

# Wondering about How to Find the Phase of the Solar Eclipse?

(We Can Tell You! And psst... it will help in making of the Eclipse Megamovie!)

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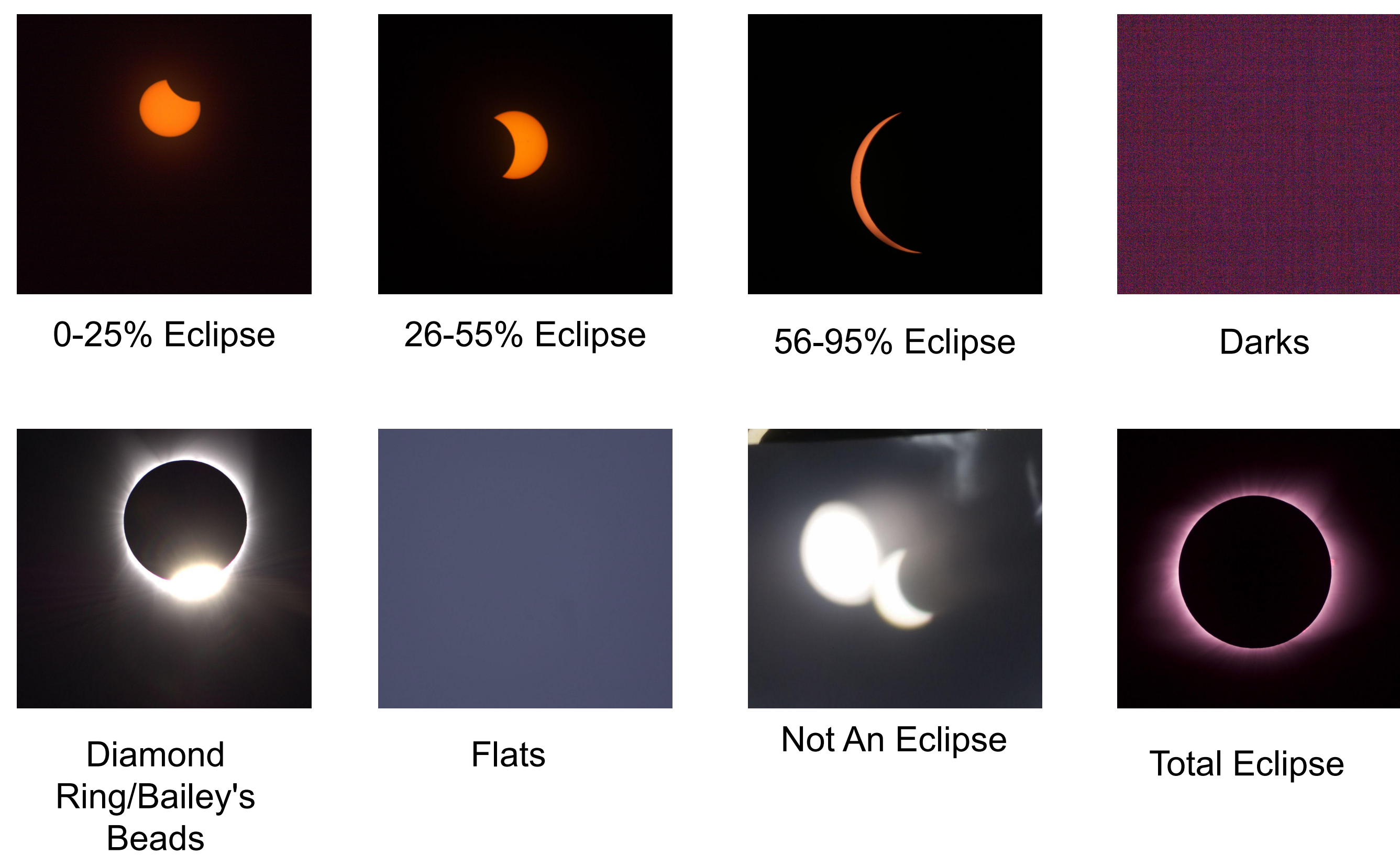


## Introduction and Goal

- Assist in creation of solar [Eclipse Megamovie](#) 2024 (EM2024) by aligning thousands of images of the eclipse submitted by citizen-scientists.
  - Will help in understanding of white-light observations of coronal jets and other transient plasma flows in the chromosphere
- Develop an automated system which accurately identifies if there is a solar eclipse in an image and the phase of the eclipse.

