

Metadata Snapshot

Full Name: Jenifer
Age: 56
Gender: Female
Systolic: 180
Diastolic: 110
Glucose Level: 376
BMI: 30.8
Duration: 16
Smoking: Yes
Hypertension: Yes
Family History: Yes
Cholesterol: 230
HbA1c: 8.6
Insulin Use: Yes
Physical Activity: 1
Medication: Yes

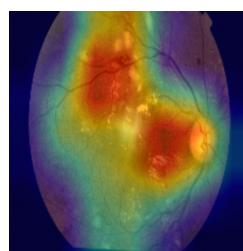
ORIGINAL



PROCESSED



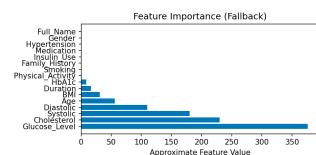
GRADCAM



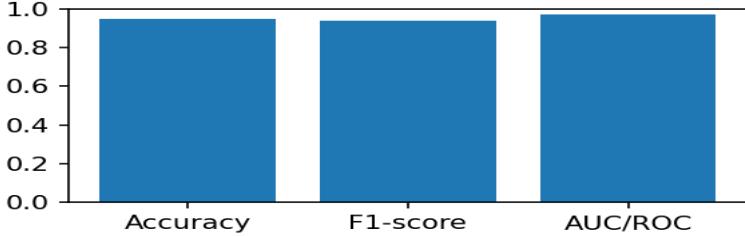
LIME



SHAP



Model Metrics



Model Metrics

Algorithmic Notes

The VisionAI pipeline uses an ensemble of CNN backbones (EfficientNet-B0, ResNet50, ViT) with metadata fusion via a small gradient-boosted and tree-based ensemble. Training used focal loss and class rebalancing to reduce sensitivity to class imbalance. Explainability is provided by Grad-CAM (spatial), LIME (local superpixel), and SHAP (global feature importance).

Research Commentary

Model classification: MODERATE NPDR. Ensemble features show concordant activation in grad-CAM across macular and temporal regions.

Notes: Investigate feature attribution (SHAP) for metadata predictors driving staging; consider calibrated probability outputs for clinical thresholds.