A Report on Two-day Guest Lecture on "Clinical Image Classifications using Deep Learning Models" Organized by Department of Computer Applications from 10.07.2025 to 11.07.2025

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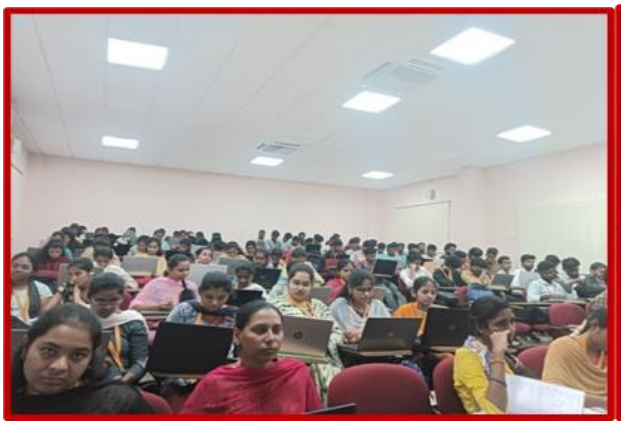
Resource Person Details: Dr. P. Shanmuga Vadivu, Senior Professor, Department of Computer Science & Applications, The Gandhigram Rural Institute (Deemed to be University), Gandhigram, Tamilnadu – 624 302.
Venue : Seminar Hall –A
Participants: 180 Students
Timings: 11.00 AM To 01.00 PM
Mode of Conduct: Online
Report Received on 17.07.2025.

A Two-Day Guest Lecture on 'Clinical Image Classifications using Deep Learning Models' was organized by the Department of Computer Applications from 10.07.2025 to 11.07.2025 in Seminar Hall-A. A total of 180 students from I MCA attended the program.
The objectives of this program were to enable participants to:

1. **Introduce the fundamentals of clinical image classification** and its importance in modern healthcare diagnostics.
2. **Provide an overview of deep learning approaches** applied to medical imaging, with a focus on classification tasks.
3. **Explore the working principles of ensemble learning models**, specifically AdaBoost and XGBoost, and their relevance in improving classification accuracy.
4. **Demonstrate the integration of AdaBoost and XGBoost with deep learning frameworks** for enhanced clinical image classification.
5. **Enable students to understand real-world applications and case studies** involving disease detection using this hybrid AI models.

The program commenced with an inaugural session on 10th July 2025. Dr. N.Naveen Kumar, HOD, Department of Computer Applications, delivered the welcome address, Dr. C.Sivaraj, Associate Professor, introduced the resource person Dr. P. Shanmuga Vadivu, Senior Professor, Department of Computer Science & Applications, The Gandhigram Rural Institute (Deemed to be University), Gandhigram.

Day 1: 10.07.2025, Thursday
The first day of the guest lecture focused on introducing the fundamental concepts of clinical image analysis and deep learning architectures. Dr. P. Shanmugavadivu provided a comprehensive overview of the following key topics:



Topics Covered on Day 1:

1. **Basics of Clinical Image Data:**
    - Types of clinical images (MRI, CT, X-ray, PET).
    - Data pre-processing techniques.
    - Importance of image annotation and labelling.
2. **Deep Learning Overview:**
    - Introduction to CNNs (Convolutional Neural Networks).
    - Architecture and layers in CNN models.
    - Activation functions, pooling, and backpropagation.
3. **Challenges in Medical Image Classification:**
    - Limited labelled data.
    - High intra-class variance.
    - Class imbalance problems.
4. **Introduction to Ensemble Models:**
    - Definition and importance of ensemble learning.
    - Bagging vs Boosting: A comparative discussion.
5. **Detailed Explanation of AdaBoost:**
    - Algorithmic approach.
    - Weak learners and iterative improvement.
    - Use cases in binary classification.

The session concluded with a Q&A interaction, where students clarified their doubts regarding CNN implementation and the feasibility of combining deep learning with traditional machine learning methods.

Day 2: 11- July- 2025

The second day began with a recap of Day 1, followed by advanced discussions on integrating deep learning with ensemble techniques and real-world implementations.

Topics Covered on Day 2:
XGBoost Model for Classification:

- Mathematical foundation and architecture.
- Feature importance and regularization.
- Comparison with AdaBoost and Gradient Boosting.

Hybrid Approach: RF + XGBoost:

- Feeding extracted features into XGBoost for classification.
- Advantages of hybrid models in medical image diagnosis.

Model Evaluation Metrics:

- Accuracy, Precision, Recall, and F1-Score.
- Confusion Matrix and ROC curve interpretation.
- Cross-validation techniques for medical datasets.

Ethics and Future Scope:

- Ethical concerns in AI-based diagnostics.
- Importance of explainability and model transparency.
- Career and research opportunities in Medical AI.

The resource person emphasized the **practical relevance** of these models and provided **insights into deploying such systems in real-world healthcare applications**. He also encouraged students to take up minor/major projects in the field of medical imaging and AI.
The two-day guest lecture was highly informative, bridging theoretical concepts with practical implementations in clinical image classification. Dr. Shanmuga Vadivu's expertise provided valuable insights into the latest advancements in deep learning for medical imaging. The sessions were interactive, with hands-on demonstrations that enhanced the learning experience.

The session ended with a **feedback collection** and a **formal valedictory ceremony**. Students shared positive responses, stating that the session gave them a deep understanding of how machine Learning principles are shaping the future of healthcare.

Outcomes of the program: The program provided significant learning outcomes for the participating I MCA students, including:

- Gained deep learning & ensemble techniques (CNN, AdaBoost, XGBoost) for medical imaging
- Learned about ensemble techniques (AdaBoost, XGBoost) and their integration with deep learning for improved accuracy.
- Implemented models using Python (TensorFlow/Keras) & evaluated performance
- Learned preprocessing (normalization/augmentation) for medical images
- Understood challenges in deploying AI solutions in healthcare
- Inspired to pursue projects/research in medical AI
- Improved practical problem-solving skills for real-world applications

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We sincerely thank the **Management** and **Principal** for their invaluable support and guidance, which were instrumental in the successful organization of this program. Their encouragement and provision of necessary resources ensured the smooth execution of this insightful guest lecture.