



WINTER SCHOOL
ON

APPLICATIONS OF DEEP LEARNING IN AGRICULTURE USING PYTHON

21st JAN - 10th FEB
2025 (21 DAYS)

Sponsored by

**Agricultural Education Division
Indian Council of Agricultural Research**

COURSE DIRECTOR: **Dr. Alka Arora**

COURSE CO-DIRECTORS: **Dr. Sapna Nigam
Dr. Madhu**

The Course is to be organised in Offline Mode

Organized by

ICAR - Indian Agricultural Statistics Research Institute
Library Avenue, Pusa, New Delhi -110 012

<https://iasri.icar.gov.in>

BACKGROUND OF THE TRAINING PROGRAM

Winter School on "Applications of Deep Learning in Agriculture Using Python" is designed to enhance the participants knowledge by providing a comprehensive understanding of python programming language and deep learning technologies along with their practical applications in agriculture. This training program emphasizes the integration of theoretical knowledge with hands-on training, enabling participants to effectively leverage technologies for addressing critical challenges in modern agriculture.

Participants will gain practical experience in python programming language with various frameworks such as TensorFlow, Keras, and PyTorch, exploring topics ranging from neural networks, image classification, and object detection to emerging concepts like Generative Adversarial Networks (GANs) and Large Language Models (LLMs). Key Convolutional Neural Networks (CNN) architectures such as ResNet, EfficientNet, InceptionNet, DenseNet and YOLO architecture will be introduced, along with techniques like attention mechanisms, segmentation algorithms. The training program aims to foster the development of AI-driven solutions through real-world case studies and practical applications in agriculture.

OBJECTIVES

- To build foundational knowledge of deep learning concepts and frameworks and enhance understanding of advanced Deep Learning Technologies focusing on their applications in agriculture.
- To train participants to acquire, preprocess, and analyze agricultural data for solving real-world problems and develop skills in data driven agricultural solutions.
- To guide participants in designing and deploying deep learning models for agricultural tasks, with hands-on experience using tools like TensorFlow and PyTorch for promoting innovation and practical implementation

- **Module 1: Basics of Python programming**
Python fundamentals, including variables, control structures, and data structures, along with Python libraries such as Pandas for data manipulation and NumPy for numerical computations. Practical exercises enhance hands-on learning of these essential tools.
- **Module 2: Introduction to Artificial Intelligence and Deep Learning**
Introduction to Artificial Intelligence, Machine Learning, Deep Learning in Agriculture, and Python programming for implementing ML and Deep Learning models. Comprehensive coverage of supervised and unsupervised learning techniques, fundamentals of Neural Networks, Artificial Neural Networks (ANN) concepts, and digital image processing with practical sessions using tools like OpenCV.
- **Module 3: Hands-on Session of Deep Learning Architectures**
Hands-on training with TensorFlow and Keras frameworks to implement CNN-based architectures, including DenseNet, ResNet, EfficientNet, and InceptionNet, with case studies focused on crop disease detection, severity stage estimation, and weed identification.
- **Module 4: Object Detection Algorithms**
Exploration of object detection and segmentation algorithms, such as YOLO and attention mechanisms for agricultural applications, and practical insights into AI-driven systems.
- **Module 5: Advanced Deep Learning Techniques**
Introduction to models like Recurrent Neural Networks (RNNs), LSTMs, LLM, Generative Adversarial Networks (GANs), and ChatGPT, with case studies highlighting cutting-edge applications and future advancements in agriculture.

ABOUT ICAR-IASRI

ICAR-Indian Agricultural Statistics Research Institute (ICAR-IASRI) started its journey as a Statistical Section in 1930 in then Imperial Council of Agricultural Research and has grown to a premier institute of relevance to conduct research, education and training in the field of Statistical Sciences (Statistics, Computer Applications, and Bioinformatics). The Institute is mainly responsible for conducting research in Agricultural Statistics and Informatics to bridge the gaps in the existing knowledge. The Institute is using the power of Statistics, as a science, blended with Informatics and their judicious fusion in agricultural sciences for enhancing quality agricultural research, to meet the challenges of agricultural research in newer emerging areas and evidence based policy decision making. The Institute also conducts M.Sc. and Ph.D. degree programmes in Agricultural Statistics, Computer Applications and Bioinformatics in collaboration with the Graduate School, ICAR-IARI, New Delhi. The Institute also conducts customized and sponsored training courses in Agricultural Statistics and Informatics at National and International level so as to be a leading Centre of excellence in Human Resource Development. The Institute provides advisory and consultancy services for strengthening the National Agricultural Research and Education System (NARES) and undertakes sponsored research and consultancy for National and International organizations. The methodological support is also provided in strengthening National Agricultural Statistics System (NASS). The Institute has also been playing a leading role in development of robust Agricultural Knowledge Management Systems and artificial intelligence based applications for NARES.

Computing facilities: The Institute features multiple computer laboratories equipped with state-of-the-art hardware, software, and modern teaching tools. Furthermore, the ICAR Data Centre and ASHOKA, housed at ICAR- IASRI, deliver extensive computing services to the entire NARES system.

Training Hostel: The Institute has a training hostel with modest facilities to cater to the needs of the participants. As per ICAR-IASRI norms, participants are not permitted to have guests stay with them during the program. Accommodation will be provided to participants starting the evening of 20th January 2025, and they must vacate by the evening of 10th February 2025.

Weather at New Delhi: During January and February 2025, New Delhi experiences a cool winter climate, with temperatures ranging from a maximum of 20°C to a minimum of 5°C. Participants are advised to bring warm woollen clothing for comfort.

ELIGIBILITY

▶ Master's degree in any discipline of Agricultural/Allied Sciences.

▶ Working in a position not below the rank of Scientist/ Assistant Professor

HOW TO APPLY

The application for participating must be filled online using CBP Vortal at <https://cbp.icar.gov.in>. After filling the application, take a printout of the application, get it approved by the competent authority of the organization and upload the scanned copy of application through the above portal.

The travelling for the selected participants will be paid to and fro by the shortest route as per the entitlement. For the class of travel restricted to AC-II fair in train and are requested to produce their original along with photocopies of the tickets in support of their claim (Air travel is not permissible).

Total number of participants: **25**
Last date for receiving applications: **31st December, 2024**
Registration Fee: **Rs. 50/-**
Demand draft in favor of **Director, ICAR-IASRI, Payable at New Delhi.**

Bank details:

Account Holder's Name: **Indian Agricultural Statistics Research Institute**
Bank Name: **Canara Bank**
Account Number: **91421010000017**
IFSC Code: **CNRB0019142**
Nature of Account: **Current Account**

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