

# A Picture of Health

## Understanding Dementia Through Art



**Tiana Aldroubi '24**  
Computer Science & Graphic Design  
Researcher & Exhibition Designer



**Emily Tsao '25**  
Exhibition Design Intern  
Graphic and Product Design

Following the research of Lehigh student, Tiana Aldroubi '24, this exhibition explores the common patterns that present themselves in artworks created by individuals with dementia.

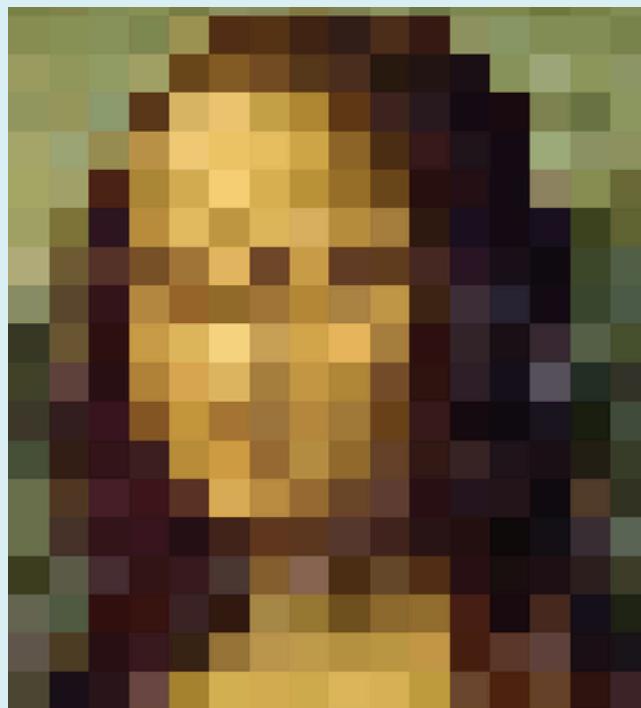
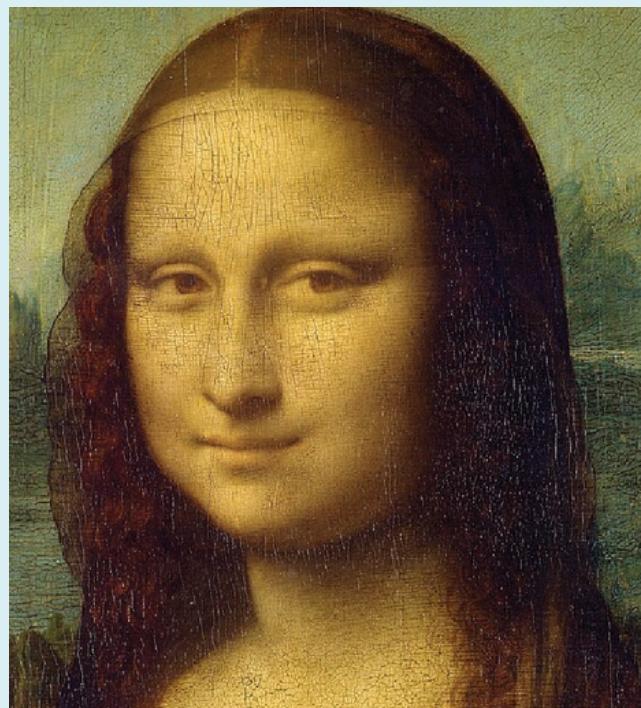
Leveraging machine learning and computer vision techniques,  
Aldroubi analyzed the different artistic features of paintings done  
by individuals both with and without dementia to find correlations  
and emerging patterns.

# How Computers See

The steps of image processing for machine learning

1.

