ABOUT THE COURSE

This course offers a foundational understanding of deep learning, covering essential mathematical concepts, Python programming basics, and fundamental neural network principles. Participants will learn about key topics such as linear algebra, calculus, activation functions, and optimization algorithms. Hands-on projects will reinforce learning, focusing on different applications. Advanced topics include convolutional and recurrent neural networks, transfer learning, and regularization techniques. By the course's end, students will have gained practical skills in implementing deep learning models, preparing them for real-world data analysis tasks and further exploration in the field. Whether beginners or seasoned professionals, learners will find this course valuable for mastering the fundamentals of deep learning in a concise and accessible format.

COURSE OBJECTIVE

1. Gain a solid understanding of foundational mathematical concepts essential for deep learning, including linear algebra, calculus, and probability theory.
2. Develop proficiency in Python programming for implementing and experimenting with neural network models, utilizing libraries such as TensorFlow.
3. Master the fundamental principles of neural networks, including architecture design, activation functions, loss functions, and optimization algorithms like gradient descent and backpropagation.
4. Acquire practical experience through hands-on projects, applying deep learning techniques to real-world datasets for tasks such as image classification, sentiment analysis, and regression, fostering the ability to solve complex problems using deep learning methodologies.

COURSE CONTENT

1. **Foundations of Mathematics**
   Linear Algebra: Matrices, Vectors, Operations, Calculus: Derivatives, Integrals, Chain Rule, Probability: Basics of Probability Theory

2. **Python Programming Basics**
   Introduction to Python Syntax and Data Structures, Control Structures and Functions, Libraries for Scientific Computing: NumPy, Pandas

3. **Fundamentals of Neural Networks**
   Artificial Neural Networks (ANNs): Concepts and Architecture, Feedforward Neural Networks: Structure and Training, Activation functions, Loss functions, Optimization Techniques, Backpropagation: Theory and Implementation

4. **Deep Learning Essentials**
   Backpropagation Algorithm: Understanding the Chain Rule in Calculus, Optimization Algorithms: Variants and Applications, Loss Function Selection and Comparison, Regularization Techniques: L1/L2 regularization, Dropout

5. **Convolutional Neural Networks (CNNs)**
   Introduction to Convolutional Layers and Filters, Architecture Overview: LeNet, AlexNet, VGG, ResNet, Transfer Learning Concepts and Applications, Image Pre-processing Techniques

6. **Recurrent Neural Networks (RNNs) and LSTMs**
   Sequential Data Modelling with RNNs, Addressing the Vanishing Gradient Problem, Introduction to Long Short-Term Memory Networks (LSTMs), Variants of LSTM Architectures.

Azadi Ka Amrit Mahotsav

G20 भारत 2023 INDIA

Short Term Course
on

Exploring Deep Learning:
Applications and Practical Implementations

(Hybrid Mode)

11th–15th JUNE 2024

Chairman
Prof. Bibhudutta Sahoo, HoD (CS)

Convener
Dr. Puneet Kumar Jain

Department of Computer Science and Engineering
National Institute of Technology
Rourkela-769008, Odisha

ABOUT NIT ROURKELA

National Institute of Technology (NIT) Rourkela is an institution of national importance funded by the Ministry of Education. NIT Rourkela was established as Regional Engineering College (REC) on August 15, 1961. In India, it was ranked 16 among engineering colleges by the National Institutional Ranking Framework (NIRF) in 2023. For details about the institute please visit us at www.nitrkl.ac.in.

ABOUT DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Department of Computer Science & Engineering, NIT, Rourkela was established in 1982. Since its inception, the Department is under dynamic progress and is able to establish the reputation for imparting quality education both at undergraduate and graduate programmes. The department also offers Ph. D. for regular as well as sponsored candidates. Please visit https://website.nitrkl.ac.in/CS/ to know more about the Department of CSE. The department has well equipped modern laboratories such as Software Engineering, Distributed Object Systems, Information Security & Data Communication, Image Processing & Cluster Computing and Advanced Database Engineering Labs for pursuing research keeping in view of the technological advancement.

TARGET PARTICIPANTS

The short-term course is of immense interest for UG/ PG students, research scholars/professionals, staff/ faculty members and industry professionals working in the area of Data Science. The participants from different Science and Engineering (Computer Science and Engineering, Electronics and Communication Engineering, Electrical Engineering, etc.) background will be benefitted with this course.

IMPORTANT DATES

Registration Starts	25th February 2024
Registration Ends	30th April 2024
Maximum Offline Participants (First Come First Serve Basis)	60
Registration Confirmation	15th May 2024
Course Schedule	03-07th June 2024

PREREQUISITES

1. The offline participants should bring their laptop.
2. Basics of programming language and data structure will be a plus.

TOURIST PLACES NEARBY

Khandadhar Waterfall

Pitamahal Dam

Vedvyas Temple

Mandira Dam

REGISTRATION & FEE PARTICULARS

Registration Fee	
Students	Rs. 1,180/-
Faculty from Academic Institutions	Rs. 2,360/-
Employees from Industry and R&D Organizations	Rs. 3,540/-
Accommodation Charges	
Guest house (South / North block)	As Per Institute Norms
Hostel (for students)	

Registration fees include Registration Kit, Refreshment, Tea and Snacks and 18% GST. (Lodging, boarding, lunch and dinner facility can be availed on separate payment basis and based on availability.)

BANK ACCOUNT DETAILS FOR REGISTRATION

Account Name:	CONTINUING EDUCATION NIT ROURKELA
Account No.:	10138951784
Bank Name	State Bank of India(002109)
Branch:	NIT Rourkela Campus
IFSC Code	SBIN0002109

REGISTRATION FORM

To complete the online registration, the participants need to fill the following google form:

Click here for the Google Form Registration Link

Patron	Prof. K. Umamaheswar Rao, Director, NIT Rourkela
Chairman	Prof. Bibhudatta Sahoo
Convener	Dr. Puneet Kumar Jain

Correspondence
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STUDENT COORDINATORS

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