Diabetic Retinopathy Patient Explanations

AI-Generated Screening Reports for Individual Patients
Generated on diabetic-retinopathy - Assignment 4 Deliverable

Patient 1 Report

Diabetic Retinopathy Screening Report

Computer-Assisted Eye Disease Detection

Generated on November 25, 2025 at 06:17 PM

PATIENT INFORMATION

Patient ID:
2cf18033da31
Age:
65 years
Gender:
F
Screening Date:
November 25, 2025
True Diagnosis:
Class 0 (No DR)

SCREENING RESULT

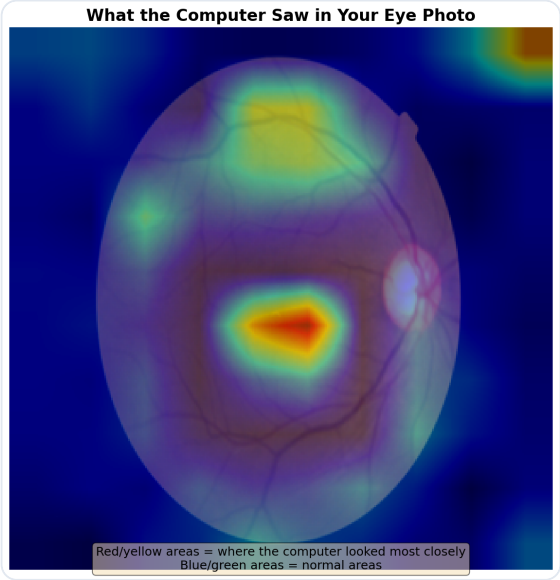
No DR

Confidence Level: 99%

The computer is 99% confident about this result.

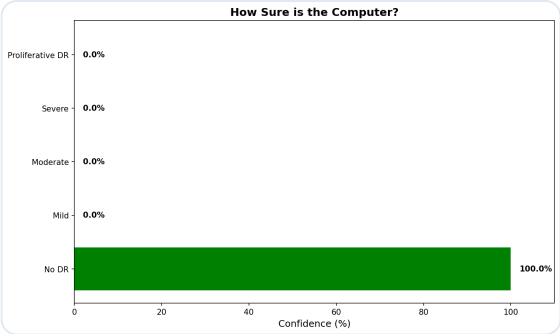
✓ **Prediction matches actual diagnosis**

VISUAL EXPLANATION



Areas highlighted show where the computer focused its attention during analysis

CONFIDENCE BREAKDOWN



How confident the computer is for each disease level

DETAILED EXPLANATION

Patient Information:

- • Age: 65 years old
- • Gender: Female
- • Screening Date: Today

WHAT WE FOUND

- ✓ Good News: No Signs of Eye Disease Found

The computer screening tool looked at your eye photo carefully. It checked your blood vessels and other parts of your eye. Everything looks healthy and normal.

HOW SURE IS THE COMPUTER?

The computer is 99% confident about this result.

This is a high confidence score. The computer is very sure about what it saw.

HOW THE COMPUTER ANALYZES YOUR EYE

The computer uses a technique called 'Grad-CAM' to highlight areas that help it make decisions. This shows which parts of your eye it focused on:

- • Blood vessels and their patterns
- • Areas that might show bleeding or fluid leakage
- • Changes in the retina structure
- • Overall eye health indicators

The colored highlight areas in your report show where the computer 'looked' most carefully.

WHAT TO DO NEXT

- ✓ Come back for another screening in 1 year
- ✓ Keep managing your diabetes with your regular doctor
- ✓ Tell your doctor right away if your vision changes
- ✓ Control your blood sugar, blood pressure, and cholesterol

IMPORTANT REMINDERS

- • This is a SCREENING tool, not a final diagnosis
- • Only a real eye doctor can give you a complete diagnosis
- • This tool helps find people who need to see a specialist
- • Even if the result is good, see an eye doctor regularly
- • Managing your diabetes is the best way to protect your eyes

DETAILED CONFIDENCE SCORES

How confident the computer is for each possibility:

No DR..... 100.0%

Mild..... 0.0%

Moderate..... 0.0%

Severe..... 0.0%

Proliferative DR..... 0.0%

⚠️ IMPORTANT REMINDERS

- **This is a screening tool, not a final diagnosis.** Only a trained eye doctor can give you a complete diagnosis.
- **See an eye doctor** for a thorough examination, especially if the screening shows any signs of disease.
- **Keep managing your diabetes** with your regular doctor. Good blood sugar control is the best way to protect your eyes.
- **Regular screenings are important.** Even if results are good, come back for regular check-ups.
- **Questions?** Ask the nurse or healthcare worker who performed your screening.

This report was generated by an AI-assisted diabetic retinopathy screening system.

For medical advice and treatment, please consult a qualified ophthalmologist.

Patient 2 Report

Diabetic Retinopathy Screening Report

Computer-Assisted Eye Disease Detection

Generated on November 25, 2025 at 06:17 PM

PATIENT INFORMATION

Patient ID:
82bb8a01935f
Age:
74 years
Gender:
F
Screening Date:
November 25, 2025
True Diagnosis:
Class 4 (Proliferative DR)

SCREENING RESULT

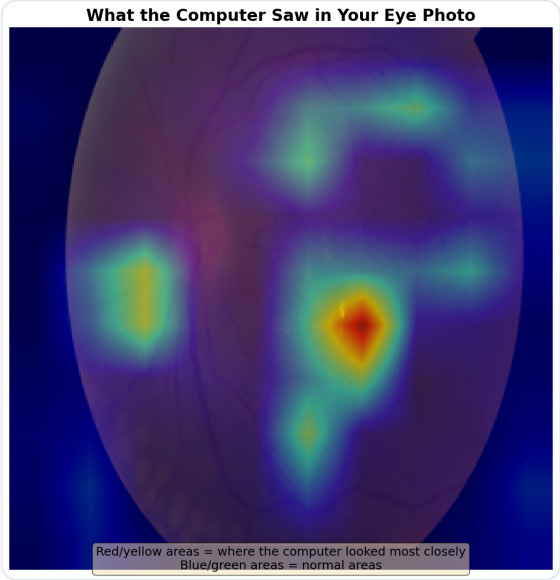
Moderate

Confidence Level: 96%

The computer is 96% confident about this result.

