High End Workshop (Physical Mode)

On

Statistical and Machine Learning Techniques for Agricultural Systems Modeling and Forecasting using R

(Under the KARYASHALA Scheme – a SERB Initiative)

18 -30 July, 2022

Funded by

Science and Engineering Research Board (SERB),
Department of Science and Technology,
Government of India

Patron	**Dr. R M Sundaram, Director IIRR**
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Organised by

ICAR-Indian Institute of Rice Research, Hyderabad – 500030

▶ ABOUT KARYASHALA

'KARYASHALA' is aimed to improve research productivity of promising PG and PhD students from universities/colleges through high-end workshops on specific themes. This program aims to provide opportunities to acquire specialized research skills and provide hands-on experience to the students primarily from universities, colleges, private academic institutions, and newly established institutes in handling/troubleshooting of high-end scientific instruments and such skill development on themes required for research work. The program is meant to support motivated PG and Ph.D. level students, who are having a strong willingness to get excellence in their scientific and engineering research pursuits.

▶ ABOUT ICAR-IIRR

The ICAR-Indian Institute of Rice Research (ICAR-IIRR) was established as the All India Coordinated Rice Improvement Project (AICRIP) by the Indian Council of Agricultural Research (ICAR) in 1965 at Hyderabad. AICRIP was elevated to Directorate of Rice Research (DRR) in 1983 and ICAR–Indian Institute of Rice Research (IIRR) in 2014. IIRR (https://www.icar-iirr.org/) is involved in basic and strategic research for enhancing rice productivity under irrigated ecosystem; coordination of multi-location testing to develop location specific varieties and technologies for various ecosystems; and dissemination of technologies, capacity building and establishing linkages.

▶ ABOUT THE WORKSHOP

Statistical modeling and forecasting plays a crucial role in decision making in agricultural and allied research for analyzing large number of data sets generated through biological field /lab experiments, surveys and published reports. To understand the increasing complexity among decision variables, many statistical and machine learning techniques have been developed in recent years. With advancement in computational open source tools and techniques, this area has become most important for the current needs. Therefore, this training programme has been designed to address both theory and application parts of the statistical and machine learning techniques.

R is the most popularly used open source programming language in statistical data analysis. R is freely available and regularly updated by the global R community with advanced computational methods. This training is designed to impart hands-on practical sessions for each of the theory classes, so that participants can analyze their data sets using R anytime.

Objectives of the proposed high end workshop are;

- ❖ Educating the participants about various advanced Statistical, Machine Learning, Remote Sensing & GIS tools and techniques for modeling and forecasting agricultural data
- ❖ Imparting hands-on experience to the participants on data analysis
- ❖ Acquainting the participants about R software package for data analysis.

▶ **COURSE CONTENT**

The course has been structured in a series of modules with classroom lectures and practical hands-on demonstrations in R software package.

Module 1: R Software package
- ❖ Introduction to R
- ❖ Data manipulation using R tidyverse
- ❖ Data Visualization through ggplot2
- ❖ R Shiny
- ❖ Basic Statistics in R

Module 2: Regression and Multivariate Analysis
- ❖ Regression Analysis
- ❖ Logit, Probit, Tobit and Logistic Regression
- ❖ LASSO and Elastic Net Regression
- ❖ Nonlinear growth models
- ❖ Data classification and reduction techniques (Custer analysis, PCA, Factor Analysis, Discriminant Function Analysis)

Module 3: Machine Learning Techniques
- ❖ Artificial Neural Network
- ❖ Support Vector Machines
- ❖ Classification and Regression Tree
- ❖ Random Forest
- ❖ Extreme Learning Machines
- ❖ Deep Learning (DL) Models
- ❖ LSTM
- ❖ ML optimization techniques

Module 4: Time Series Data analysis

- ❖ Trend Analysis
- ❖ Introduction to Time Series Analysis (TSA)
- ❖ Vector Autoregressive Model
- ❖ Bayesian TSA
- ❖ Spatiotemporal TSA
- ❖ ARCH Family of Models
- ❖ Count Time Series Models
- ❖ Intervention TSA
- ❖ Hybrid Time Series Models
- ❖ Ensemble TS models

Module 5: Remote Sensing (RS) and GIS

- ❖ Introduction and application of RS and GIS
- ❖ RS image analysis using supervised & unsupervised techniques
- ❖ Spatial Regression and Kriging
- ❖ Geospatial crop modeling
- ❖ ML and DL techniques for RS Data analysis

Module 6: Other Useful Topics

- ❖ Google Earth Engine
- ❖ Meta-Analysis
- ❖ Fuzzy TSA
- ❖ Crop simulation modeling
- ❖ Application of AI in crop yield forecasting

▶ NOMINATIONS

Interested candidates fulfilling the eligibility conditions may apply through proper channel with the approval of competent authority

25 students will be selected based on the merits/ suitability of the candidates

▶ ELIGIBILITY

- ❖ Students pursuing Master's Degree / Ph.D. in any discipline of Agricultural sciences/Animal sciences/Fishery sciences/ Statistics/ Computer Application or other P.G/Ph.D. students with research specialization in agriculture and allied sciences.
- ❖ Working knowledge of Statistics and R / other software packages

APPLICATION FORM

DST–SERB Sponsored High End Workshop "KARYASHALA"
On
Statistical and Machine Learning Techniques for Agricultural Systems Modeling and Forecasting using R

(18-30 July, 2022)

1	Full Name (in BLOCK letters)				
2	Highest degree pursuing with specialization				
3	Present Institute Name				
4	Address for Correspondence				
5	E-mail address Telephone Number Mob / O / R:				
6	Date of Birth				
7	Sex (Male/Female)				
8	Education Qualification:				
	Degree	Subject	Year of passing	Class/Division/ Equivalent	University /Institute
	Bachelors Masters Ph.D. Any Other				
9	Level of Knowledge in Statistics				
10	Level of Knowledge in R / other softwares				
11	Area of present research work				
13	Expectations from the workshop				

Signature of the Applicant with date

CERTIFICATE

It is certified that information furnished above is correct. Travel, Boarding and Lodging allowances will not be paid by this office.

Signature of the Recommending Authority
/ Head of the Department/ Institute along with Seal

▶ IMPORTANT DATES

Last Date for Receipt of Applications: 8th July, 2022

Information to Selected Candidate: 10th July, 2022

Workshop Dates: 18-30th July, 2022

▶ REGISTRATION

Interested eligible candidates can register through google form link **"https://forms.gle/CTG6JvGAnYQwQRCX6"** by uploading application form duly signed by the Recommending Authority / Head of the Department/ Institute.

▶ TRAVEL AND ACCOMMODATION

The participants will be provided travel, lodging and boarding as per SERB guidelines.

▶ CERTIFICATES

On successful completion of workshop, certificates will be issued by the organizing institute.

For any registration related queries contact

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