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Department of Computer Science & Engineering – AI & ML

Report on

"One Day Seminar on Machine Learning Applications in Geographic Information Systems (GIS)"

On
05-11-2025

Organized by:
Mr. Udayakumar.P, Assistant Professor, Department of CSE (AI and ML)

Submitted by:
Mr. Udayakumar.P, Assistant Professor, Department of CSE (AI and ML)

Resource Person Details:
Dr. Nakkeeran G, Faculty, Department of Civil Engineering, MITS.

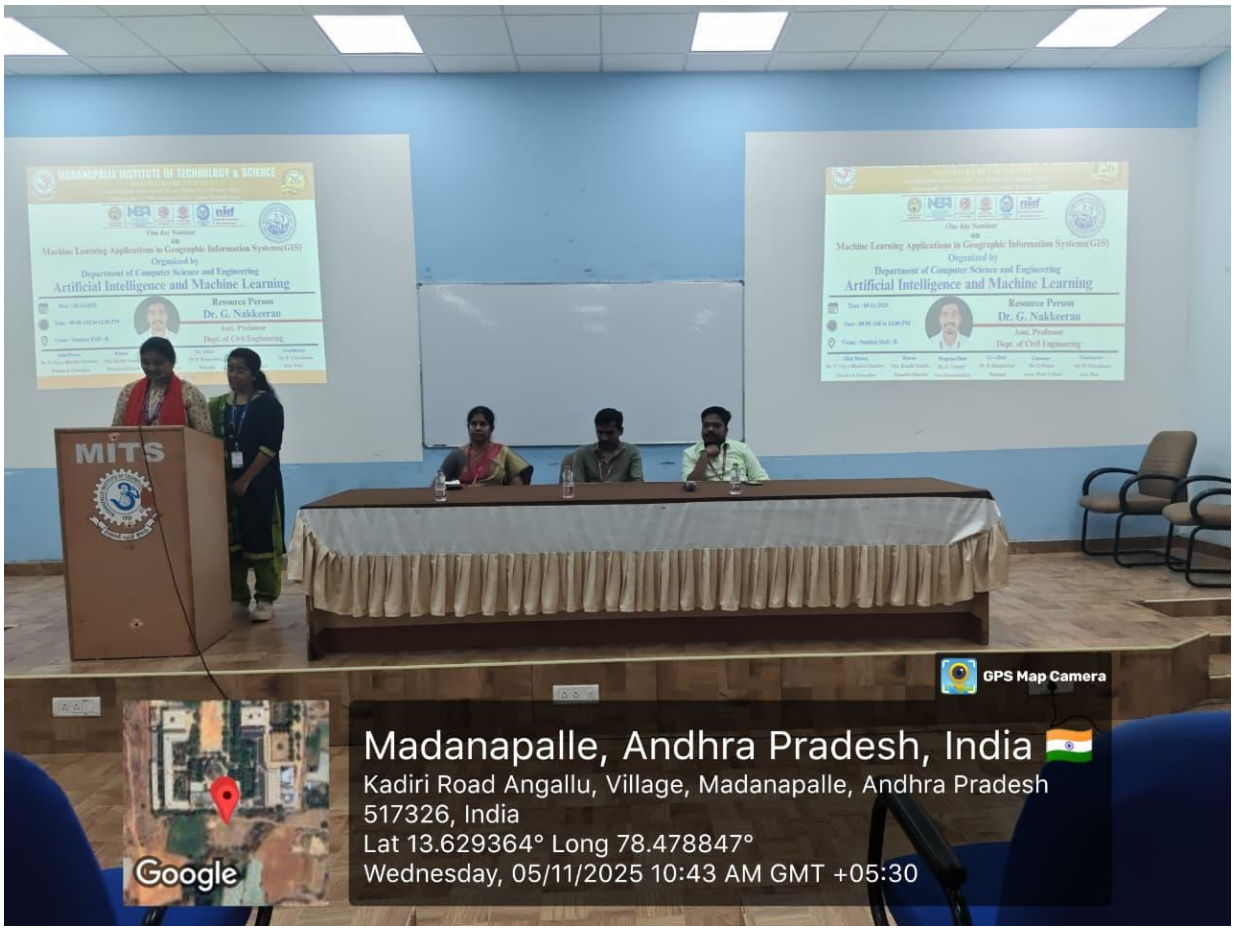
Participants:
CSE (AI and ML) and CSE (Networks) (54 Students)

Venue: Seminarhall-B, South Block.