## Dataset

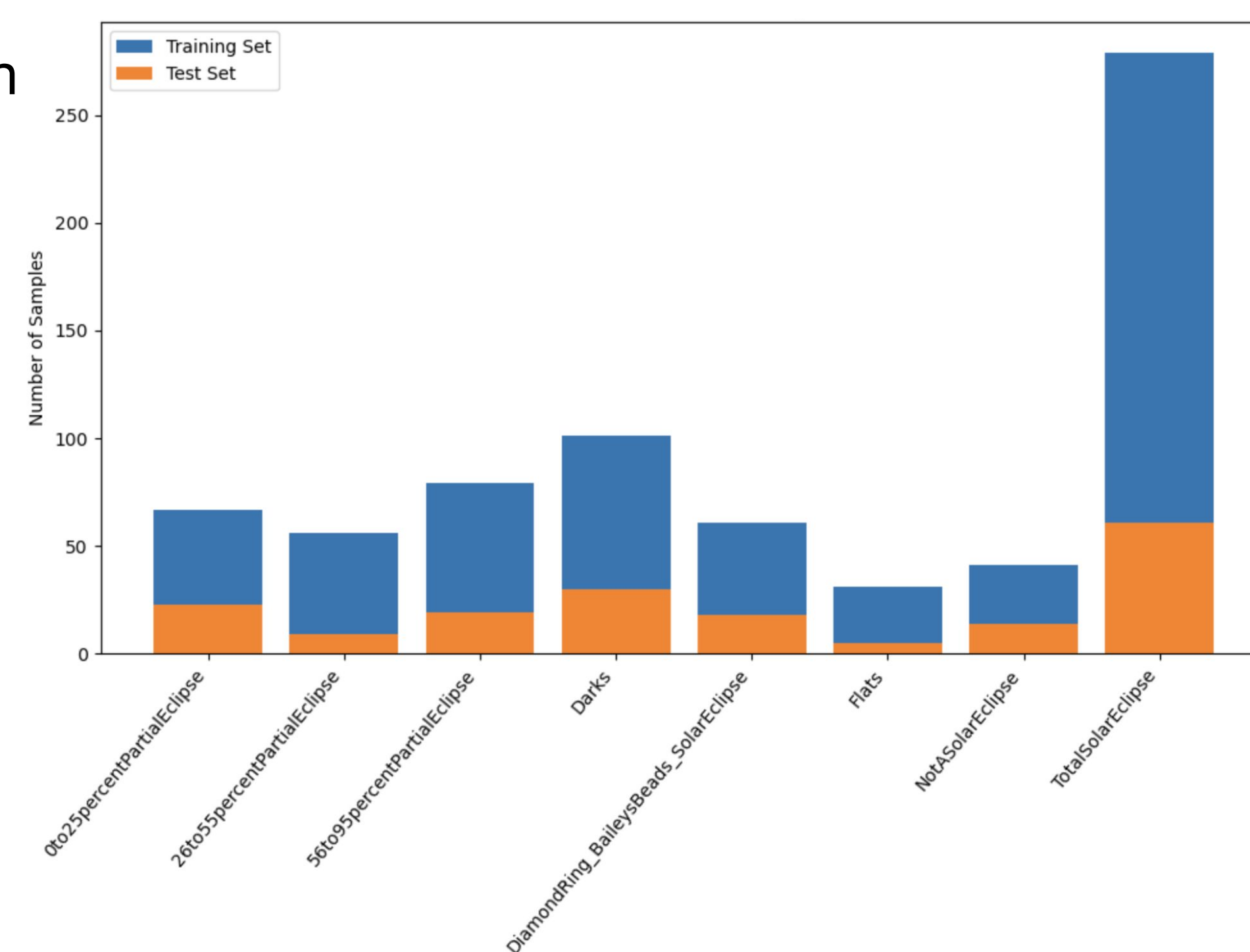
- These are examples of images from each of their respective classes.