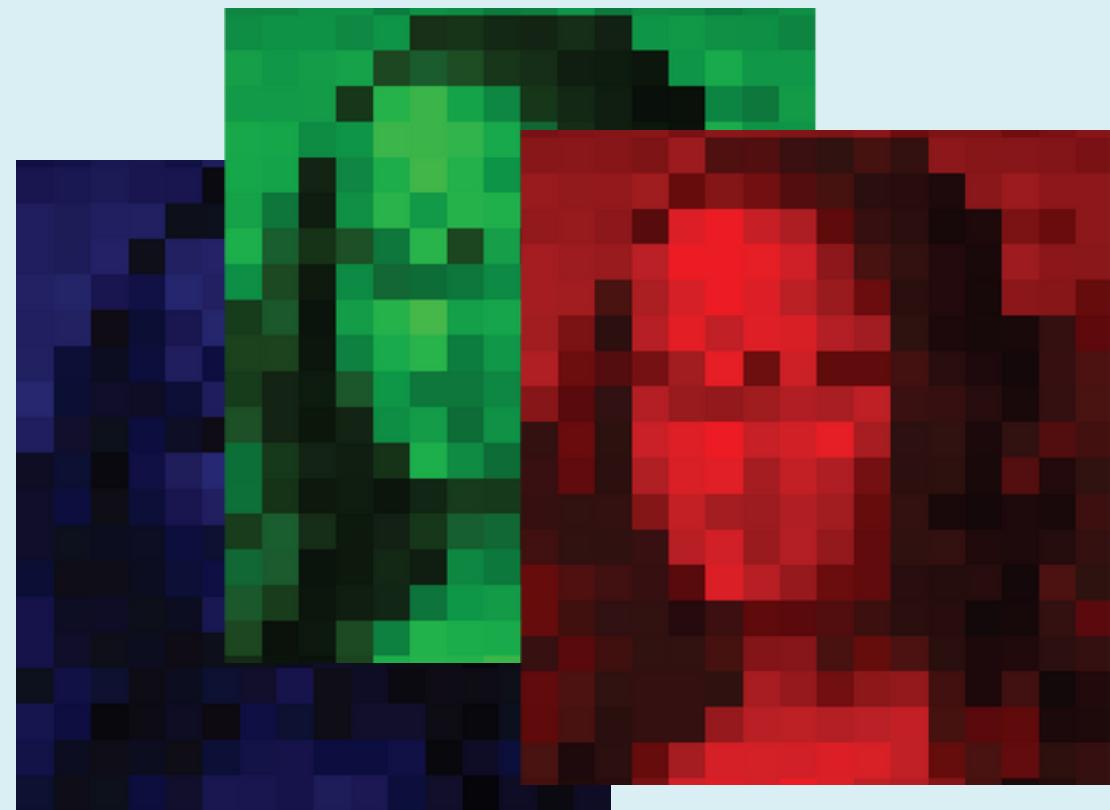
An image is represented digitally as a grid of tiny squares called pixels. Each pixel has a color value.



# How Computers See

The steps of image processing for machine learning

2.



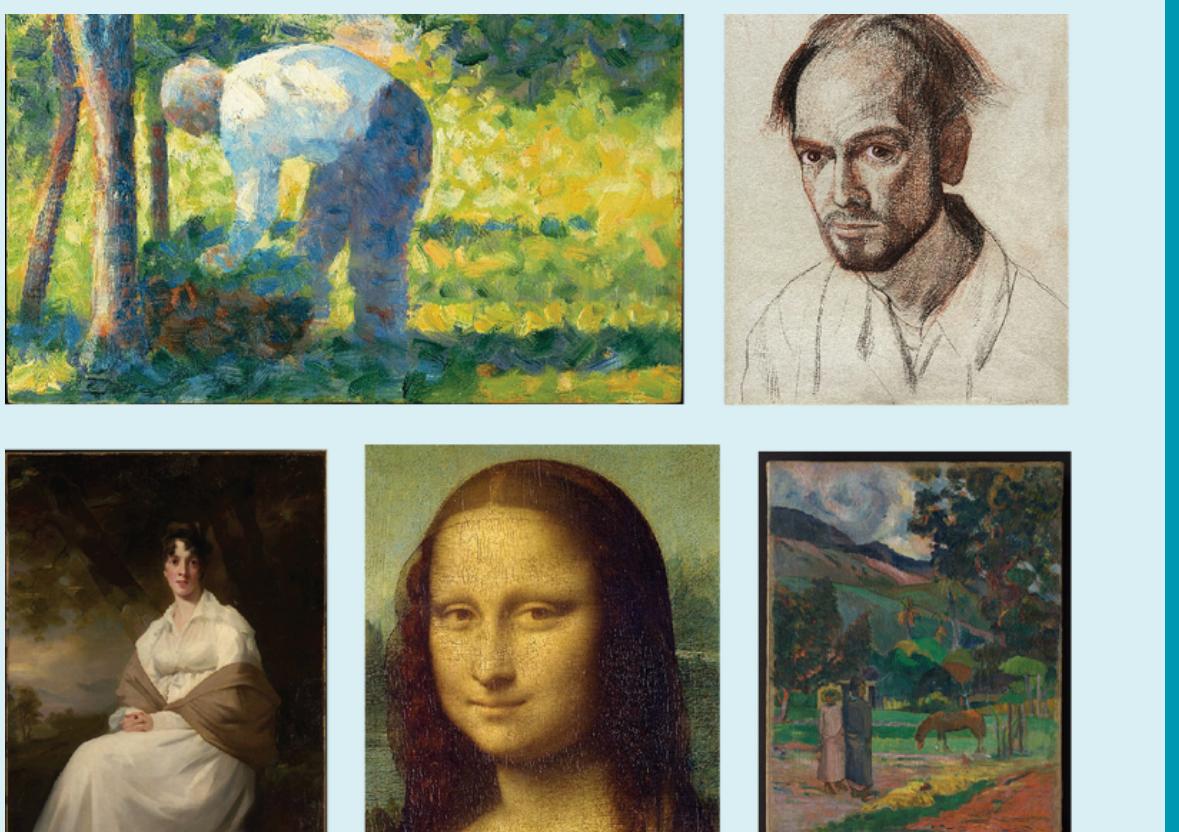
The most common way to represent this color is using the RGB (Red Green Blue) color system. In RGB, each pixel has three values between 0 and 255 that represent the intensity of red, green, and blue.

