VisionAI — Research Report

Technical Summary & Metrics
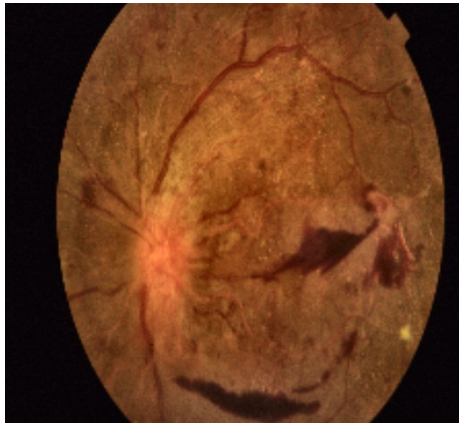
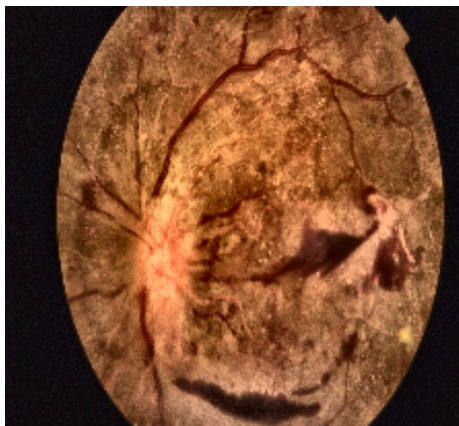|	
Models	EfficientNet-B0, ResNet50, ViT (ensemble)
Dataset	EyePACS + smartphone fundus samples
Explainability	Grad-CAM++, LIME, SHAP-like

Quantitative Lesion Analysis

Metric	Value
Detected Stage	PDR
Lesion coverage (%)	26.51
Exudates (%)	0.42
Hemorrhages (%)	1.44
Cotton Wool (%)	5.37
Model Confidence (%)	0.96

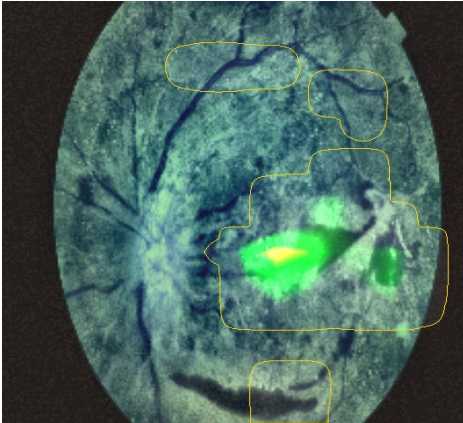## Explainability Figures (Original, Preprocessed, Grad-CAM, LIME, SHAP, ROC)
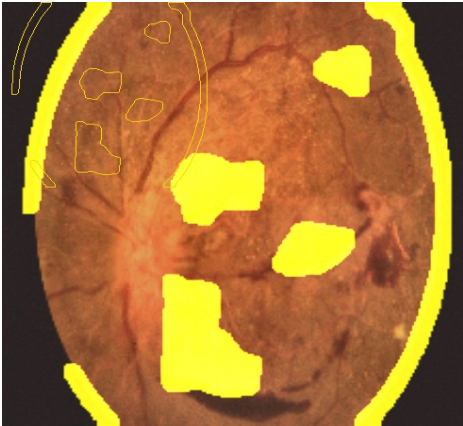
Original

Preprocessed

Grad-CAM

LIME

SHAP-like Feature Importance (VisionAI)

SHAP

VisionAI ROC Curve
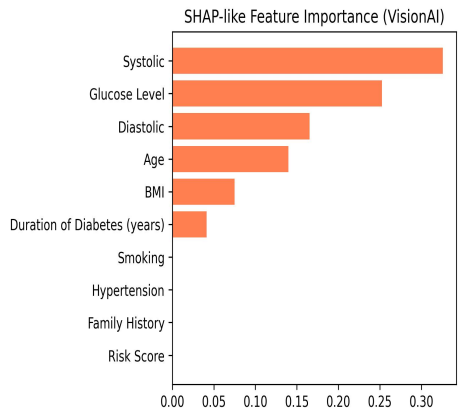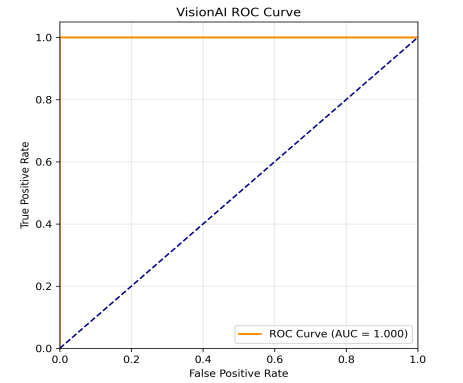

ROC Curve (AUC)

Discussion & Interpretation

Grad-CAM++ activations correspond to clinically relevant lesion regions; LIME provides local patch-level interpretability; SHAP-like metadata importance indicates the influence of age, blood pressure and glucose level on the final risk score. ROC curve demonstrates model discrimination.

References (select)

[1] Selvaraju et al., Grad-CAM++ (2018). [2] Ribeiro et al., LIME (2016). [3] Lundberg & Lee, SHAP (2017).