Special Track

GEOSA: Geospatial and Earth Observation Systems Applications

Chair

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Rouhollah Nasirzadehdizaji

Education

- Ph.D., in Civil Engineering, Hydraulic Program, Istanbul University, Turkey (2022).
- Ph.D., in Geomatic Engineering, Remote Sensing and GIS Program, Yildiz Technical University, Turkey (2020).
- M.Sc., degree in Geographical Information Technology, Istanbul Technical University, Turkey (2015).
- B.Sc., degree in Civil Engineering, I.A University Shabestar, Tabriz, Iran (2006).

Research Interest

- He has conducted research in several areas, including Interferometric SAR (InSAR) coherence and backscattering analysis, polarimetric SAR (PolSAR) analysis for crop variables investigation, and the integration of Optical and SAR data for crop mapping improvement. He has experience in flood mapping and permanent water bodies change detection using Radar data, as well as the application of remote sensing techniques in land monitoring.
- He has also conducted research on the application of hydrological models to assess the impacts of land use changes such as forest fires on runoff and sediment loads.

Current Profession

- He works as a specialist engineer in Water & Environment Department at Yüksel Proje Inc., Turkey, where he is working as a senior engineer on water-related projects, including conducting hydrological analysis and hydraulic modeling, as well as managing and developing GIS and remote sensing R&D projects related to water and environmental studies.

GEOSA: Geospatial and Earth Observation Systems Applications

- Geographical Information Systems (GIS) and remotely sensed (RS) images played a crucial role in addressing environmental challenges by providing important data for mitigation systems, sustainable management practices, and decision support systems.

- The Special Track was aimed to explore the implementation and improved applications of Geo-spatial, Earth Observation (EO), and remote sensing technologies in assessing and monitoring geo-environmental threats like landslides, volcanic eruptions, and groundwater pollution.

- The Special Track also proposed to provide the opportunity to apply the research regarding the integration of advanced Machine Learning (ML), artificial intelligence (AI), and image analysis algorithms in the environmental field provided an in-depth understanding of geo-environmental hazards.

- The Special Track invited researchers from academia and industry to contribute their research findings for solving existing challenges and identifying opportunities in the remote sensing and GIS domain.

GEOSA

Topics include, but not limited to:

- Classical image processing and computer vision problems,
- Satellite image time-series analysis and multimodal data fusion,
- Geospatial data acquisition and processing,
- GIS and web-based GIS applications,
- Dynamical geo-spatial mapping,
- Precise environmental monitoring,
- Integrated urban resource management,
- Hydraulic and hydrological modelling,
- Big data in geo-spatial information science,
- AI-enabled geo-spatial and earth observation present and future applications,
- Flood vulnerability assessment and remote sensing in climate change studies,
- Spatio-temporal database management,
- Sustainable management practices,
- Challenges and trends of geo-spatial information science.

GEOSA Content

- Application of InSAR Method to Estimate the Surface Deformation of the May Embankment Dam, Turkey.
  - **Rouhollah NASIRZADEHDIZAJI** and Anıl OLGAÇ
- Geo-processing Approaches for Urban Water Supply and Drainage Systems' Data Rehabilitation.
  - Cagri Cimen, **Suleyman Canberk Tuskan**, and Anıl OLGAÇ
- Development of a Web-Based Geospatial Application for Efficient Spatial Data Management.
  - **Rouhollah NASIRZADEHDIZAJI** and Anıl OLGAÇ
- Development of Data Quality Improvement Method for Hydrodynamic Model of Urban Drainage System Using GIS Capabilities.
  - **Cagri Cimen**, Rouhollah NASIRZADEHDIZAJI, and Anıl OLGAÇ

Application of InSAR Method to Estimate the Surface Deformation of the May Embankment Dam, Turkey

- This study is applied the Interferometric Synthetic Aperture Radar (InSAR) method to investigate the deformation of the upstream face of the May Embankment Dam.
- Optical satellite imagery revealed significant water volume variation at the May Dam over the past decade, prompting investigation due to the high seismic risk of the region and the potential consequences of dam failure for downstream lives and properties.
- This study has revealed the displacement rates of the structure of the Dam using the InSAR method.
- The results of this study can be used to warn the relevant authorities to make appropriate decisions and necessary measures to strengthen the dam to prevent potential risks.

Geo-processing Approaches for Urban Water Supply and Drainage Systems' Data Rehabilitation

- This study highlights the critical importance of accurate and comprehensive physical data in Integrated Urban Water Management (IUWM) and sustainable planning of water resources.
- The study proposes a methodology for handling physical datasets of infrastructure systems in a GIS environment to obtain reliable simulation results.
- This approach resulted in high-precision planning, detecting and correcting deficiencies and errors of the system elements, and ensuring the upstream-downstream continuity relationship in the hydraulic model structure.
- GIS tools and algorithms provide a range of benefits, such as data visualization, spatial analysis, data editing, and the ability to integrate multiple data sources.
- This integration enables efficient visualization and analysis of the urban water supply and drainage system's behavior and performance, aiding decision-making processes related to system design and management.

Development of a Web-Based Geospatial Application for Efficient Spatial Data Management

- In this work, a Web-GIS application has been designed and implemented by providing interoperability between different open-source software, such as GIS database, GIS data entry interface, and map server.

- This developed Web-GIS application that can be accessed from a computer or mobile device, allowing the dynamic presentation, analysis, and manipulation of spatial or non-spatial data for various purposes.

- The application can be applied to quickly access data obtained from different disciplines within an institution and stored in databases from anywhere in the world if the user can connect to the Internet.

- This work's significance lies in its demonstration of the integrated use of open-source software and interoperability between them to develop a Web-based GIS application that caters to the needs of decision-makers and authorities, promoting collaboration and data sharing within organizations and institutions.

Development of Data Quality Improvement Method for Hydrodynamic Model of Urban Drainage System Using GIS Capabilities

- This study proposed a methodological approach to prepare critical large-scale data for the hydrodynamic model set up in a GIS environment, aiming to improve the accuracy of analysis results and reflect the real-world situation.

- The prepared data based on the proposed the methodological approach provide a detailed and precise representation of complex structures for mathematically realistic simulations.

- The application can be applied to quickly access data obtained from different disciplines within an institution and stored in databases from anywhere in the world if the user can connect to the Internet.

- This work highlights the importance of using geospatial analysis and GIS tools to prepare input data for hydrodynamic models of urban drainage systems, leading to improved accuracy and efficiency of urban drainage services.

Projection on future challenges

- The contributions highlight the importance of addressing the challenges and uncertainties associated with climate change, population growth, urbanization, and resource scarcity.
- These challenges require innovative and adaptive management strategies that can foster resilience and adaptability in water resources and infrastructure systems.
- The contributions highlight the importance of accurate and up-to-date geospatial data in decision-making and planning processes.
- They emphasize the need for regular monitoring and assessment of natural and human systems using modern techniques to ensure sustainable development.
- The contributions suggest the need for continued research and development in sustainable management of water resources and infrastructure system.
- These efforts can facilitate evidence-based decision-making, enhance the effectiveness of management practices, and promote the sustainable use of water resources for future generations.