Mode: Offline

The Department of CSE (AI and ML), in association with the **Institute of Engineers (India) – IEI Student Chapter, MITS**, organized a one-day seminar on **"Machine Learning Applications in Geographic Information Systems (GIS)"** with the aim of enhancing students' understanding of how machine learning techniques can be effectively implemented in geospatial analysis. The seminar offered an interdisciplinary perspective by connecting core concepts of Artificial Intelligence with Geographic Information Systems, enabling participants to understand the transformation of raw spatial data into meaningful analytical insights.

The session emphasized how ML-driven GIS models are being used globally in areas such as urban growth mapping, agricultural monitoring, disaster prediction systems, environmental sustainability planning, water resource management, transportation network optimization, and climate change impact assessment. Through this seminar, students gained awareness of how spatial intelligence is shaping smart city development and decision-making processes in government, industry, and research sectors.



Furthermore, the seminar provided clarity on data acquisition, satellite imagery interpretation, spatial feature extraction, supervised and unsupervised classification methods, predictive modeling, and visualization techniques used in modern geospatial workflows. The event created a platform for students to explore potential research collaborations, project development opportunities, and higher studies pathways in the rapidly emerging domain of GeoAI (Geospatial Artificial Intelligence).

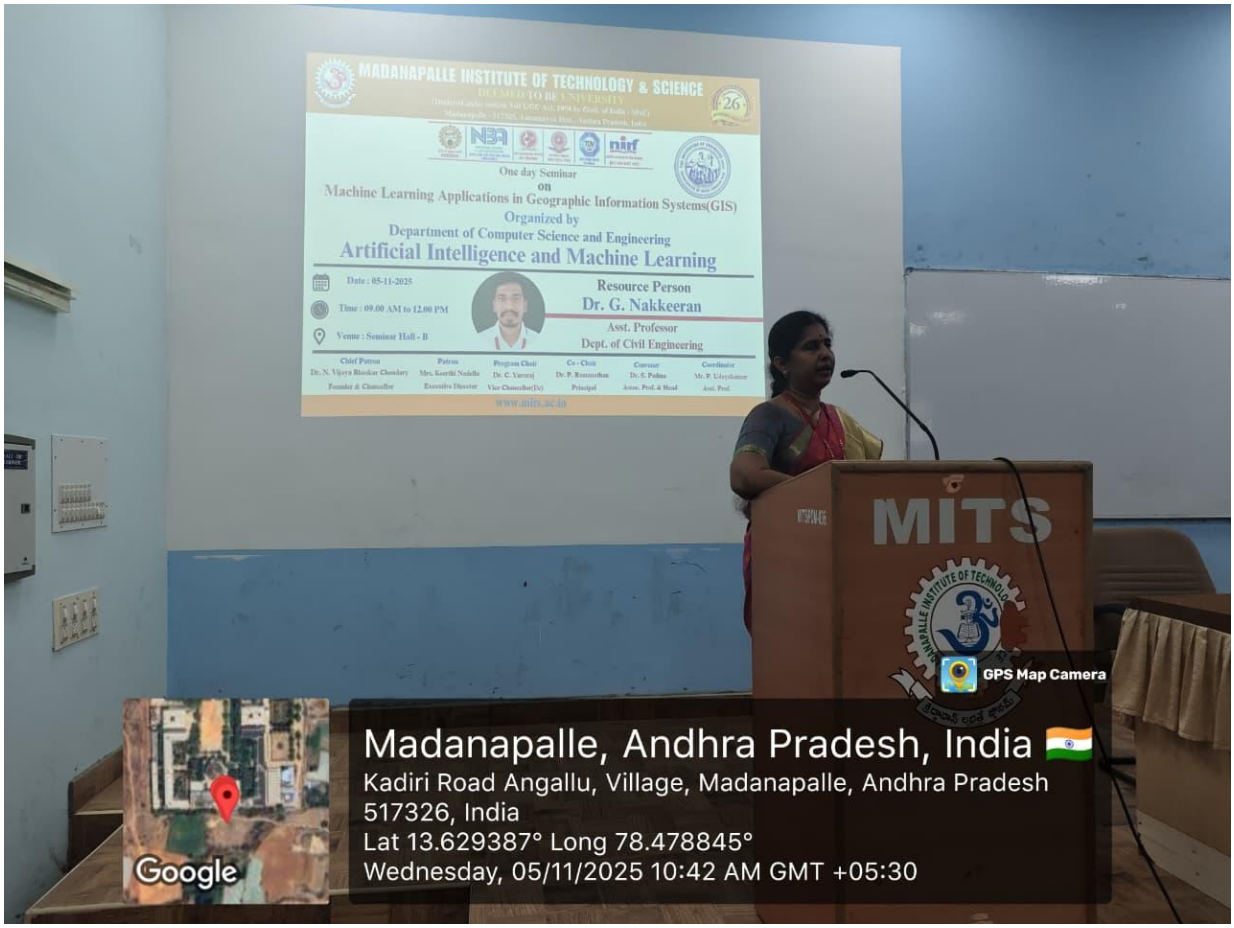
Welcome Address:

