Grah-based machine learning with respect to Graph Neural Networks (GNNs) and their variants underpin many cutting-edge applications across industries. They enable modeling complex, interconnected data in social networks, healthcare, finance, transportation, recommendation systems, and bioinformatics, driving advances in fraud detection, disease modeling, traffic prediction, and drug discovery. With increasing graph data volumes, scalable and robust models like S3GC, DMoN, and BONSAI address key challenges in graph clustering through contrastive learning, modularity maximization, and graph distillation respectively, making these techniques critical skills for research and industry innovation.

Course objectives:

- Understand graph-based data and core principles of GNNs.
- Learn key graph learning models like Graph Convolutional Networks (GCNs) and their applications.
- Explore advanced scalable and self-supervised graph clustering and optimization methods like S3GC and DMoN.
- Understand why and how we distill large graphs into smaller ones through state-of-the art distillation techniques like BONSAI.
- Develop skills to build and optimize GNN models for real-world graph tasks such as clustering and classification.

Course Coverage:

Day 1:
Session 1: Graph Neural Networks (GNN) (Theory)
Session 2: Hands on: Basics of Graph ML

Day 2:
Session 1: Graph Convolutional Networks (GCN) (Theory)
Session 2: Hands on: Clustering with GCNs

Day 3:
Session 1: S3GC (Scalable Self-Supervised Graph Clustering) (Theory)
Session 2: Hands on: Code walk through of S3GC

Day 4:
Session 1: DMoN (Deep Modularity Networks) (Theory)
Session 2: Hands on: Code walk through of DMoN

Day 5:
Session 1: Graph distillation through BONSAI (Theory)
Session 2: Hands on: Code walk through of BONSAI

Resource person(s):

Dr. Panthadeep Bhattacharjee, Dept. of CSE,
NIT Rourkela

National Institute of Technology Rourkela

Short Term Course
(Online Mode)
On

A Primer to Graph-based Machine Learning (GraphML-2025)

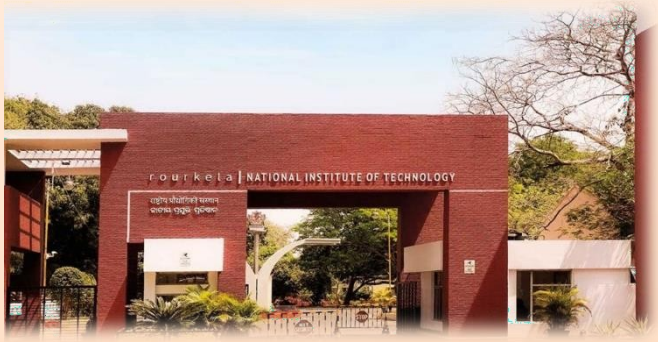
6th - 10th December 2025

Principal-Coordinator
Dr. Panthadeep Bhattacharjee

Convener
Prof. Bidhudutta Sahoo

Organized by
Dept. of Computer Science and Engineering

NIT Rourkela



Introduction

In contemporary technology landscapes, computer vision has emerged as a pivotal discipline, enabling machines to comprehend and interpret visual data, effectively bridging the gap between human perception and artificial intelligence. Its manifold advantages are prominently demonstrated in domains such as autonomous driving, healthcare diagnostics, retail optimization, and security enhancements, where it bolsters decision-making, automates tasks, and fortifies safety measures. However, persistent challenges include the demand for robustness across varying environmental conditions, the complexities entailed in managing object occlusion, and the ethical considerations surrounding privacy preservation and algorithmic bias mitigation. Nonetheless, the undeniable merits of computer vision hold the promise of revolutionizing industries, optimizing operational efficiencies, and ushering in innovative applications such as augmented reality, human-computer interaction, and smart urban development. As scholars and technologists grapple with these intricacies, the trajectory of computer vision unfolds with limitless potential for innovation and societal progress.

Online Account Details:

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About the Institute:

National Institute of Technology (NIT), Rourkela is one of the premier national level institutions in our country under MoE, Govt. of India, and is responsible for providing technical education. For knowing further details, please visit https://www.nitrkl.ac.in/

34 NIRF Overall	13 NIRF Engg.	30 NIRF Research	396 QS Asia

About the Department:

The department of CSE was established with the vision

to prepare its students for professional employment and graduate education throughstudyand implementationof the fundamental principles of theory, abstraction, and

software design, while at the same time presenting the ethical and social issues associated with computer science.

The department offers various UG courses with a mission to provide high-quality education that prepares the graduates for success in their professional practice and advanced studies. The department also offers M. Tech in Computer Science, Information Security, and Software Engineering; and Ph. D. for regular as well as sponsored candidates.

Please visit https://website.nitrkl.ac.in/CS/

Online Registration Form:

https://docs.google.com/forms/d/1hUOxwhJdJvinVFtdC_eE81yJEnbgepeOy1AEaJOXC-s/preview

Registration Details:

Category	Online Registration Fee in INR
Research Scholars/ PG / UG Student	800/-
Faculty fromEngineering Institutes	1000/-
Engineers from Industry and R&D Organizations	1200/-

No registration fee for students / staffs of NIT Rourkela

Important Dates:

Registration Deadline: 5th December 2025

Short-term Course Date: 6th-10th December 2025

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