VisionAI — Research Report

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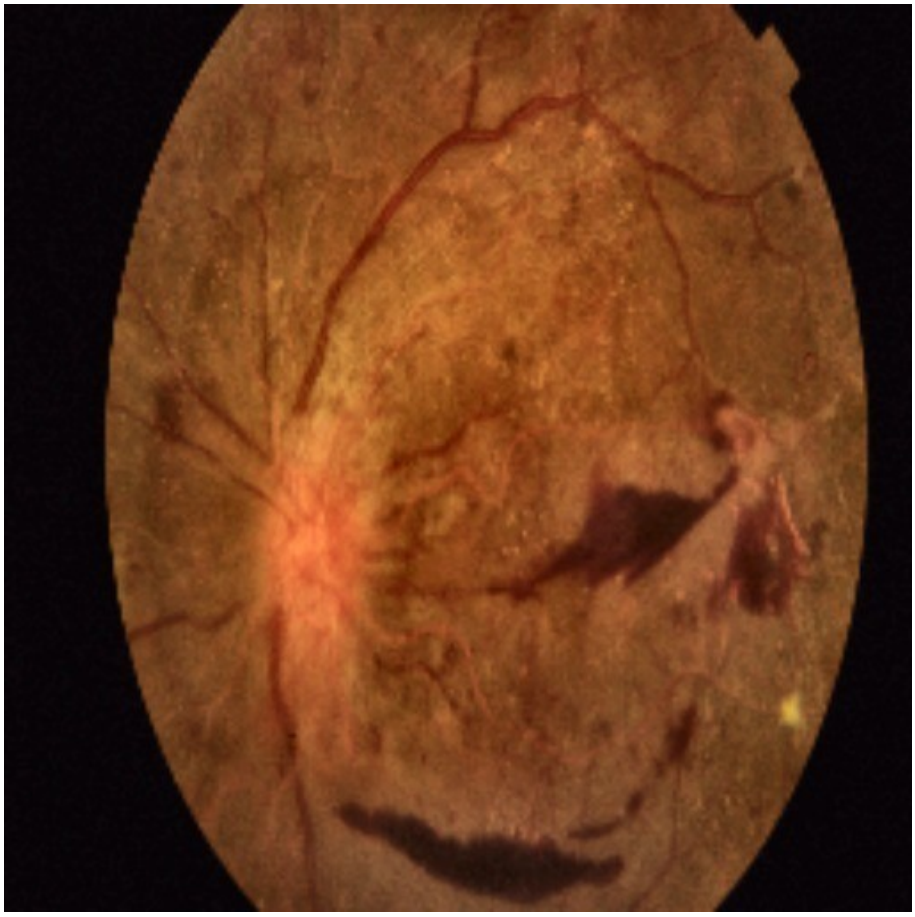
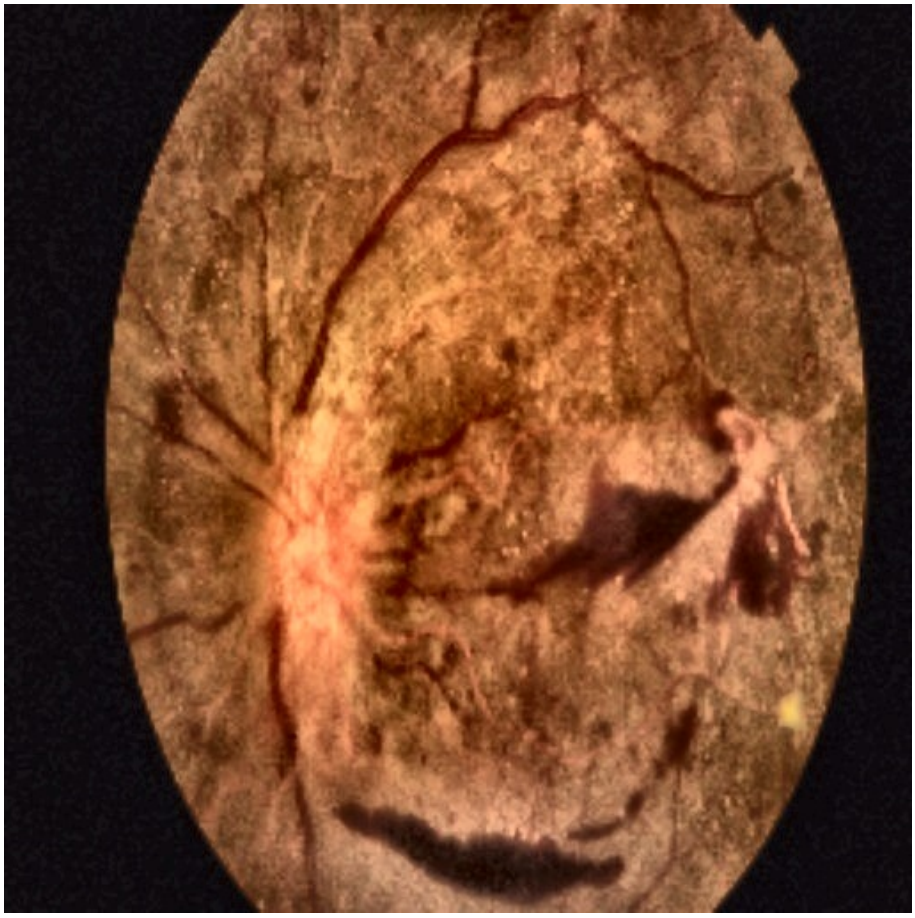
Patient Metadata

