

# Intelligent Agents: Medical Image Analysis

Hello everyone. I'm Diego, and I'll be presenting my final project for the Intelligent Agents course, focusing on medical image analysis using AI.



# Project Objective

The main objective was to train a Deep Learning model to classify endoscopic images of three gastrointestinal diseases:

 polyps       Esophagitis       Ulcerative Colitis

These systems can help doctors detect diseases more quickly and accurately.

# Dataset and Data Preparation

I used the Kvasir dataset, which contains real endoscopic images, organized by class and uploaded from Google Drive.

To improve the model's generalization, I applied data augmentation techniques such as rotation, zoom, and horizontal flipping, given the relatively small dataset.

# Model and Methodology

I implemented Transfer Learning with ResNet50, a neural network pre-trained on millions of images.

## Phase 1: Freeze Base Layers

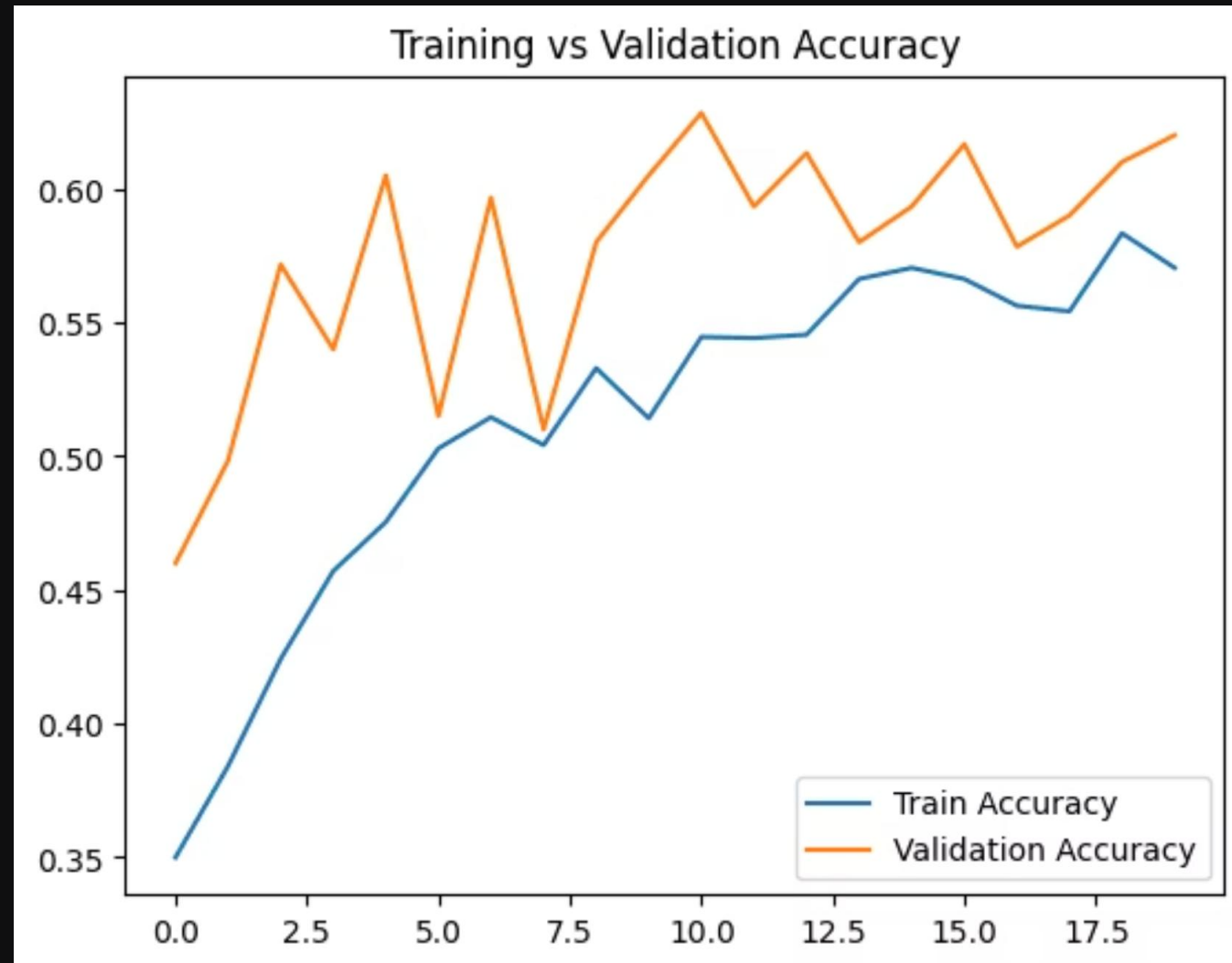
I trained only the top layers of the model.