# How Computers See

## The steps of image processing for machine learning

3.

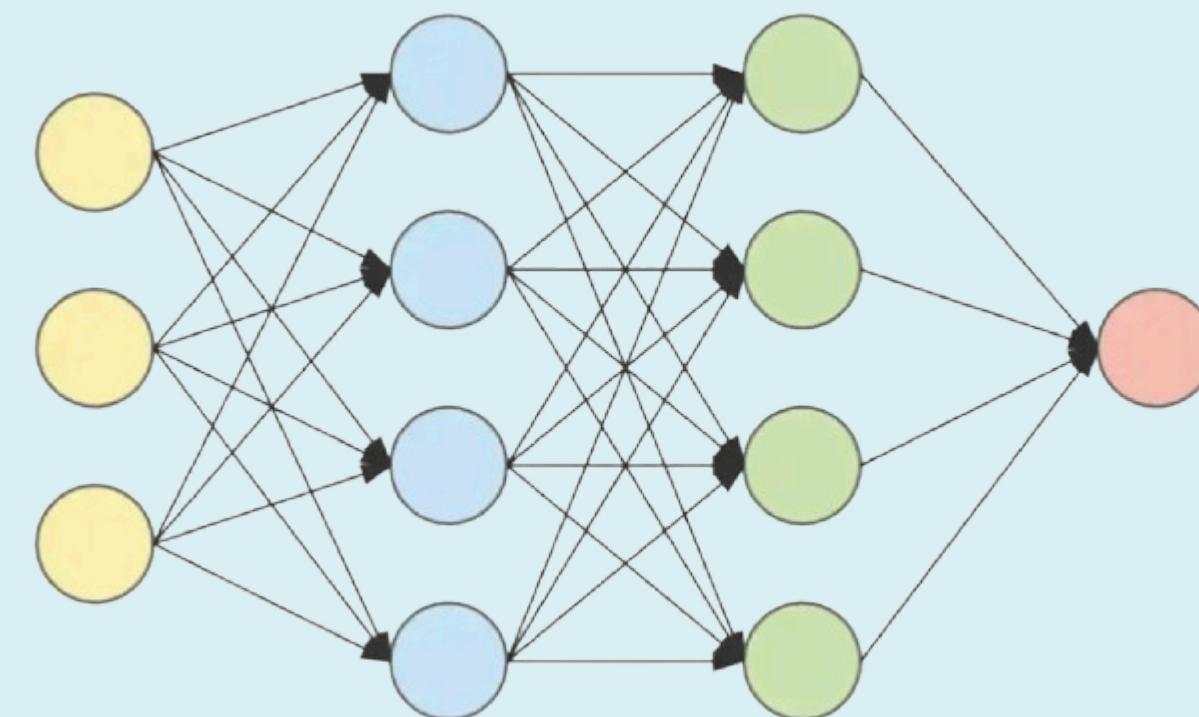
These values are fed into a special type of program called a Convolutional Neural Network (CNN). The CNN looks at the image and identifies key features, like edges, textures, and shapes. For example, in an image of a face, it might identify features like eyes, a nose, and a mouth.



