Research Report

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Stage: PDR

Metadata Snapshot

Name: Sebastian

Age: 89

Gender: Male

Systolic (mmHg): 190

Diastolic (mmHg): 110

BMI: 30.1

Glucose: 389

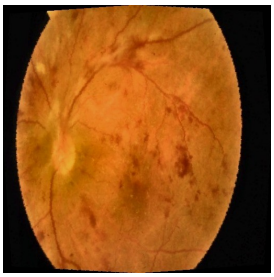
HbA1c: 9.8

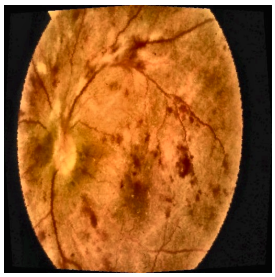
Cholesterol: 279

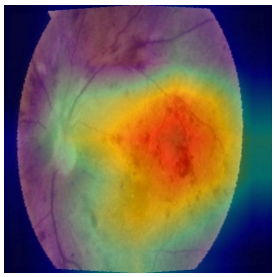
Smoking: Yes

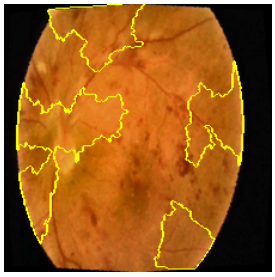
Hypertension: Yes

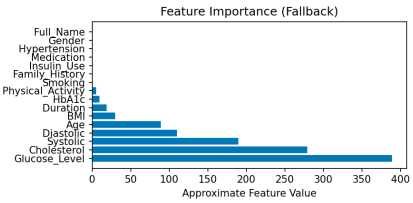
Diabetes Duration: 19











Summary

- Research Notes
- UID: cb771b61
- Predicted stage: PDR
- Confidence: 83.96%

Summary

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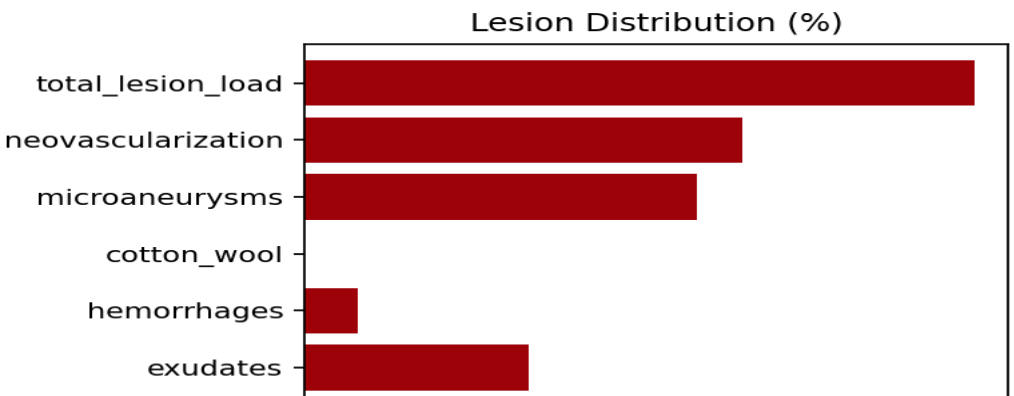
- Risk score: 96.04%
- Model stack & inference
- - CNN ensemble: EfficientNet, ResNet50, ViT
- - Metadata models: Random Forest, XGBoost, Stacked ensemble
- - Fusion method: weighted averaging with risk calibration
- - Inference device: CPU
- Explainability & lesion quantification:
- - Microaneurysms: 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.



