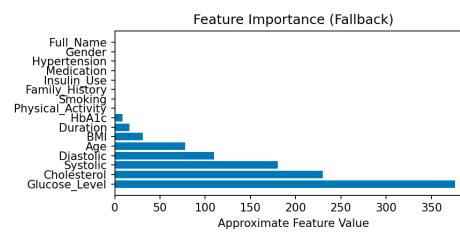
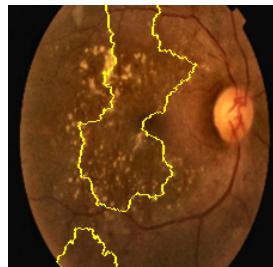
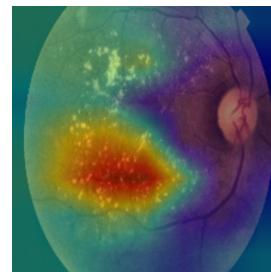


Metadata Snapshot

Name:	solomon
Age:	78
Gender:	Female
Systolic (mmHg):	180
Diastolic (mmHg):	110
BMI:	30.8
Glucose:	376
HbA1c:	8.6
Cholesterol:	230
Smoking:	Yes
Hypertension:	Yes
Diabetes Duration:	16



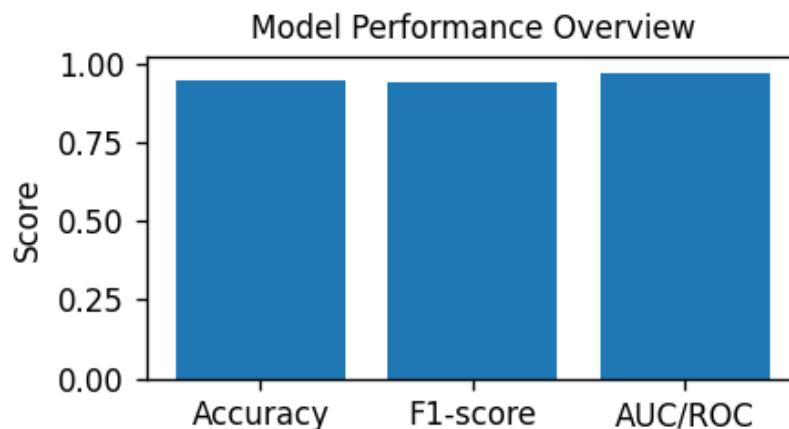
Research Findings

- Research Notes
- UID: bbca3e43
- Predicted stage: SEVERE
- Confidence: 83.6%
- Risk score: 95.42%
- Model stack and fusion:
 - CNN ensemble: EfficientNet, ResNet50, ViT
 - Metadata models: Random Forest, XGBoost, Stacked ensemble
 - Fusion method: weighted averaging with risk calibration
- Device used for inference: CPU
- Explainability summary:
 - GradCAM++ / LIME: localize exudates/hemorrhages in the posterior pole.

Research Findings

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- SHAP: systemic features (HbA1c, BMI, BP) show highest importance for risk estimation.
- Performance metrics:
- Accuracy: 0.947
- F1-score: 0.938
- AUC/ROC: 0.971
- Probability vector (fused): [0.04583035825762507, 0.03836910264489016, 0.04008035760254893, 0.8360139336333661, 0.03970624786156982]
- Recommendations for research:
 1. Validate lesion segmentation against expert masks (dice/IoU metrics).
 2. Add cotton-wool-spot augmentation / labeling to improve detection if false-negatives seen.
 3. Evaluate GradCAM fidelity vs human heatmaps; consider GradCAM region IoU as a metric.
 4. Consider temporal tracking for progressive DR detection (longitudinal data).



Model Metrics

- Accuracy: 0.947
- F1-score: 0.938
- AUC/ROC: 0.971