## Phase 2: Fine Tuning

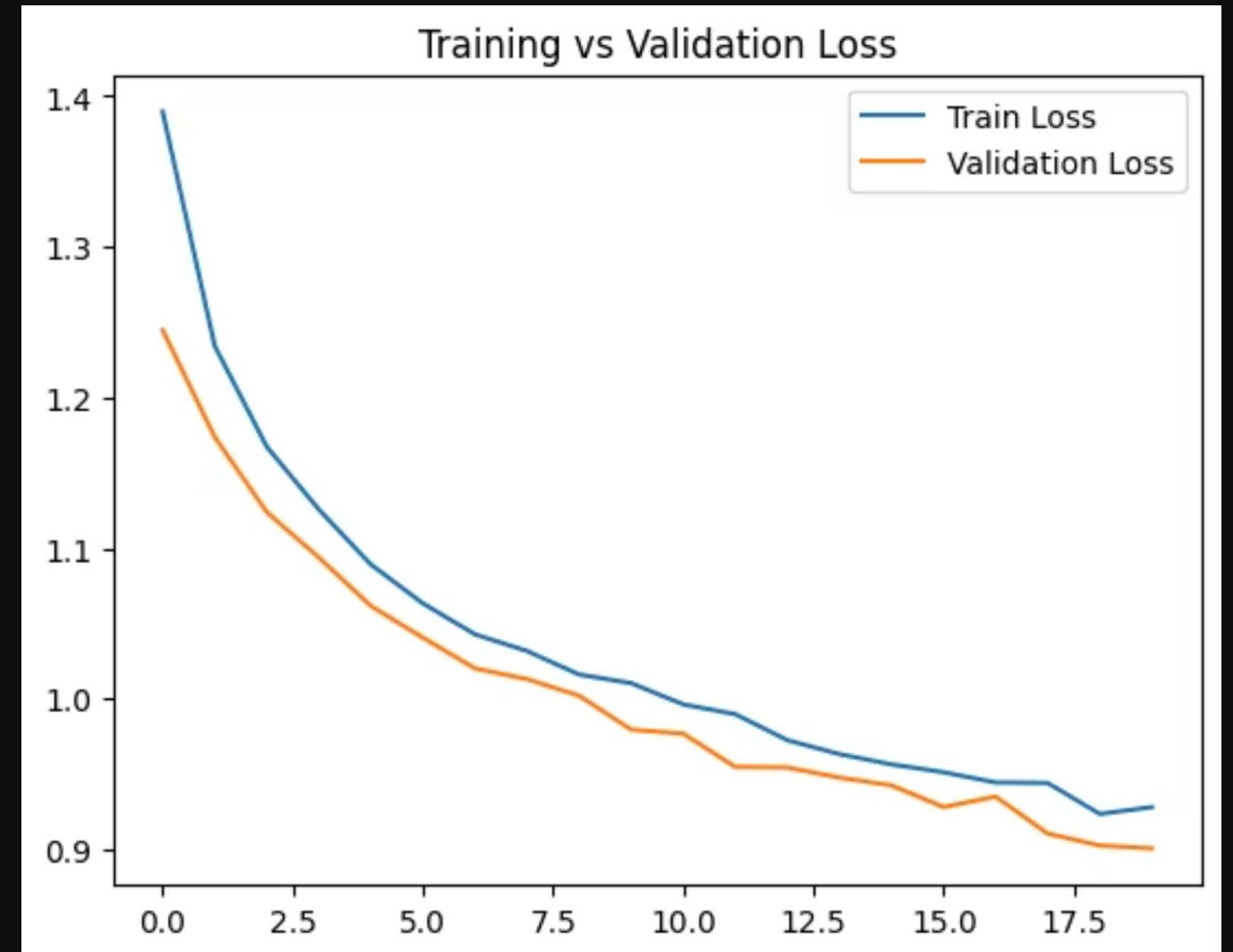
I tuned the last layers with a lower learning rate.

I also used Dropout to reduce overfitting and EarlyStopping to stop training when validation did not improve.

# Model Results



Validation accuracy reached 82.67%, showing solid performance with minimal overfitting.