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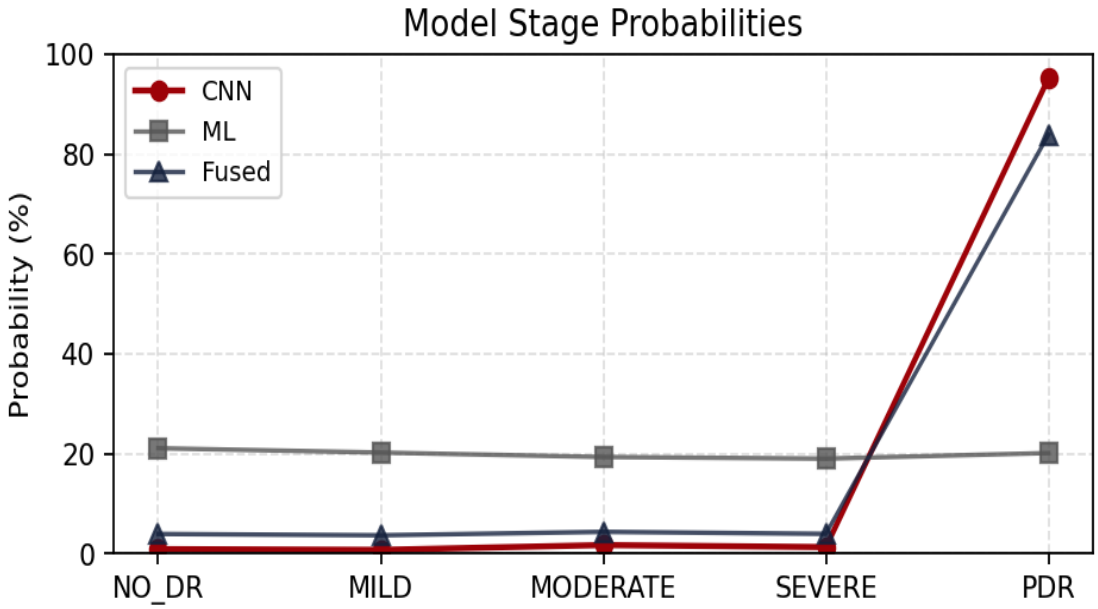

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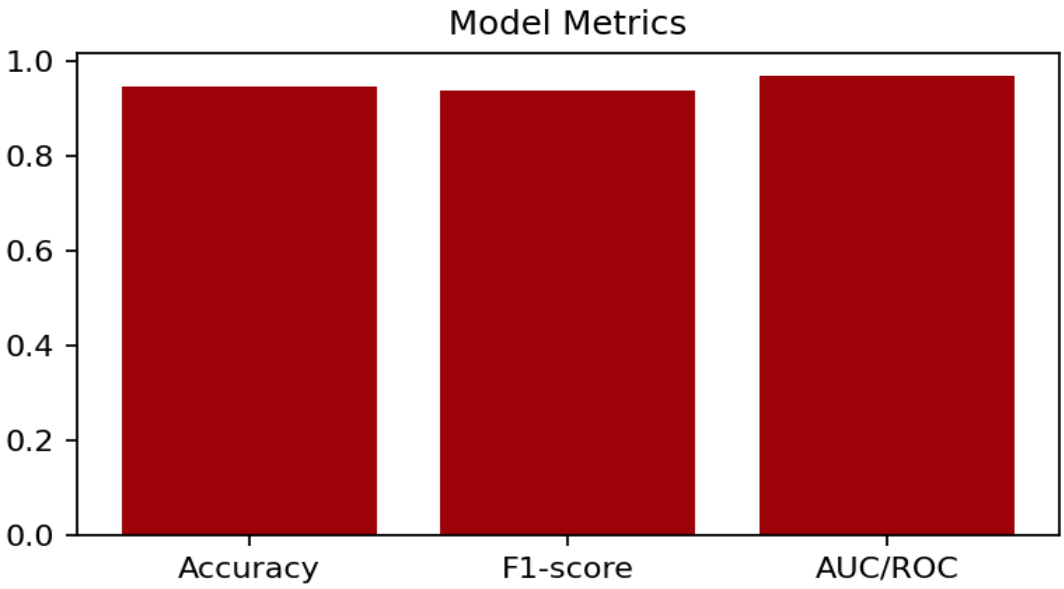

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