**SYNOPSIS**

**Project Group No.:** 24SOCU2134

**Register No:** **Name:**

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**Project Title:** Transparency in Glaucoma Diagnosis: Fundus Image Analysis With XAI-Based Classification.

**Name of the Guide**: Dr. Renuga Devi T Asst. Professor II, School of Computing

**Abstract:**

Glaucoma, a severe optic nerve ailment, poses grave risks to vision, often leading to permanent blindness if untreated. Timely detection via optic disk segmentation and categorization of glaucomatous traits in fundus images is crucial for effective intervention. Leveraging machine learning advancements, convolutional neural networks (CNNs) are pivotal tools, for analyzing cup-to-disc ratio (CDR) features extracted from fundus images. To enhance CNN prediction interpretability and transparency, Explainable Artificial Intelligence (XAI) techniques visualize salient regions in fundus images, like Gradient-weighted Class Activation Mapping (Grad-CAM), elucidating AI algorithm workings. We use saliency maps for validating our prediction Grad-CAM is one of the ways of implementing saliency maps. We also use a concept called Global Average Pooling (GAP) in our Grad-CAM. This fosters clinician trust, particularly in resource-scarce settings, facilitating responsible adoption of AI-driven glaucoma detection and management solutions. However, it is used only for early detection of glaucoma patients can be warned in early stages itself so that further complications can be avoided by treating the disease in early stages itself. Moreover, this study offers personalized intervention recommendations, proposing suitable lenses based on the glaucoma progression stage. The recommended lens can act as a temporary solution for this issue. Following which a medical consultation is recommended.

**Specific Contribution:**

* Implementing InceptionV3, ResNet50, and VGG19 architectures in the CNN model, Executing Grad-CAM for VGG19 & InceptionV3.

**Specific Learning: -**

* A clear idea of Explainable AI techniques, Deep understanding of different architectures in CNN

**Technical Limitations & Ethical Challenges Faced: -**

* CDR was the only feature the model could identify.

***Keywords:*** *ResNet -Residual Network, VGG - Visual Geometry Group, GRAD-CAM*