Research Notes

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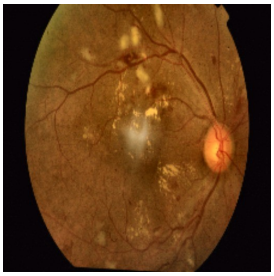
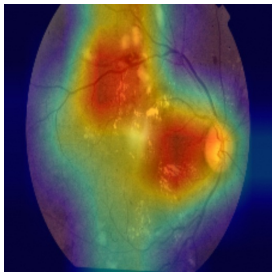
Metadata Snapshot

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: 92ad6e0d
- Predicted stage: MODERATE
- Confidence: 44.51%
- Risk score: 95.55%
- 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): [0.044482259415023734, 0.04311996028982296, 0.4450573868056451, 0.4225743614982674, 0.04476603199124101]
- 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

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