## Dataset Distribution

This visualization shows the dataset distribution

- For purposes of CNN the training set is oversampled.



## Classification Script

Our Python-based script enables manual classification and organization of solar eclipse images in various phases, streamlining the preparation of balanced datasets for various analytical models.

The script features 2 modes:

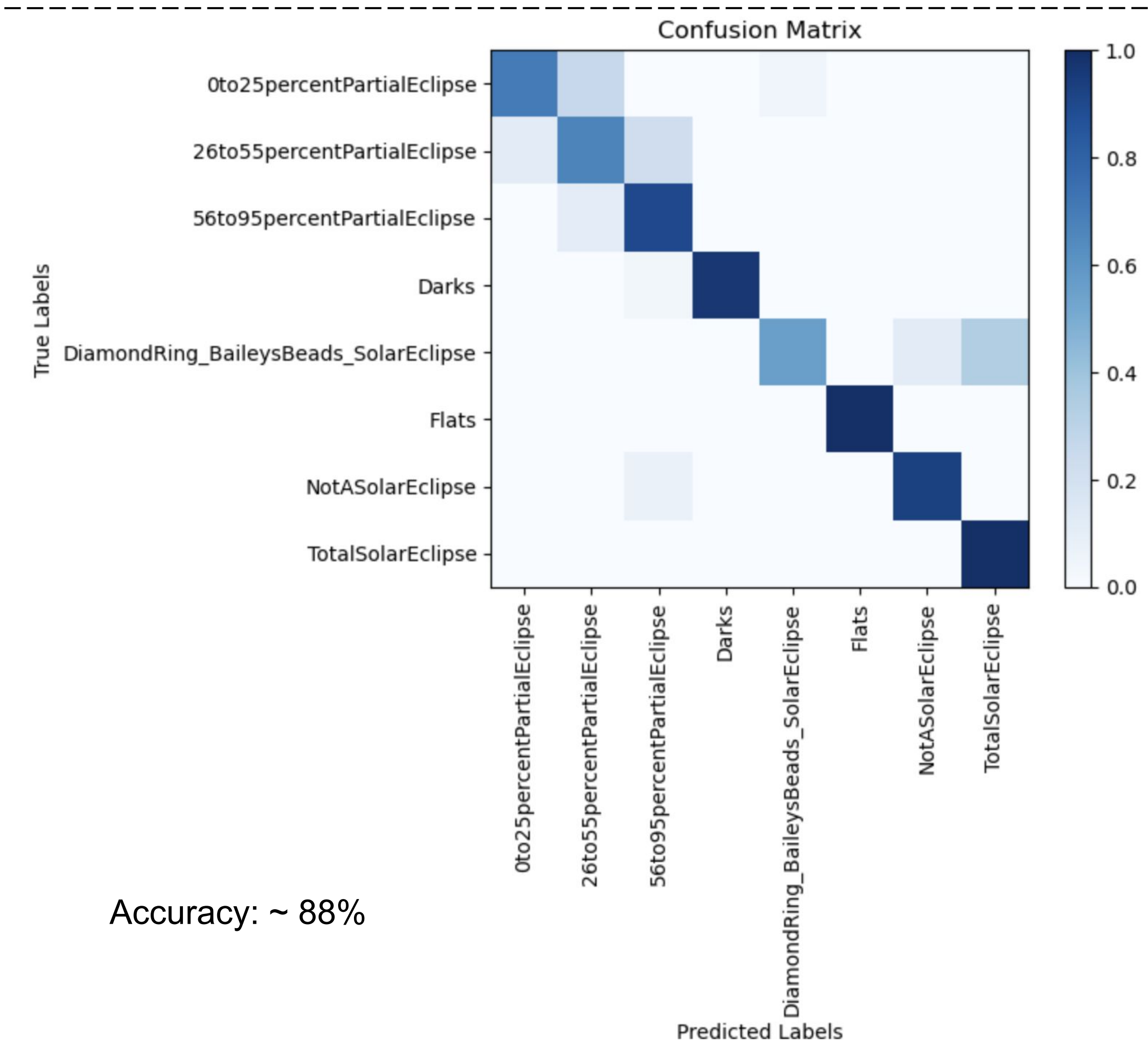
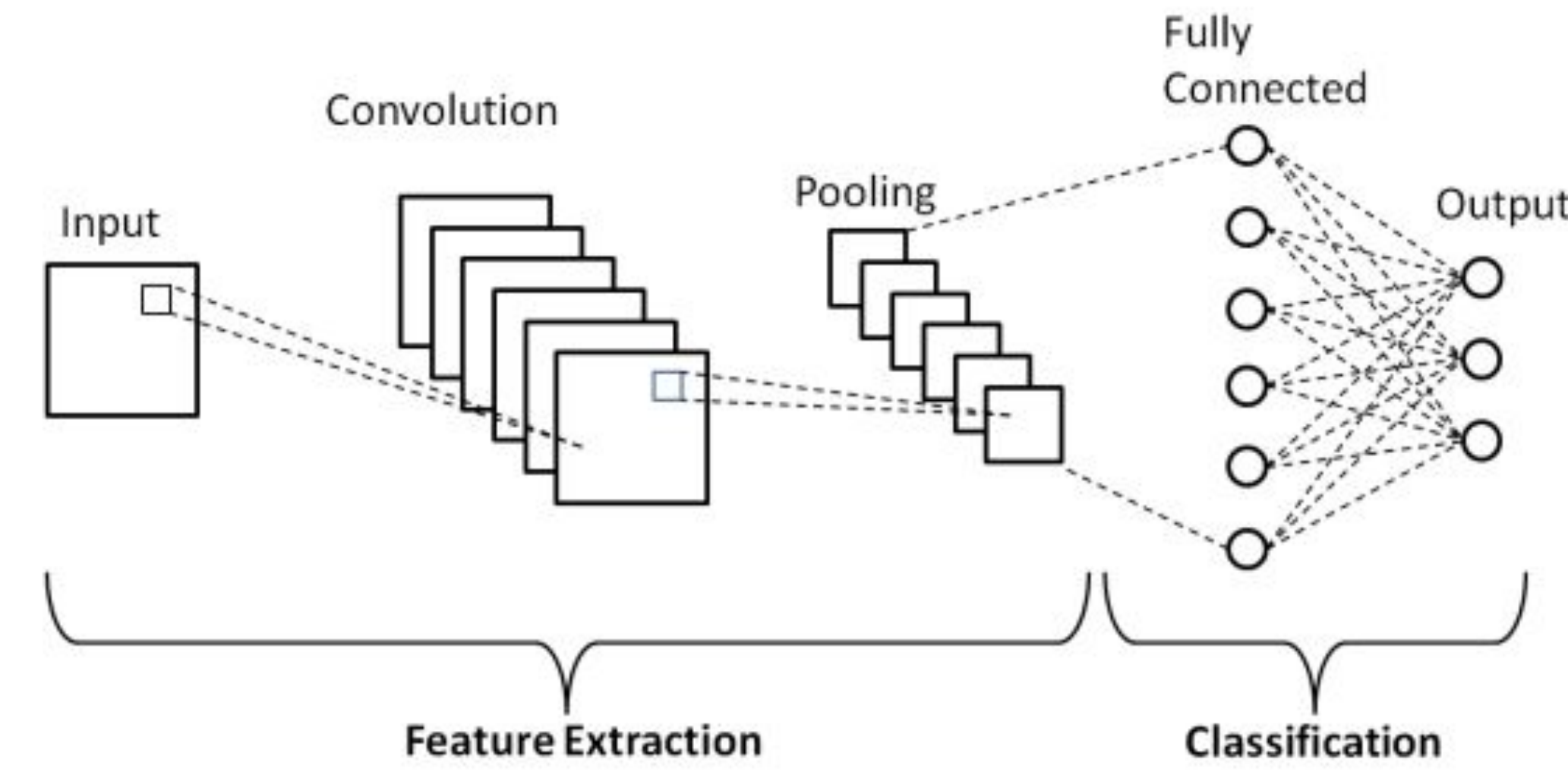
- One mode for classifying images across multiple categories
- Another mode focused on categorizing images for one specific category

Link to Github Repository:



