



This short-term course is meticulously designed to provide participants with a comprehensive knowledge of the present landscape of computer vision. It offers an extensive academic exploration of the field's strengths, challenges, and benefits in current applications. Participants will delve into the basics/pre-requisites of Machine Learning, vector algebra, matrix and their operations. Latest trends such as coverage of various deep learning models, generative AI, equipping them with the skills to interpret, manipulate, and analyze visual data effectively.

Challenges, such as object recognition under varying conditions, application of various deep learning models in vision will be discussed in-depth. The course will also lay spotlight on the strengths of computer vision, highlighting its capacity to revolutionize human motion understanding, autonomous systems, and augmented reality.

Moreover, participants will gain hands-on experience in executing ML applications, providing them with practical skills for handling real-world projects. This course is ideal for students, researchers, and professionals seeking to harness the transformative potential of computer vision and to stay at the forefront of technological innovation.

Course Coverage:

- Introduction to vectors and matrices
- Solving System of Linear equations (LeQs)
- Vector Spaces and linear independence
- Basis and rank of a matrix
- Angles and orthogonality, ONB (orthonormal basis), inner product
- Matrix decompositions: determinant, trace, Cholesky decomposition, SVD, eigen decomposition, diagonalization.
- Matrix approximation, phylogeny
- Computer vision and its latest research.
- Generative AI with deep learning.
- Supervised and unsupervised learning along with their various metrics and parameters involved; algorithms with latest research.
- Recent paradigms of clustering algorithms, community detection; social network analysis.

Lab Sessions:

- Installation of necessary tools for executing ML algorithms.
- Implementation of fundamental ML algorithms with demonstration in Python.
- Illustrating the implementation of vectors and their variants.
- Demonstrating and explaining the working of various unsupervised algorithms.
- Identify the clusters and their visualization.
- Usage of programming libraries to execute graph-based learning algorithms.



**National Institute of Technology
Rourkela**

**Short Term Course
(Online Mode)
On**

**Horizons of ML: Pre-cursor to
Present (PMLP-2024)**

11th - 15th December 2024

Coordinator

Dr. Panthadeep Bhattacharjee

Chairman

Prof. Bidhudutta Sahoo

Organized By

**Dept. of Computer Science and
Engineering**

**National Institute of Technology
Rourkela,**



Introduction:

In contemporary technology landscapes, machine learning (ML) 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 autonomous objects, and the ethical considerations surrounding privacy preservation and algorithmic bias mitigation. Nonetheless, the undeniable merits of ML paradigms 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 ML unfolds with limitless potential for innovation and societal progress.

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	19 NIRF Engg.	30 NIRF Research	291 QS Asia
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About the Department:

The department of CSE was established with the vision to prepare its students for professional employment and graduate education through study and implementation of 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.

Scan the QR code for registering to PMLP'24



Online Registration Form:

<https://tinyurl.com/registerPMLP24>

Registration Details:

Category	Online Registration Fee in INR
Research Scholars/ PG / UG Student	650/-
Faculty from Engineering Institutes	800/-
Engineers from Industry and R&D Organizations	950/-
No registration fee for students / staffs of NIT Rourkela	

Payment details:

Account name: Continuing Education, NIT Rourkela

Account number: 101 3895 1784

Bank name: State Bank of India (SBI)

Branch name: NIT Rourkela Campus

IFSC: SBIN0002109

UPI ID: 01389517841@sbi

Important Dates:

***Registration Deadline: 10th December 2024**

Short-term Course Date: 11th-15th December 2024

Contact:

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