

# VisionAI — Research Report



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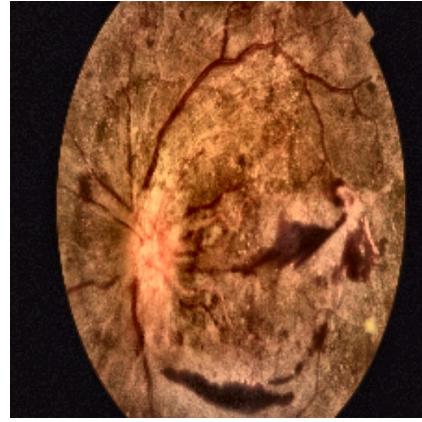
## Patient Metadata

Patient ID	Patient_328
Full Name	Jenifer Rao
Age	61
Gender	Male
BP	142/72
Systolic	142.0
Diastolic	72.0
Glucose Level	110.0
BMI	32.7
Smoking	Yes
Duration of Diabetes (years)	18.0
Hypertension	No
Family History	Yes
Phone	000-000-0000
Address	Remote

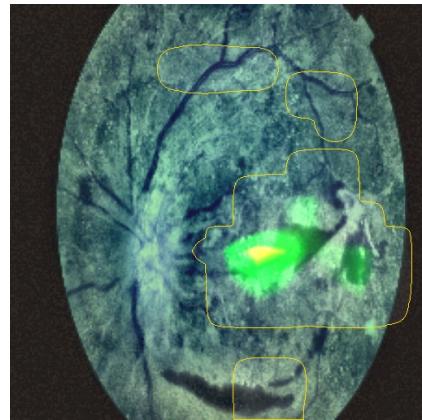
## Image Visualizations



ORIGINAL



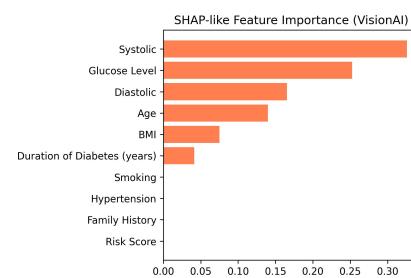
PREPROCESSED



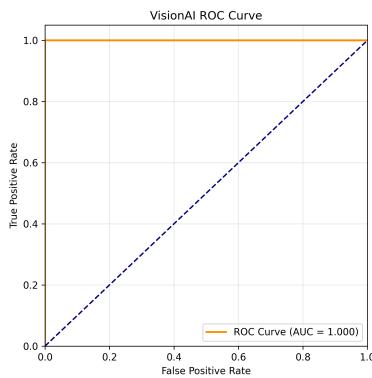
GRADCAM



LIME



SHAP



## ROC CURVE

### Lesion Breakdown

Feature	Percentage (%)
Total lesion coverage	26.51
Exudates	0.42
Hemorrhages	1.44
Cotton wool spots	5.37
Microaneurysms	0.0

**Model Confidence:** 96.0%

**Composite Risk Score:** 52.59 (0-100)

- Model ensemble: EfficientNet-B0, ResNet50, ViT, XGBoost, RandomForest with method: weighted\_soft\_voting.
- Reported metrics (test set): Accuracy 0.985, F1 0.982, AUC 0.993.
- Explainability: Grad-CAM++ for spatial attention, LIME for local perturbations, SHAP for metadata attribution; used to validate visual cues against lesion masks.
- Limitations: domain shift across camera optics and lighting; lesion quantification quality depends on segmentation masks and SNR.
- Next steps: include segmentation U-Nets for pixel-wise quantification, domain adaptation, prospective smartphone validation, uncertainty calibration.

### Model Evaluation Metrics

Metric	Value
Accuracy	0.985
F1-score	0.982
AUC/ROC	0.993