



# Applications of ML in Multiple Sclerosis Diagnostics

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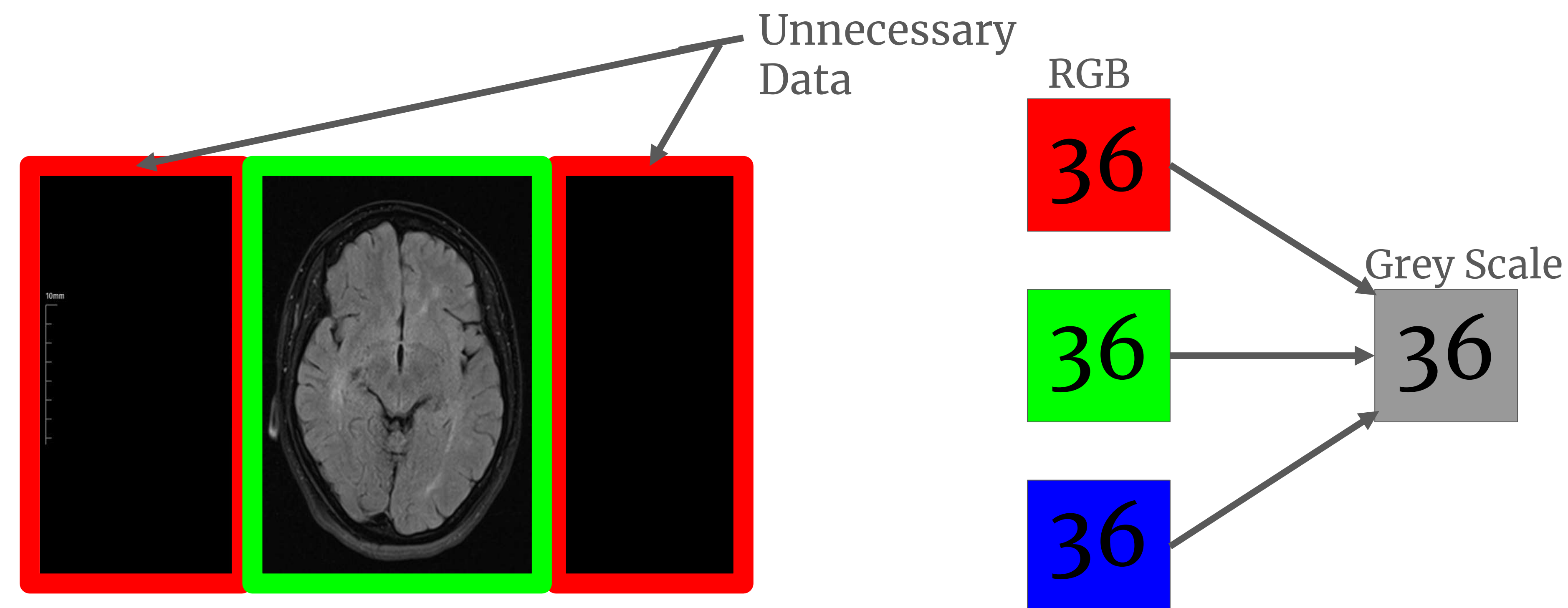
## Introduction

Multiple Sclerosis (MS) is one of the most misdiagnosed illnesses **globally**, with around a 66% misdiagnosis rate

WHY?

MS is challenging to diagnose due in part to factors such as the lack of a biomarker, symptoms that overlap with other diseases, and the disproportionate impact on an under-studied demographic (women). **MRI misinterpretation** is the most accessible factor to address for our team.

## Image Preprocessing



- Initial Image Size: 628 x 1158 x 3
- Processed Image Size: 569 x 565 x 1
- Achieved via:
  - Removal of Unnecessary Data
  - Conversion to Grayscale from RGB
- Conversion from RGB resulted in no loss of data as every RGB value in a given pixel was the same

## Project Goals

Our goal is to leverage neural networks to address what we *can* change to better equip healthcare providers with tools that can reduce misdiagnosis that stems from MRI misinterpretation.

