecasting in Non-Stationary Scenarios using Conceptual and Machine Learning Models**. Manuscript submitted for publication in *Hydrology and Earth System Sciences (HESS)*.

[S.1] Tofighi S., **Gurbuz F.**, Mantilla R., Xiao S. (2025). **Advancing Machine Learning-Based Streamflow Prediction Through Event Greedy Sampling, Asymmetric Loss Function, and Rainfall Forecasting Uncertainty**. Manuscript submitted for publication in *Environmental Modelling and Software*.

[C.2] Mantilla R., Barco J., **Gurbuz F.**, Xiao S., Muñoz D., Lewkebandara K., Sharma V. (2024). **Interpolation vs. Extrapolation in Flood Forecasting: Exploring the Predictive Capability of Conceptual and Machine Learning Tools in Non-Stationary Scenarios**. *EGU24*.

[J.4] **Gurbuz F.**, Mudireddy A., Mantilla R., Xiao S.(2024). **Using a physics-based hydrological model and storm transposition to investigate machine-learning algorithms for streamflow prediction**. *Journal of Hydrology*.

[C.1] Xiao S., Mantilla R., **Gurbuz F.**, Mudireddy A. (2021).**The role of AI algorithms in flood prediction and mitigation**. *AGU Fall Meeting*.

[T] **Gurbuz F.**, (2020).**Exploration of Flood Forecasting and Flood Mitigation**. *The University of Iowa*.

[J.3] Tosunoglu F., **Gurbuz F.**, İspirli M. N. (2020).**Multivariate modeling of flood characteristics using Vine copulas**. *Environmental Earth Sciences*, 79(19).

[J.2] Tosunoglu F., **Gurbuz F.** (2019).**Mapping spatial variability of annual rainfall under different return periods in Turkey: The application of various distribution functions and model selection techniques**. *Meteorological Applications*.

[J.1] Tosunoglu F., Ispirli M.N., **Gurbuz F.**, Sengül S. (2017).**Estimation of Missing Streamflow Records in the Euphrates Basin using Flow Duration Curves and Regression Models**. *Igdır Univ. J. Inst. Sci.& Tech.*

HONORS AND AWARDS

- **YLSY Graduate Scholarship** *August 2017*
  Turkish Ministry of Education & Turkish State Hydraulic Works (DSİ)
  - Fully funded scholarship for graduate studies abroad (2018–2021)
  - Awarded through a nationally competitive selection process
  - Granted based on the research topic: *Flood Forecasting and Early Warning*
- **Graduate Research Fellowship** *March 2017*
  Scientific and Technological Research Council of Türkiye (TÜBİTAK)
  - Research topic: "Multivariate Flood Frequency Analysis using Copulas; a case study for The Euphrates Basin"
  - Grant Number: 115Y673

ADDITIONAL EXPERIENCE

- **2nd Executive Seminar on Water Diplomacy** *15 April 2024 – 24 April 2024*
  Seminar Attendee
  - Organized by the Diplomatic Academy of the German Federal Foreign Office
  - Selected through a competitive interview process by the host organization
  - Participated in an intensive seminar on transboundary river basin hydrology, flood and drought risk management, hydro-meteorological modelling, and negotiation strategies in data-scarce or conflict-affected regions
  - Included official visits to key institutions such as German governmental agencies, the UN Bonn Campus, and the International Criminal Court in The Hague, among others
- **Hydrological Advisor of Türkiye at the World Meteorological Organization (WMO)** *September 2022 - September 2023*
  Advisor
  - Designated national representative for hydrology within the WMO framework
- **Post-Disaster Field Survey – 2021 Bozkurt Flood** *August 2021 - September 2021*
  Field Engineer
  - Contributed to field assessment activities following the historic Bozkurt flood in Türkiye
  - Surveyed damaged hydraulic structures, floodplain changes, and sediment transport mechanisms
  - Collected geospatial data and supported documentation for technical evaluation and future mitigation planning

ADDITIONAL INFORMATION

Languages: English (Fluent), Turkish (Native)