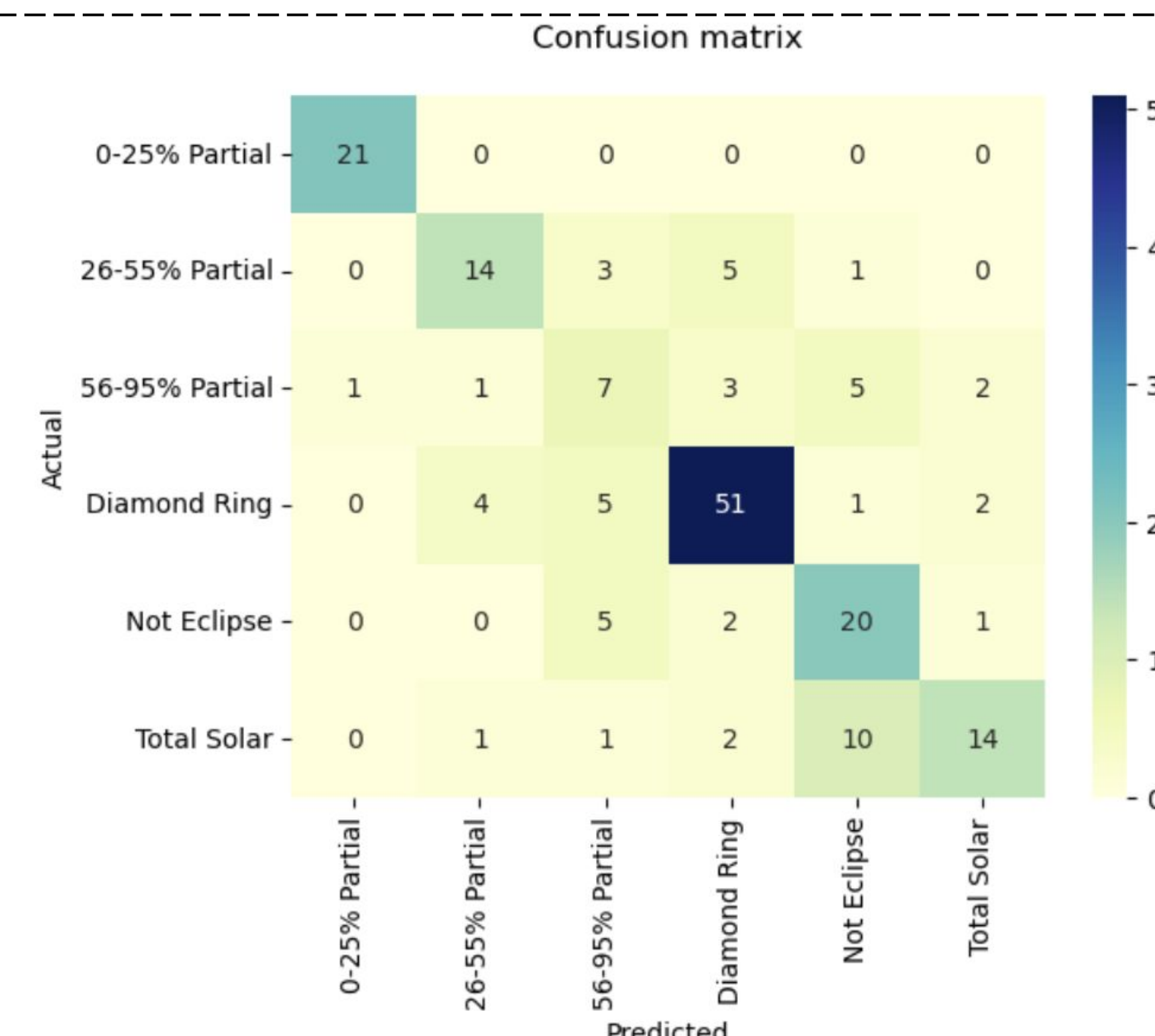
## Classification using Convolutional Neural Networks (CNN)

- Takes as input an image belonging to a category (presence/absence/phase of the eclipse)
- Passes image through collection of filters to generate features
- Classifies features into different categories



