ACKNOWLEDGEMENT

We would like to take this opportunity to thank our college **Rajiv Gandhi Institute of Technology,** Bengaluru for providing us with an opportunity to carry out this project work.

We express our gratitude to **Dr. D G Anand,** Principal, RGIT, Bengaluru for providing the resources and support without which the completion of this project would have been a difficult task.

We extend our sincere thanks to **Dr. Arudra A,** Associate Professor and Head of the Department of Computer Science and Engineering, RGIT, Bengaluru, for being a pillar of support and encouraging us in face of all adversities.

We would like to acknowledge the through guidance and support extended towards us by **Mrs. Deepti N N,** Assistant Professor, Dept. of CSE, RGIT, Bengaluru, and project coordinators **Dr. Latha P H,** Assistant Professor, Dept. of CSE, RGIT, Bengaluru, **Mrs. Bhagyashri Wakde,** Assistant Professor, Dept. of CSE, RGIT, Bengaluru. Their incessant encouragement and valuable technical support have been of immense help. Their guidance gave us the environment to enhance our knowledge, skills and to reach the pinnacle with sheer determination, dedication and hard work.

We also extend our thanks to the entire faculty and support staff of the Department of Computer Science and Engineering, RGIT, Bengaluru, who has encouraged us throughout the course of Bachelor's Degree.

We want to thank my family for always being there with full support and for providing us with a safe haven to conduct and complete our project. We are ever grateful to them for helping us in these stressful times. Lastly, we would like to acknowledge all the helpful insights given to us by all our friends during the course of this project.

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ABSTRACT

Diabetic Retinopathy (DR) is a leading cause of vision loss in diabetic patients, making early and accurate diagnosis essential. This project, titled “Transparent Diagnosis for Diabetic Retinopathy,” presents an explainable deep learning system using the EfficientNet-B0 model to classify retinal fundus images into five DR stages—No DR, Mild, Moderate, Severe, and Proliferative. The dataset, sourced from Kaggle, undergoes preprocessing steps including resizing, grayscale conversion, contrast enhancement, Gaussian blurring, and edge detection to improve feature clarity. Data augmentation through zooming, rotation, and flipping helps address class imbalance and improve generalization. The model achieved an accuracy of 97.4%, validated through precision, recall, and F1-score metrics. Grad-CAM visualization is integrated to provide transparent, interpretable results highlighting key retinal regions influencing the diagnosis. The system is deployed through a Flask-based web application, allowing users to upload images, receive predictions, and download diagnostic reports containing disease stages, causes, and treatment suggestions. This solution enhances trust, interpretability, and accessibility in automated DR detection for real-world medical applications.

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