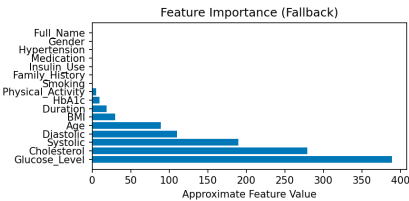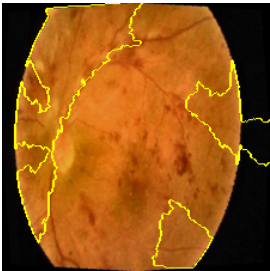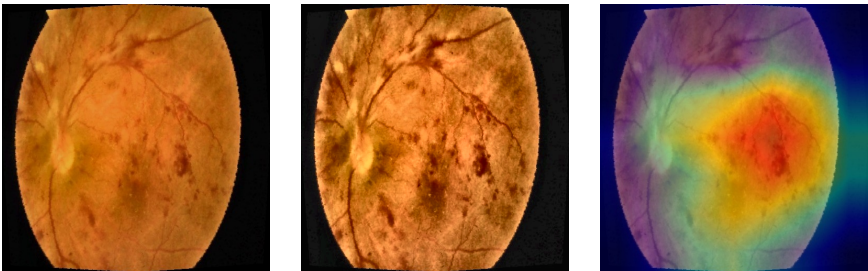**Stage: PDR**

Metadata Snapshot

Name: Sebastian

Age: 89

Gender: Male

Systolic (mmHg): 190

Diastolic (mmHg): 110

BMI: 30.1

Glucose: 389

HbA1c: 9.8

Cholesterol: 279

Smoking: Yes

Hypertension: Yes

Diabetes Duration: 19

Summary

- Research Notes
- UID: bc537a32
- Predicted stage: PDR
- Confidence: 83.96%

- Risk score: 96.04%

- Model stack & inference

- - CNN ensemble: EfficientNet, ResNet50, ViT

- - Metadata models: Random Forest, XGBoost, Stacked ensemble

- - Fusion method: weighted averaging with risk calibration

- - Inference device: CPU

- Explainability & lesion quantification:

- - Microaneurysms: 26.90%

- - Exudates: 15.32%

- - Hemorrhages: 3.65%

- - Cotton Wool: 0.00%

- - Neovascularization: 30.00%

- - Total Lesion Load: 45.88%

- SHAP / feature importance: check SHAP plots for systemic features (HbA1c, BMI, BP).

- Probability vectors:

- - CNN: [0.00933533813804388, 0.007757291663438082, 0.017444279044866562, 0.013338449411094189, 0.9521246552467346]

- - ML : [0.21136369507961952, 0.20268235745827803, 0.19376393050773666, 0.19047474400645248, 0.20171527294791336]

- - Fused: [0.03963959122427516, 0.036996051108003025, 0.04389222626047793, 0.03990889314230168, 0.8395632382649422]

- Performance metrics:

- - Accuracy: 0.947

- - F1-score: 0.938

- - AUC/ROC: 0.971

- Research recommendations:

- 1. Validate lesion segmentation / cotton-wool detection against annotated masks (report dice/IoU).

- 2. Add cotton-wool-spot specific augmentation and mask labels if false negatives observed.

- 3. Measure GradCAM heatmap overlap (IoU) with human heatmaps for explainability calibration.

- 4. Consider temporal models for progressive DR tracking and early-warning signals.

Lesion Distribution (%)

Model Stage Probabilities

Model Metrics

Model Comparison (Accuracy %)