# How Computers See

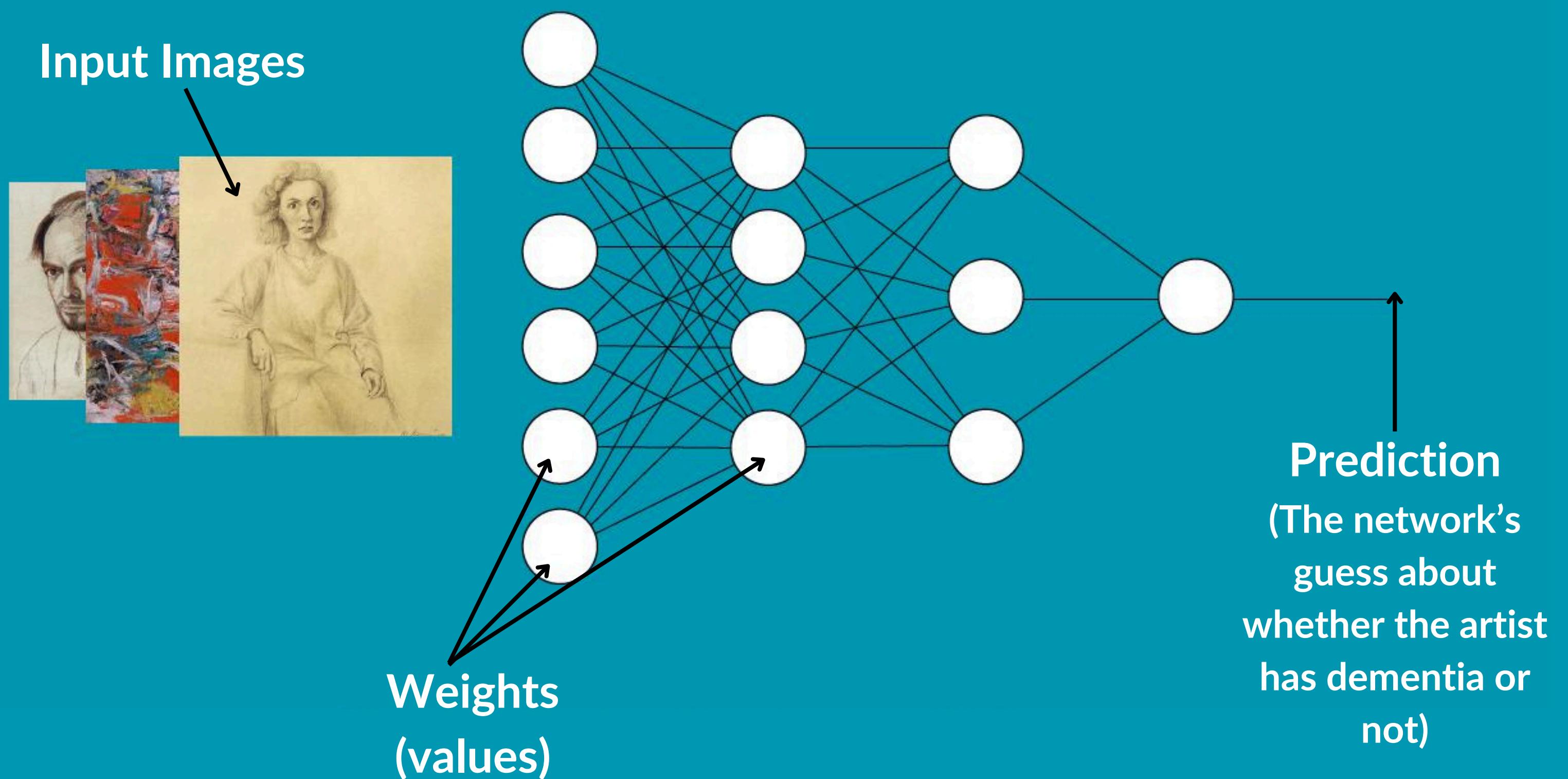
The steps of image processing for machine learning

4.