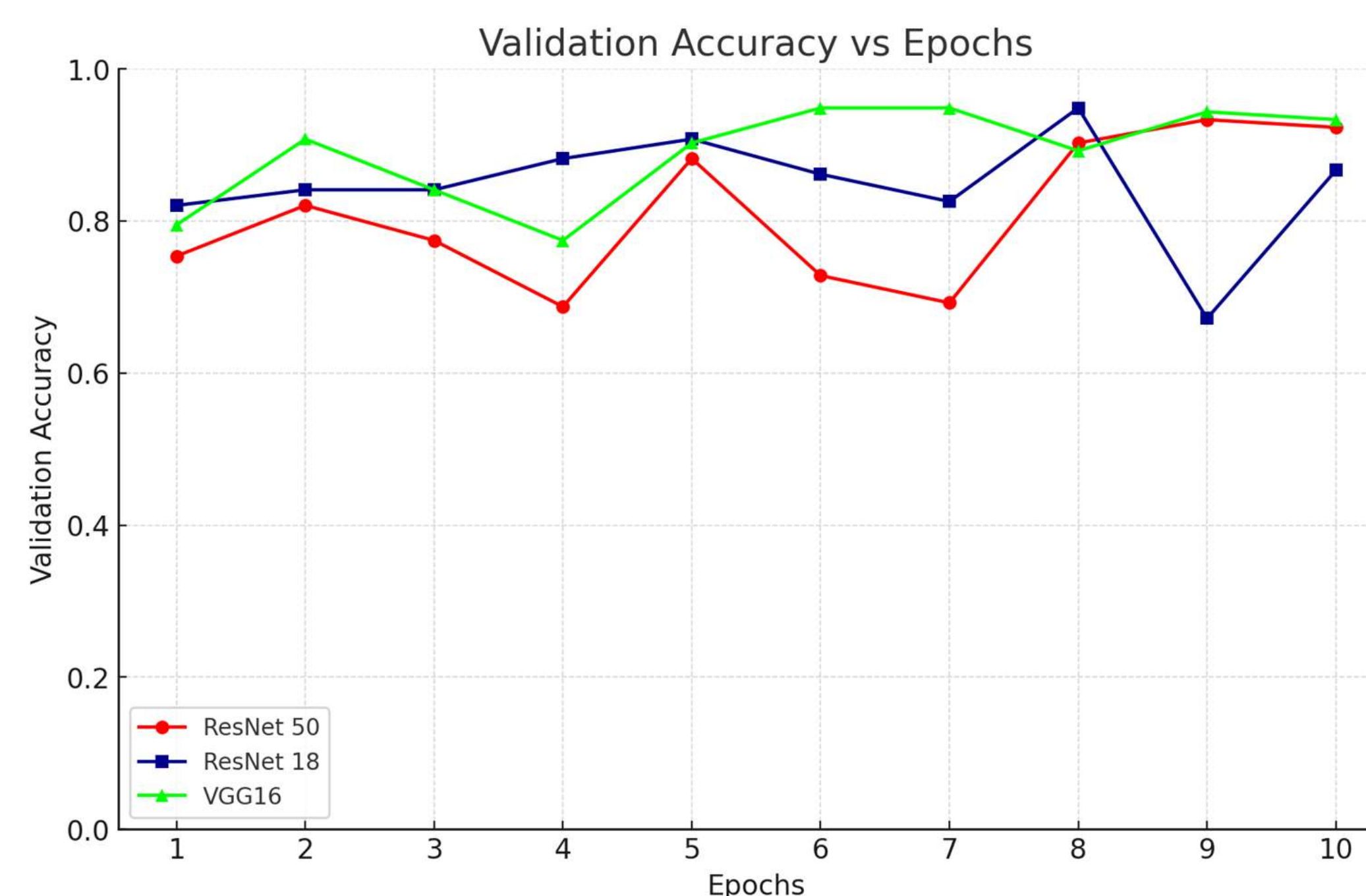
To tackle this goal, we:

- Investigate the causes of high rates of false positive and negatives in MS diagnosis
- Compared the testing accuracy of different pre-trained models with MRI data
- Preprocessed the data to reduce computational load

Challenges we faced:

- Finding publicly available MRI datasets for MS, similarly presenting diseases, and healthy brains
- Getting in contact with healthcare professionals

## Results



To train the model we separated the dataset into training, validation and testing, the ratio being 65%, 15% and 20%, on the left it shows the validation accuracy through epochs and the right shows the final testing accuracy for the three models.

Models	Accuracy
ResNet 18	88.85%
ResNet 50	89.23%
VGG	95.00%

## Next Steps

There is still much to be done in the scope of our project. In the future, we would like to...

- Gain access to more specific datasets (i.e. labelled by gender, age, etc.) in order to provide neurologists and healthcare workers with more sophisticated & accurately trained models
- Address the unique problems that vulnerable populations face (i.e. women & non-white patients) and work towards integrating a solution into our app
- Get feedback from healthcare providers
- Add a user interface (such as a web app) to aid healthcare providers by offering decision support, improving differentiation between MS and other conditions.