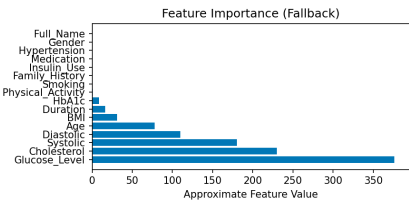
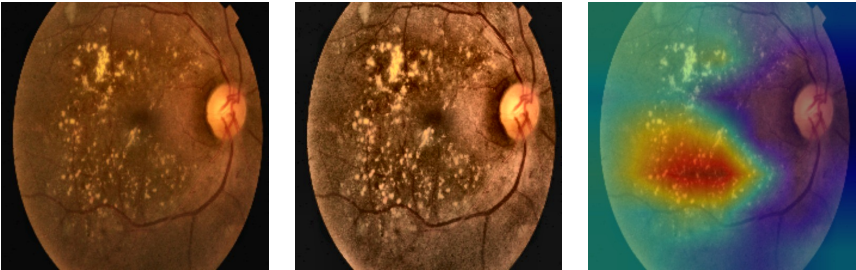


Stage: SEVERE

Metadata Snapshot

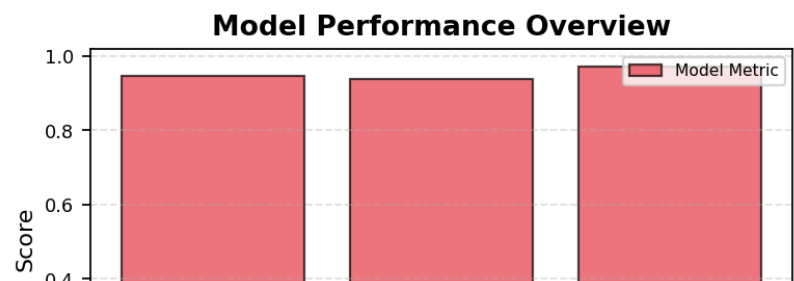
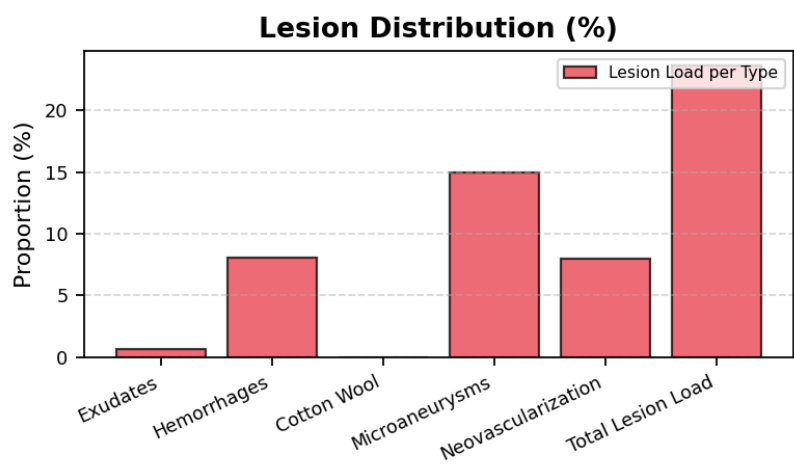
Name:	solomon
Age:	78
Gender:	Male
Systolic (mmHg):	180
Diastolic (mmHg):	110
BMI:	30.8
Glucose:	376
HbA1c:	8.6
Cholesterol:	230
Smoking:	Yes
Hypertension:	Yes
Diabetes Duration:	16



Research Findings

- Research Notes
- UID: 309d8013
- 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

- - Inference device: CPU
- Explainability & lesion quantification:
  - - Microaneurysms: 14.99%
  - - Exudates: 61.50%
  - - Hemorrhages: 8.02%
  - - Cotton Wool: 0.00%
  - - Neovascularization: 7.99%
  - - Total Lesion Load: 23.63%
- 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.



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- AUC/ROC: 0.971