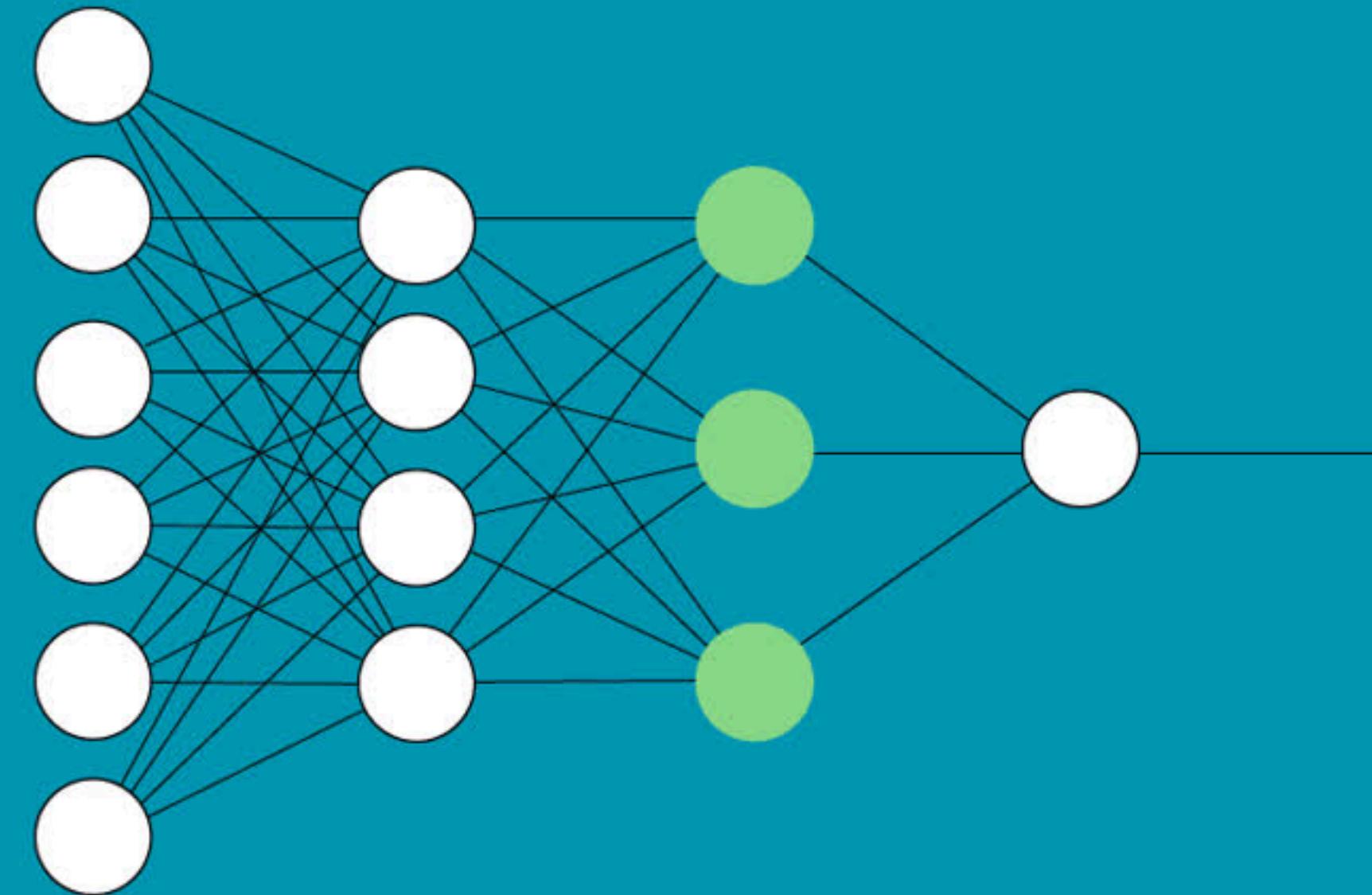


The CNN then compares these features to known labels, which in this case might indicate whether or not a person has dementia. By examining a large number of labeled images, the CNN learns to recognize patterns that are associated with these labels.