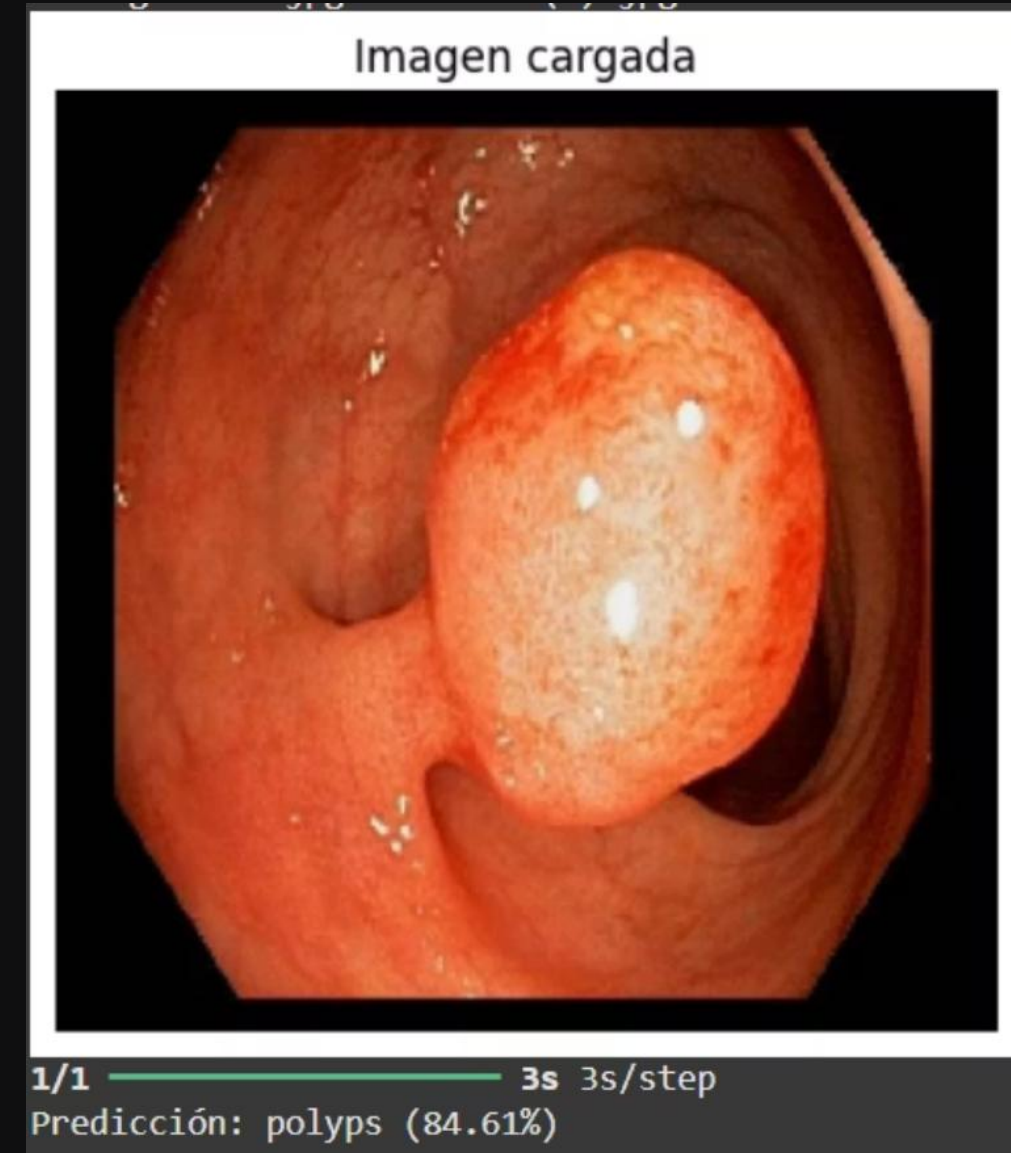


The validation loss remained low and close to the training loss, indicating that the model was not overfitting.

# Real-Time Prediction

The model can receive an image from the user or from Google Drive and predict which class it belongs to.

This simulates its use in a real medical tool, allowing for faster and more accurate diagnoses.



# Confusion Matrix

The confusion matrix shows the performance of the model for classifying esophagitis, polyps, and ulcerative colitis.

	Esofagitis (Pred)	Pólipos (Pred)	Colitis (Pred)
Esofagitis (Real)	69	79	52
Pólipos (Real)	76	83	41
Colitis (Real)	73	74	53

The model has difficulty clearly distinguishing between the three diseases, especially with ulcerative colitis.

# Conclusion and Next Steps

This project demonstrates how AI can support medical diagnosis with real-life images.



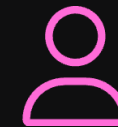
## More Diseases

Extend the model to include more diagnoses.



## Integrate Segmentation

Improve accuracy with image segmentation.



## User Interface

Develop a user-friendly visual interface.