Research Report

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Stage: NO_DR

Metadata Snapshot

Name: jenifer

Age: 22

Gender: Female

Systolic (mmHg): 130

Diastolic (mmHg): 80

BMI: 30

Glucose: 148

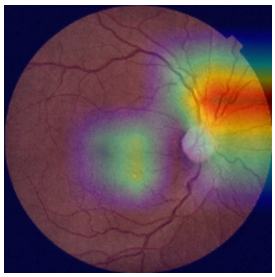
HbA1c: 5.4

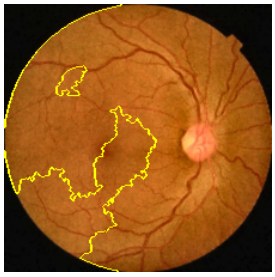
Cholesterol: 235

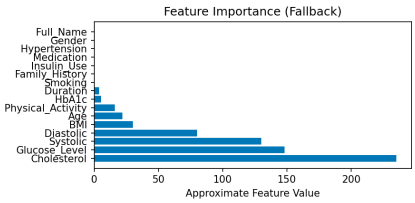
Smoking: No

Hypertension: No

Diabetes Duration: 4







Summary

- Research Notes
- UID: c0ba033c
- Predicted stage: NO_DR
- Confidence: 84.32%

Summary

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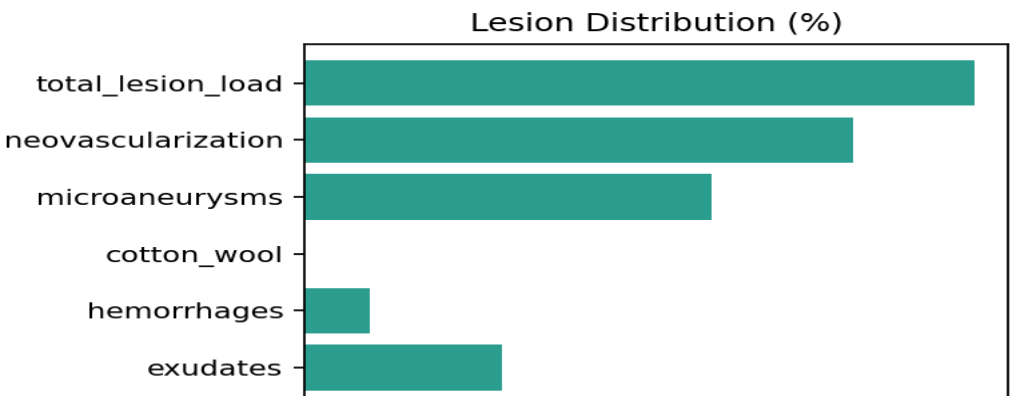
- Risk score: 15.68%
- Model stack & inference
- - CNN ensemble: EfficientNet, ResNet50, ViT
- - Metadata models: Random Forest, XGBoost, Stacked ensemble
- - Fusion method: weighted averaging with risk calibration
- - Inference device: CPU
- Explainability & lesion quantification:
- - Microaneurysms: 22.25%
- - Exudates: 10.81%
- - Hemorrhages: 3.56%
- - Cotton Wool: 0.00%
- - Neovascularization: 30.00%
- - Total Lesion Load: 36.63%
- SHAP / feature importance: check SHAP plots for systemic features (HbA1c, BMI, BP).
- Probability vectors:
- - CNN: [0.9547113180160522, 0.008773685432970524, 0.011920971795916557, 0.01217014528810978, 0.012423889711499214]
- - ML : [0.21136369507961952, 0.20268235745827803, 0.19376393050773666, 0.19047474400645248, 0.20171527294791336]
- - Fused: [0.8432091672330349, 0.03785998590708696, 0.039197415261363736, 0.03891583475698731, 0.04081759684152717]
- 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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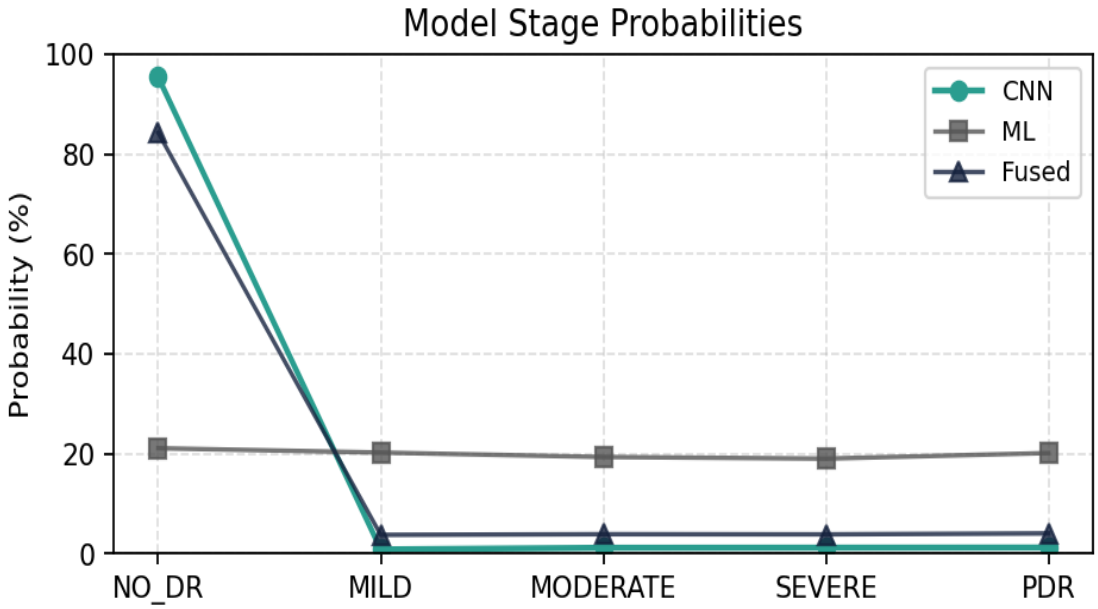