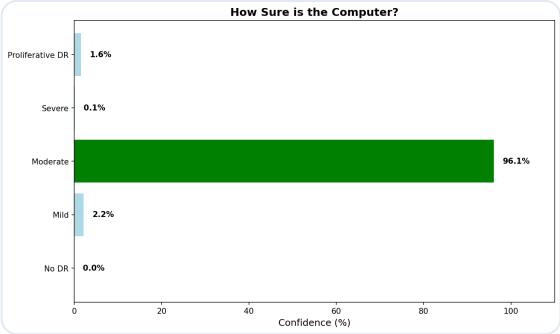
⚠ **Prediction differs from actual diagnosis**

VISUAL EXPLANATION



Areas highlighted show where the computer focused its attention during analysis

CONFIDENCE BREAKDOWN



How confident the computer is for each disease level

DETAILED EXPLANATION

Patient Information:

- • Age: 74 years old
- • Gender: Female
- • Screening Date: Today

WHAT WE FOUND

- ⚠ Moderate Changes Detected

The computer found changes in your eye that need attention from an eye doctor. There are signs of blood vessel damage. This doesn't mean you're going blind, but you should see a specialist soon.

HOW SURE IS THE COMPUTER?

The computer is 96% confident about this result.

This is a high confidence score. The computer is very sure about what it saw.

HOW THE COMPUTER ANALYZES YOUR EYE

The computer uses a technique called 'Grad-CAM' to highlight areas that help it make decisions. This shows which parts of your eye it focused on:

- • Blood vessels and their patterns
- • Areas that might show bleeding or fluid leakage
- • Changes in the retina structure
- • Overall eye health indicators

The colored highlight areas in your report show where the computer 'looked' most carefully.

WHAT TO DO NEXT

- ⚠ See an eye specialist (ophthalmologist) for a complete exam
- ⚠ Do this within the next few weeks
- ✓ Keep managing your diabetes with your regular doctor
- ✓ Control your blood sugar - this is very important!
- ✓ Tell your doctor if you notice any vision changes

IMPORTANT REMINDERS

- • This is a SCREENING tool, not a final diagnosis
- • Only a real eye doctor can give you a complete diagnosis
- • This tool helps find people who need to see a specialist
- • Even if the result is good, see an eye doctor regularly
- • Managing your diabetes is the best way to protect your eyes

DETAILED CONFIDENCE SCORES

How confident the computer is for each possibility:

No DR..... 0.0%

Mild..... 2.2%

Moderate..... 96.1%

Severe..... 0.1%

Proliferative DR..... 1.6%

⚠️ **IMPORTANT REMINDERS**

- **This is a screening tool, not a final diagnosis.** Only a trained eye doctor can give you a complete diagnosis.
- **See an eye doctor** for a thorough examination, especially if the screening shows any signs of disease.
- **Keep managing your diabetes** with your regular doctor. Good blood sugar control is the best way to protect your eyes.
- **Regular screenings are important.** Even if results are good, come back for regular check-ups.
- **Questions?** Ask the nurse or healthcare worker who performed your screening.

This report was generated by an AI-assisted diabetic retinopathy screening system.

For medical advice and treatment, please consult a qualified ophthalmologist.

How to Generate Reports for Additional Patients

This document shows two example patient reports generated by our AI explainability system. To create reports for new patients, follow these steps:

Method 1: Using the Command Line Tool (Recommended)

The easiest way to generate a new patient report:

```
python generate_patient_cli.py --patient_id NEW_ID --image_path path/to/
retinal_image.jpg
```

Method 2: Using the Jupyter Notebook

1. Open the patient explanation notebook: `notebooks/04_local_explanations.ipynb`
2. Navigate to the "Generate Complete Explanation for Each Patient" section (cell 8)
3. Update the patient selection in the earlier cells or modify the generation function
4. Run the `generate_patient_explanation()` function with new patient data
5. Check the `outputs/patient_reports/` folder for generated files

Method 3: Converting HTML Reports to PDF

To convert the HTML reports to a combined PDF (like this document):

```
python generate_local_pdf_from_html.py
```

This script automatically finds patient HTML reports and combines them into `explanation_local.pdf`

Required Files

- **model.h5** - The trained ResNet50 model
- **src/** folder - All utility modules for data processing and explanation generation
- **Patient retinal images** - JPG or PNG format, minimum 224×224 pixels

- **requirements.txt** - Python dependencies

Generated Output Files

For each patient, the system generates:

- `patient_X_report.html` - Interactive HTML report
- `patient_X_explanation_viz.png` - Visual explanation overlay
- `patient_X_simple_overlay.png` - Simplified heatmap
- `patient_X_confidence.png` - Confidence distribution
- `patient_X_multiclass_gradcam.png` - Multi-class analysis

Troubleshooting

- **Image loading issues:** Ensure images are in supported formats and accessible paths
- **Missing dependencies:** Run `pip install -r requirements.txt`
- **Model not found:** Verify `model.h5` is in the project root directory
- **Permission errors:** Check write permissions for `outputs/` folder

Important: These AI-generated reports are for screening purposes only. All results should be validated by qualified medical professionals before making clinical decisions.