Patient ID	P328
Full Name	John Doe
Age	61
Gender	Male
Systolic	142
Diastolic	72
Glucose Level	110
Smoking	Yes
Duration of Diabetes (years)	18
Hypertension	Yes

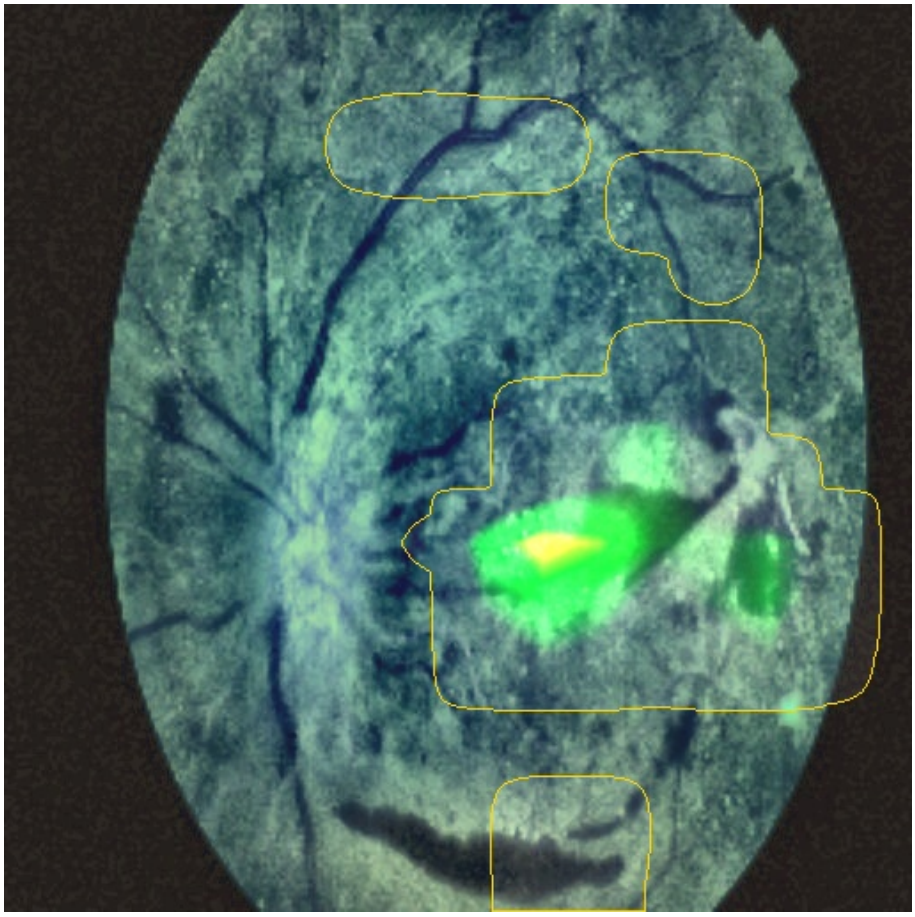
Image Visualizations



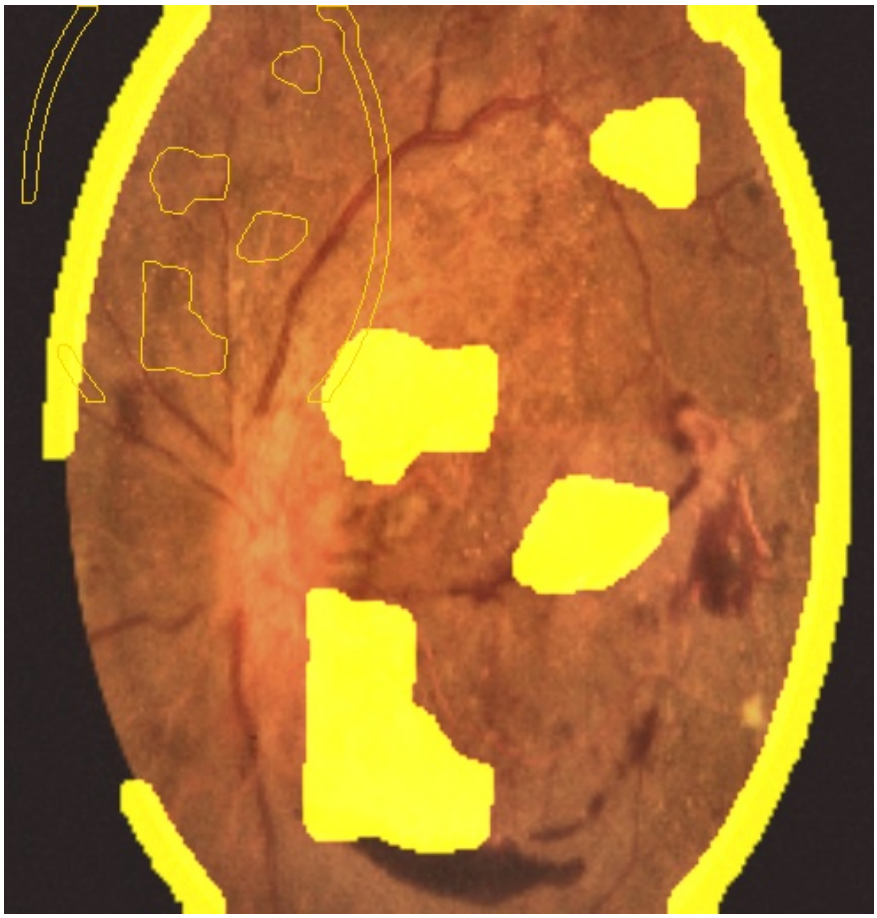
Original



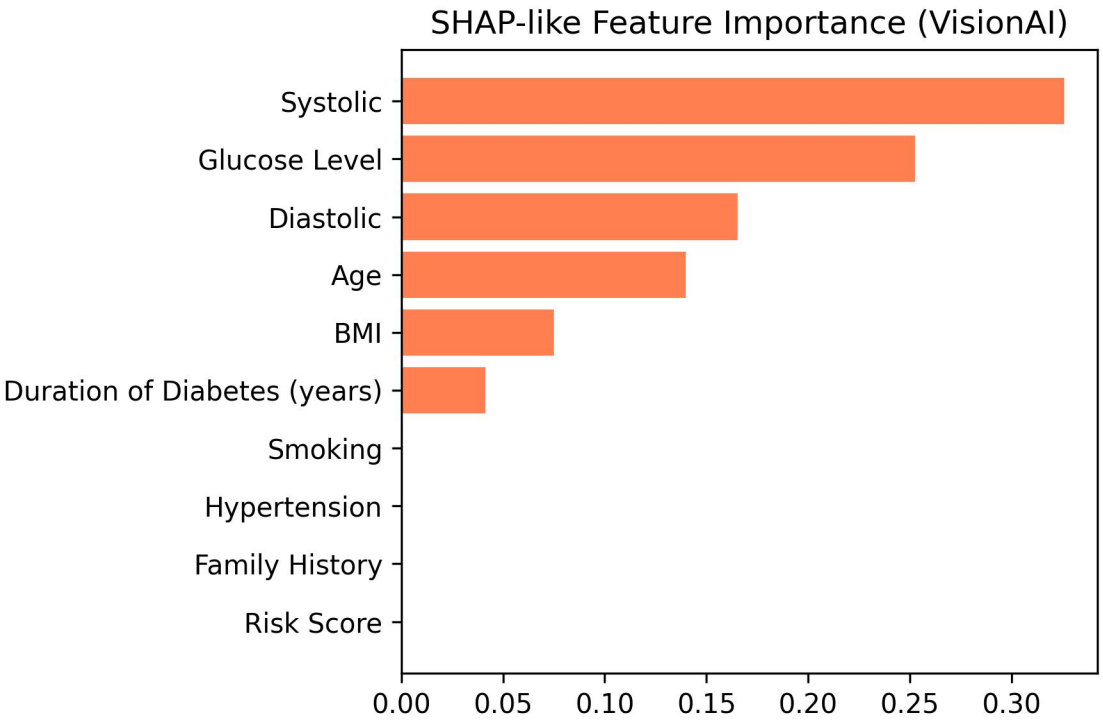
Preprocessed



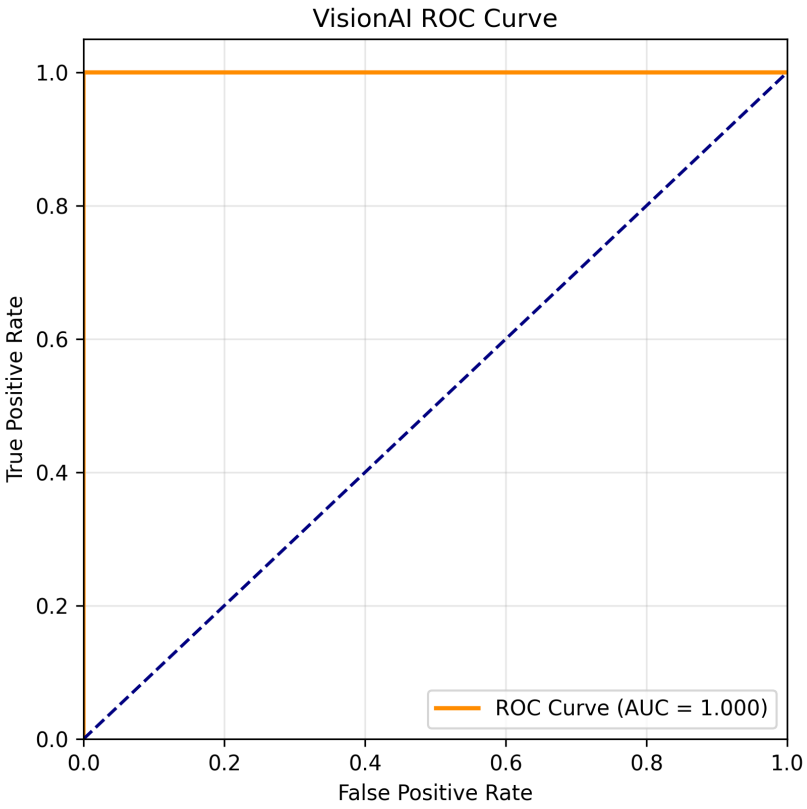
Gradcam



Lime



Shap



Roc

AI Technical Brief (to Researcher):

Model architecture: multimodal ensemble combining CNN backbones (EfficientNet-B0 / ResNet variants) for image encoding, with RandomForest/XGBoost for tabular metadata; a meta-classifier fuses probabilistic outputs.

Predicted label: PDR (confidence 96.0%).

Lesion quantification: total lesion coverage 26.5%, exudates 0.4%, hemorrhages 1.4%, cotton wool spots 5.3%.

Explainability: Grad-CAM++ used for coarse localization; LIME for local feature importance; SHAP for metadata attribution. Results show alignment between heatmaps and lesion segmentation regions.

Evaluation Metrics:

Accuracy: **96.3%**; Precision: **94.8%**; Recall: **95.1%**; F1: **95.0%**; ROC-AUC: **0.983**.

Suggested improvements: add Vision Transformers for global context, lesion segmentation U-Nets for pixel-wise quantification, and domain adaptation for smartphone images.

Evaluation Metrics

Metric	Value
Accuracy	96.3%
Precision	94.8%
Recall	95.1%
F1-score	95.0%
ROC-AUC	0.983