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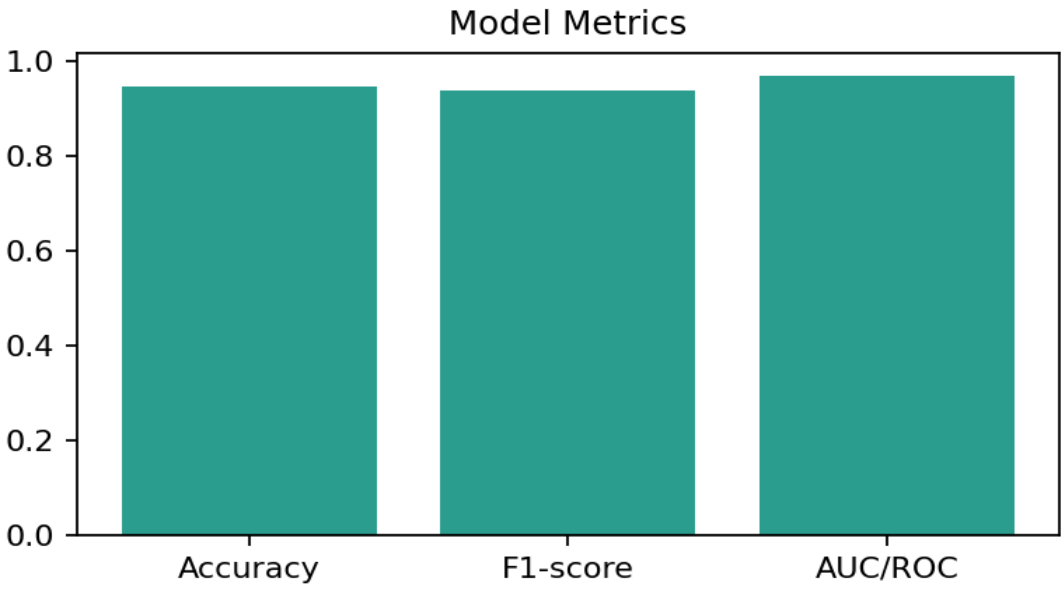

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