

ABOUT THE COURSE

Time series forecasting (TSF) assists in making better strategic decisions under uncertain circumstances so that financial crisis can be avoided, wise investments can be made, under/over contracting of utility can be avoided, staffs can be scheduled appropriately, service providers can provide better service, mankind can get prepared for natural disasters and many more. However, the accuracy in forecasting plays a vital role and achieving such is a challenging task owing to the vagueness and nonlinearity associated with most of the real world time series. This course will provide a forum for discussing theoretical and practical aspects of neural network, deep learning and its application in Time Series Forecasting.. It will help in exchanging research ideas and challenges, exploring possible solutions and future directions. The main goal of this course is to bring together researchers & practitioners from both academia & industry.

CONTENTS OF THE COURSE

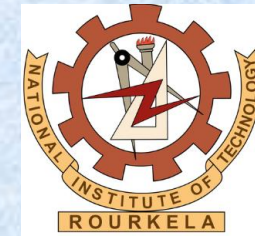
1. Introduction to Neural Network and Deep Learning
 - Mathematical Formulation of Artificial Neural Network, Differentiation and its Application in Optimization.
 - Training Single Neuron Model and Training Multilayer Neural Network
 - Dropout and Regularization, Weight Initialization (Xavier/Glorot Initializer, He Initializer, etc.), Batch Normalization
 - Optimizers: Gradient Descent, Stochastic Gradient Descent, Nesterov Accelerated Gradient (NAG), Adaptive Gradient (AdaGrad), AdaDelta, RMSProp, ADAM, Choice between optimizers based on problem
 - Hands-on: Hard coding Neural Network for Classification and/or Regression Problems.
 - Hands-on using Tensorflow and Keras.
2. Crisp Time Series Forecasting using Deep Learning
 - Introduction to Time Series Forecasting (TSF), Methodologies used in Time Series Forecasting
 - Crisp TSF using Deep Learning Models
 - Additive, Multiplicative and Decomposition Based Hybrid models employing Deep Learning and Statistical Models.
 - Long Short-Term Memory (LSTM), Gated Recurrent Units (GRU).
 - Hands-on using Tensorflow and Keras

3. Fuzzy Time Series Forecasting

- Introduction to Fuzzy Time Series Forecasting
 - Fuzzy Time Series Forecasting Ignoring Membership Values
 - Fuzzy Time Series Forecasting considering Membership values (Traditional Fuzzy Set, Intuitionistic Fuzzy Set, Hesitant Fuzzy Set and Neutrosophic Fuzzy Set).
 - Fuzzy Time Series Forecasting using Deep Learning.
 - Hands-on using Tensorflow and Keras
4. Transfer Learning and Hybrid Machine Learning and Deep Learning for Time Series Forecasting
 - Introduction to Convolutional Neural Network: Convolution, Padding and Strides, Convolution Layer, Pooling, Data Augmentation, Popular CNN Models: AlexNet, VGGNet, RESNet, GoogleNet etc.
 - Transfer Learning & Fusion: Early Fusion (Feature Level Fusion), Late Fusion (Decision Level Fusion).
 - 1-D CNN and ConvLSTM for Time Series Forecasting.
 - Hands on using Tensorflow and Keras.
 5. Performance Evaluation, Enhancement and Deployment:
 - Hyper-Parameter Optimization: Grid Search, Keras Tuner, Swarm and Evolutionary Algorithm Optimized DL Models.
 - Model Evaluation using Non-parametric statistical tests. Deployment of Deep Learning Models.

COURSE OBJECTIVES

1. To familiarize the participants with the basics of Neural Network and recent advances in Deep Learning.
2. To familiarize the participants with the basics and recent advances in crisp and fuzzy Time Series Forecasting using Deep Learning models.
3. To familiarize the participants with transfer learning and perform Time Series Forecasting using hybridization of Deep Learning and shallow Machine Learning models.
4. To familiarize the participants with different hyper-parameter optimization methods of Deep Learning models.
5. To have 15-hours of Theory and 15-hours of Hands-on Session relating to above four objectives.



Short Term Course
on
Recent Trends in Time Series
Forecasting using Deep Learning
Models
(RTTSFDL - 2023)
Hybrid Mode
(Online and Offline)
25th–29th DECEMBER 2023

Coordinators

Dr. Sibarama Panigrahi
Prof. Bibhudatta Sahoo

Department of Computer Science
and Engineering
National Institute of Technology
Rourkela-769 008, Odisha

<http://www.nitrkl.ac.in>

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 Machine Learning and/or Time Series Forecasting. 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	10 th November 2023
Registration Ends	15 th December 2023
Maximum Offline Participants (First Come First Serve Basis)	60
Registration Confirmation	15 th December 2023
Course Schedule	25-29 th December 2023

PREREQUISITES

1. The offline participants should bring their laptop.
2. Knowledge of Python.
3. Knowledge of Machine Learning 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
Hostel	Norms

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 (02109)
Branch:	NIT Campus Rourkela
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
Chairperson	Prof. Bibhudatta Sahoo
Coordinators	Dr. Sibarama Panigrahi Prof. Bibhudatta Sahoo

Correspondence

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