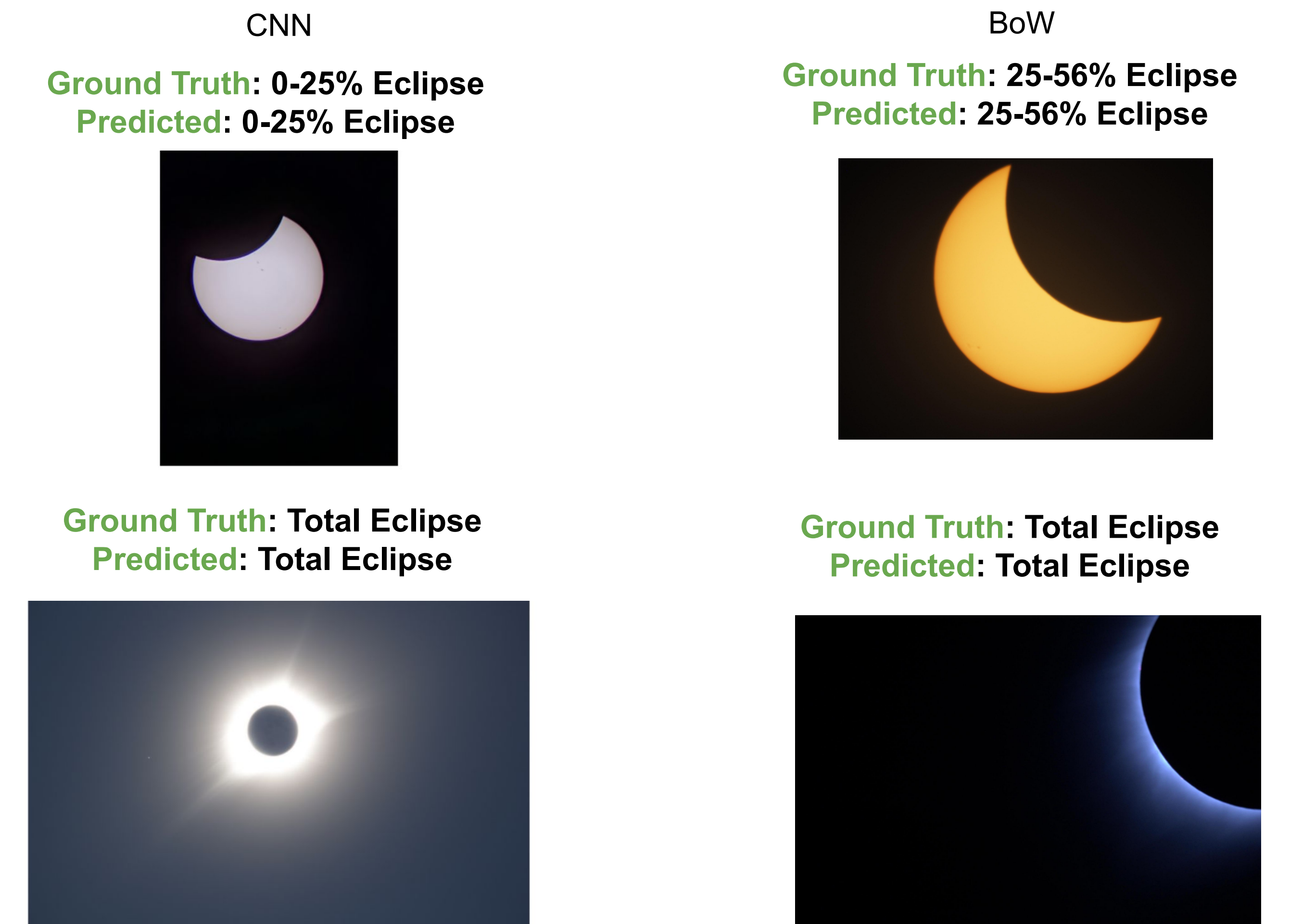
## Classification using Bag of Words (BoW)

- Takes an image as input
- Uses the SIFT algorithm to extract salient features
- Employs of the Bag of Visual Words Model to describe each image
- Uses the KNN algorithm to predict and classify the input images.

