Research Notes

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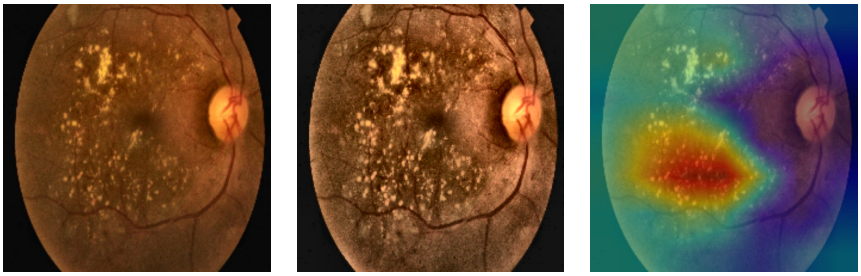
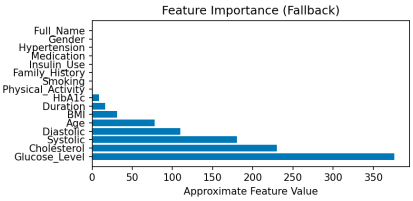
Stage: SEVERE

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: d346e08a
- Predicted stage: SEVERE
- Confidence: 83.6%
- Risk score: 95.42%
- Model stack & inference
- - CNN ensemble: EfficientNet, ResNet50, ViT
- - Metadata models: Random Forest, XGBoost, Stacked ensemble
- - Fusion method: weighted averaging with risk calibration

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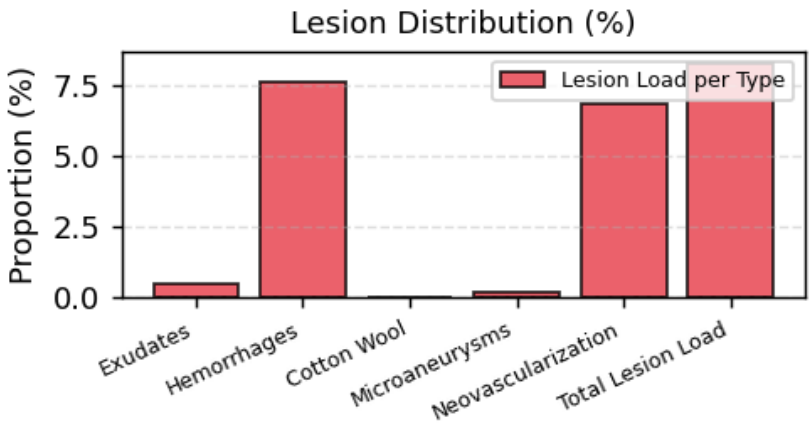
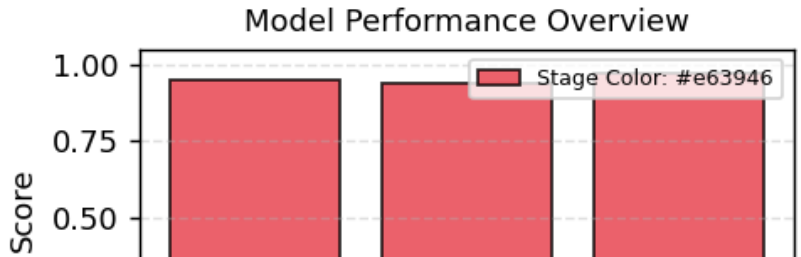
- - Inference device: CPU
- Explainability & lesion quantification:
- - Microaneurysms: 16.10%
- - Exudates: 49.30%
- - Hemorrhages: 7.65%
- - Cotton Wool: 0.00%
- - Neovascularization: 6.86%
- - Total Lesion Load: 8.31%
- SHAP / feature importance: check SHAP plots for systemic features (HbA1c, BMI, BP).
- Probability vectors:
- - CNN: [0.01661859080195427, 0.009372644126415253, 0.012959725223481655, 0.9499325752258301, 0.011116418056190014]
- - ML : [0.21136369507961952, 0.20268235745827803, 0.19376393050773666, 0.19047474400645248, 0.20171527294791336]
- - Fused: [0.04583035825762507, 0.03836910264489016, 0.04008035760254893, 0.8360139336333661, 0.03970624786156982]
- 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.





Model Metrics

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