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ELECTRICAL AND COMPUTER ENGINEERING

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# Automated Diabetic Retinopathy Detection

## 01 INTRODUCTION

Diabetic Retinopathy (DR) is a leading cause of preventable blindness globally, especially in Low- and Middle-Income Countries (LMICs) where specialist access is limited. Traditional fundus cameras are expensive (USD 20k-50k) and impractical for remote areas.



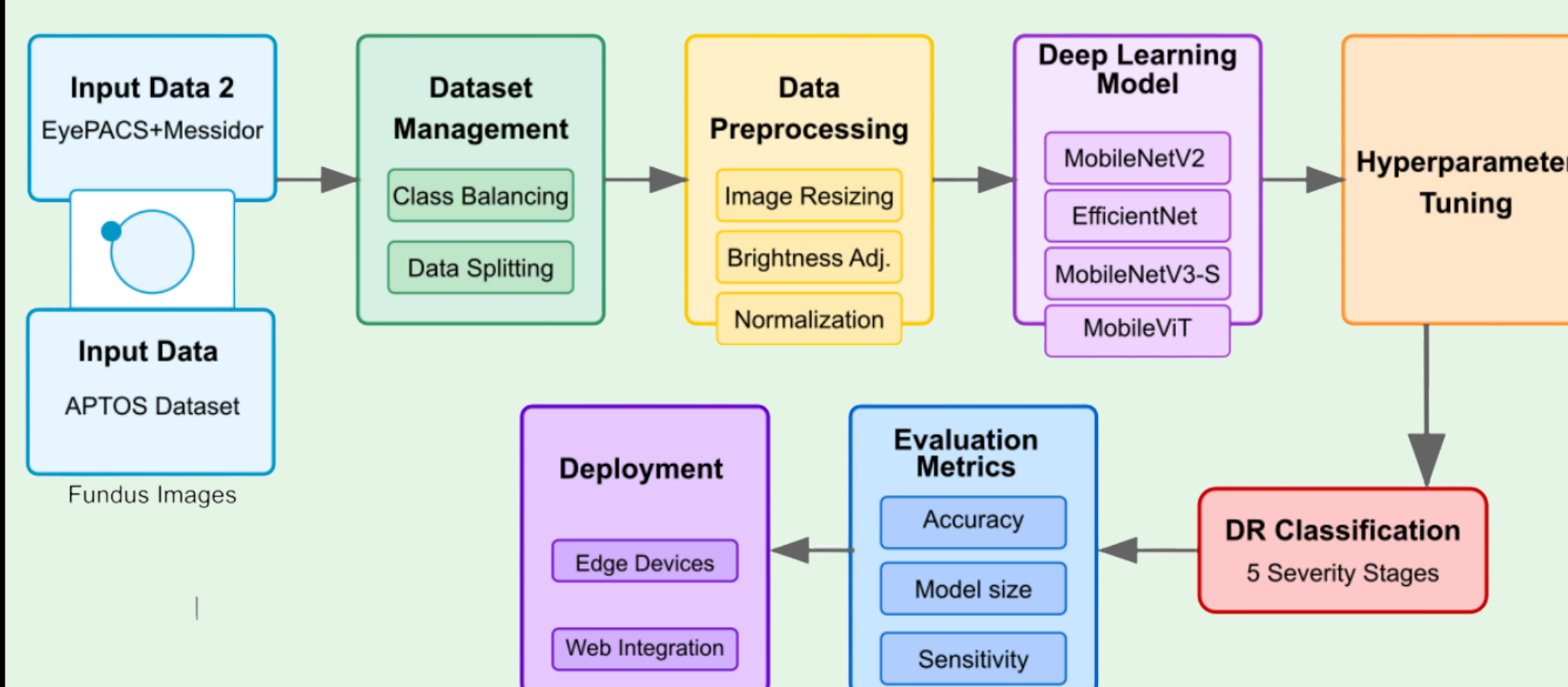
## 02 OBJECTIVE

- Develop a lightweight, portable deep learning model for edge devices.
- Create a user-friendly web interface for healthcare workers.
- Evaluate the model for accuracy, efficiency, and robustness



## 03 METHODOLOGY

A complete pipeline was designed for DR screening, from data acquisition to web-based deployment.



Dataset & Training: A balanced dataset of 15,000 images was created from EyePACS, APTOS, and Messidor sources. MobileNetV2 was optimized via: Post-training Quantization, Knowledge Distillation and Structured Pruning.

## 04 RESULTS

The customized MobileNetV2 achieved optimal balance of performance and efficiency.

**Specificity: 91.58%**

**Model Size: 8.88 MB**

## 05 WEB DEPLOYMENT

### Diabetic Retinopathy Detection

Upload fundus camera images to predict diabetic retinopathy stages for multiple people.

Number of People to Predict For:

Image for Person 1:  
 No file chosen

Image for Person 2:  
 No file chosen

**Image 1**  
**Predicted Class:** Severe DR (class 3)

**Probabilities:**

No DR (class 0): 0.38%  
Mild DR (class 1): 1.35%  
Moderate DR (class 2): 3.03%  
Severe DR (class 3): 90.64%  
Proliferative DR (class 4): 4.6%

**Image 2**  
**Predicted Class:** Proliferative DR (class 4)

**Probabilities:**

No DR (class 0): 0.18%  
Mild DR (class 1): 0.66%  
Moderate DR (class 2): 0.9%  
Severe DR (class 3): 2.16%  
Proliferative DR (class 4): 96.11%



## 06 CONCLUSION

This project delivers a lightweight (8.88 MB) DR detection framework with high specificity (91.58%). The web-based system provides a feasible, scalable solution for remote screening in Low- and Middle-Income Countries (LMICs), helping to prevent vision loss via early diagnosis.



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