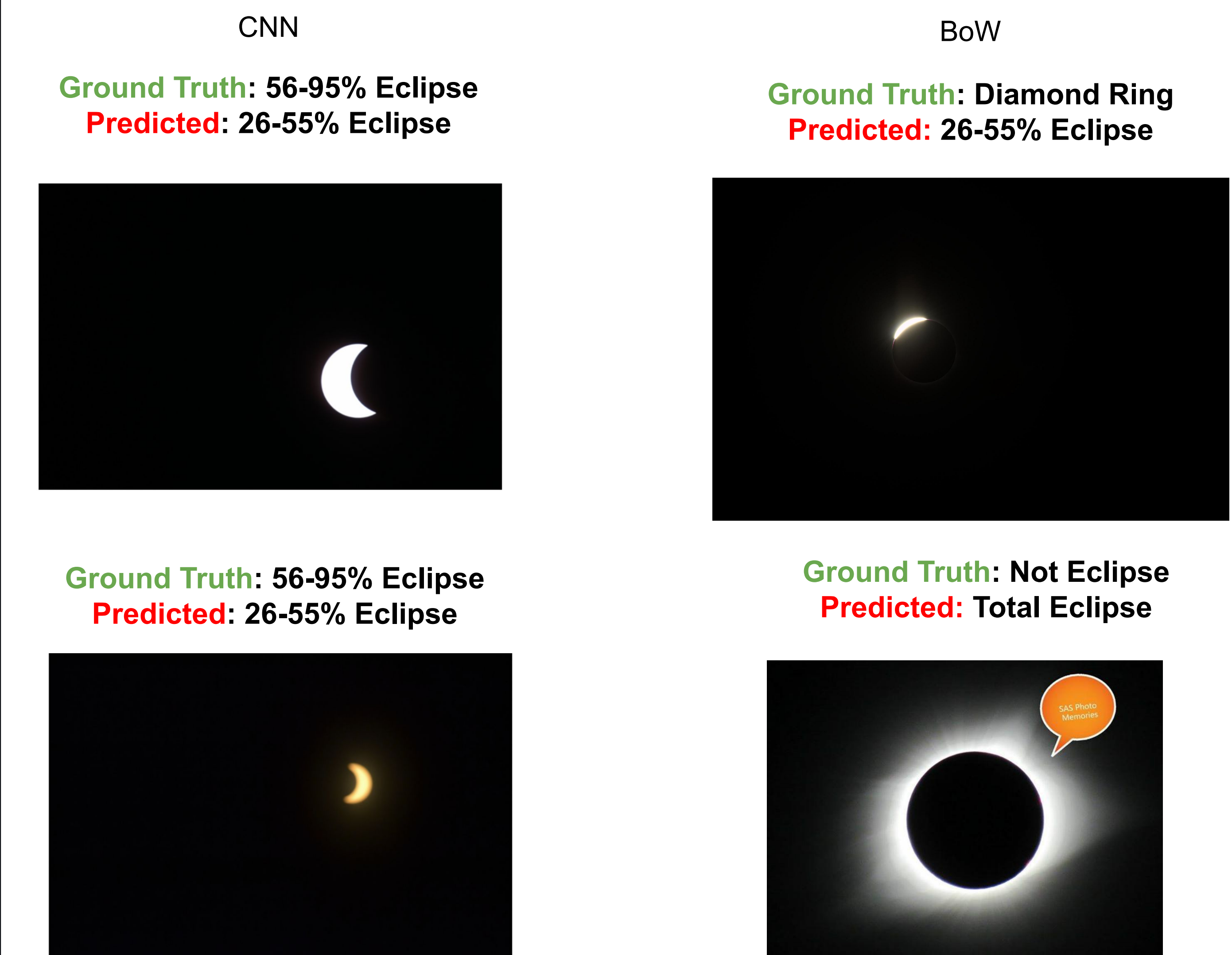


## Results

### Some Correctly Classified Images



### Some Incorrectly Classified Images



## Conclusion, Future Research and References

- CNN is the better model to use for classifying these images
- Improve CNN accuracy even further than it is now
- Explore different ways of splitting train and test data to see the effects on the models
- CNN Image: <https://medium.com/sfu-csmpmp/an-introduction-to-convolutional-neural-network-cnn-207cdb53db97>

## Acknowledgements

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