The session commenced with a warm and engaging welcome address delivered by **Mr. Udayakumar P**, Assistant Professor, Department of CSE (AI & ML). He greeted the resource person, faculty members, and students, expressing appreciation for their presence and active interest in emerging interdisciplinary technologies. He highlighted the purpose of the seminar, emphasizing the growing relevance of **Geographic Information Systems (GIS)** in various scientific, industrial, and governmental applications. He noted that GIS is no longer limited to cartographic visualization but has evolved into a strategic analytical tool used for spatial data interpretation and intelligent decision-making.

Further, he underscored how Machine Learning is strengthening GIS by enabling automated feature extraction, predictive modeling, and data-driven spatial insights. He expressed that acquiring knowledge in GeoAI (Geospatial Artificial Intelligence) will enhance students' technical competency and open pathways to research, internships, and career opportunities in fields such as Smart Cities, Environmental Management, Remote Sensing Analytics, and Infrastructure Planning. He encouraged the participants to actively engage in the seminar, interact with the resource person, and explore the potential of applying machine learning methods to real-world spatial data challenges.

Keynote Address:

The keynote address was delivered by **Dr. S. Padma**, Associate Professor & Head, Department of CSE (AI & ML). She began by highlighting the rapid evolution of **Geographic Information Systems (GIS)** as a powerful technological platform that supports a wide range of real-world applications—from land resource planning and environmental conservation to urban infrastructure development and national-level policy formulation. She emphasized that GIS, when combined with Machine Learning, enables the processing of large-scale spatial datasets, allowing analysts and decision-makers to derive meaningful insights that were previously difficult to obtain through traditional methods. She concluded by motivating students to explore **GIS and Machine Learning** not only as academic subjects but also as promising career pathways in government agencies, environmental organizations, geospatial consulting firms, and advanced research institutions.



Resource Person Lecture:

The core session was delivered by **Dr. Nakkeeran G**, who provided a comprehensive and practical lecture with demonstrations.

Topics Covered:

- Introduction to GIS and Remote Sensing Data Acquisition
- Understanding Raster and Vector Data Models
- Feature Engineering in Spatial Datasets
- Machine Learning Algorithms for Spatial Classification and Prediction
- Land Use & Land Cover Mapping (LULC)
- Change Detection and Time-Series Remote Sensing Interpretation
- Python Libraries & Tools (GeoPandas, Rasterio, GDAL, QGIS Plugins)
- Real-Time Case Studies and Project Scopes

He demonstrated how Random Forest, SVM, K-Means, and CNN models are used to categorize satellite imagery into meaningful land categories such as vegetation, water bodies, agricultural fields, and urban settlements.

Students observed hands-on workflows including:

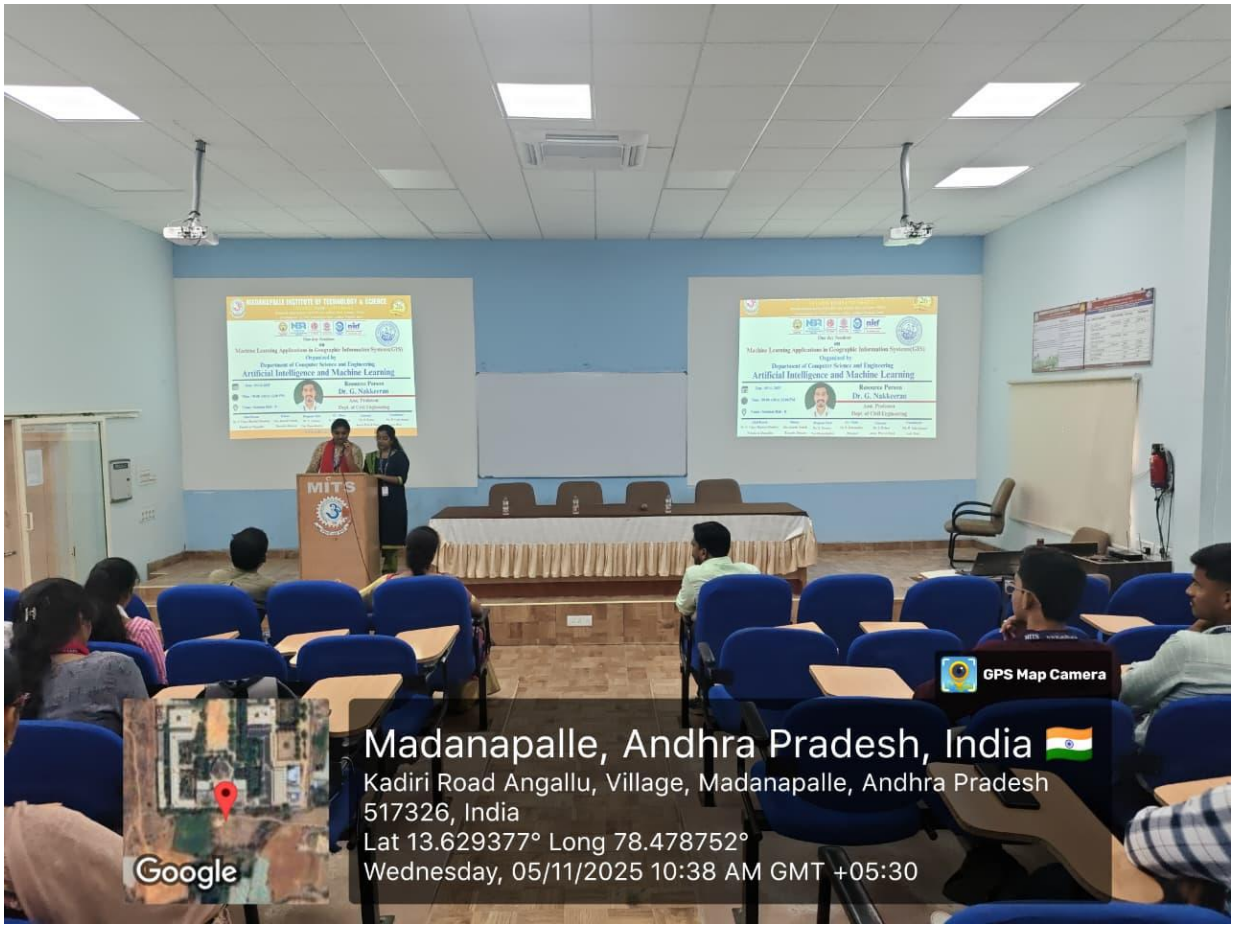
- Georeferencing spatial layers
- Preprocessing multispectral satellite images
- Applying ML classification techniques
- Validating spatial accuracy and model performance

The session helped students clearly visualize how machine learning strengthens GIS for evidence-based decision-making used by government agencies, environmental scientists, and industry professionals.

Vote of thanks:

The session concluded with a Vote of Thanks delivered by Mr. Udayakumar. P. He expressed sincere gratitude to:

- The Management and Principal for support and infrastructure.
- Dr. Nakkeeran G for sharing technical expertise.
- Faculty members and volunteers for coordination.
- Students for their active participation and meaningful engagement.



Outcomes:

At the end of the program, students were able to:

1. Understand how Machine Learning models are integrated into GIS systems.
2. Analyze spatial datasets for classification, clustering, and prediction tasks.
3. Use GIS & ML tools for environmental and infrastructural problem-solving.
4. Explore GeoAI research and project opportunities.
5. Improve readiness for industry roles and higher studies in geospatial technologies.

UN-SDG Mapping:

SDG 4→Quality Education through interdisciplinary knowledge

SDG 8→Skill development for future employment opportunities

SDG 9→Innovation in smart infrastructure & data-driven planning

SDG 13→Climate Action through environmental monitoring & prediction

SDG 17→Academic and community collaboration through IEI Chapter