# Training the Neural Network

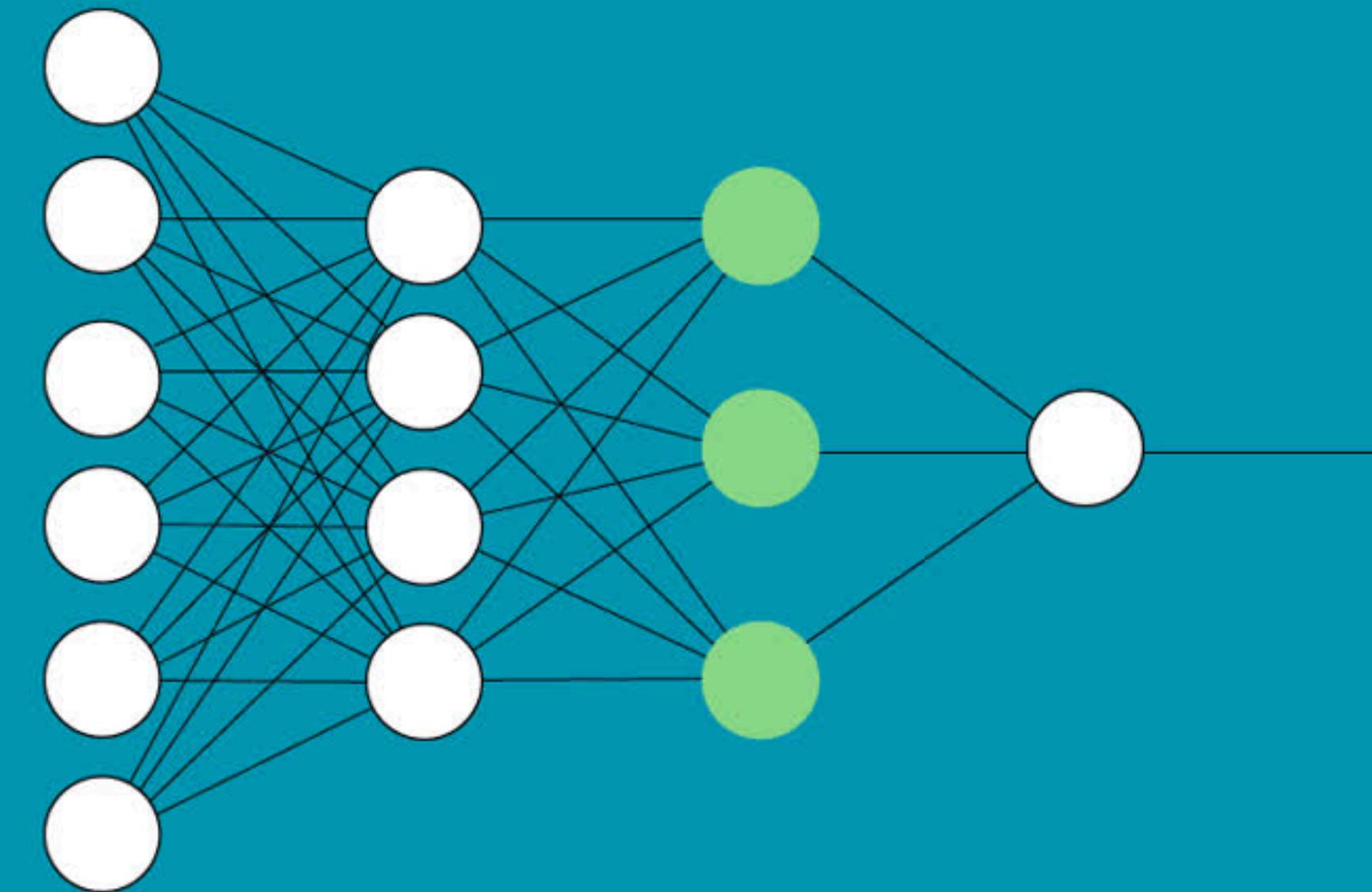


# Training the Neural Network



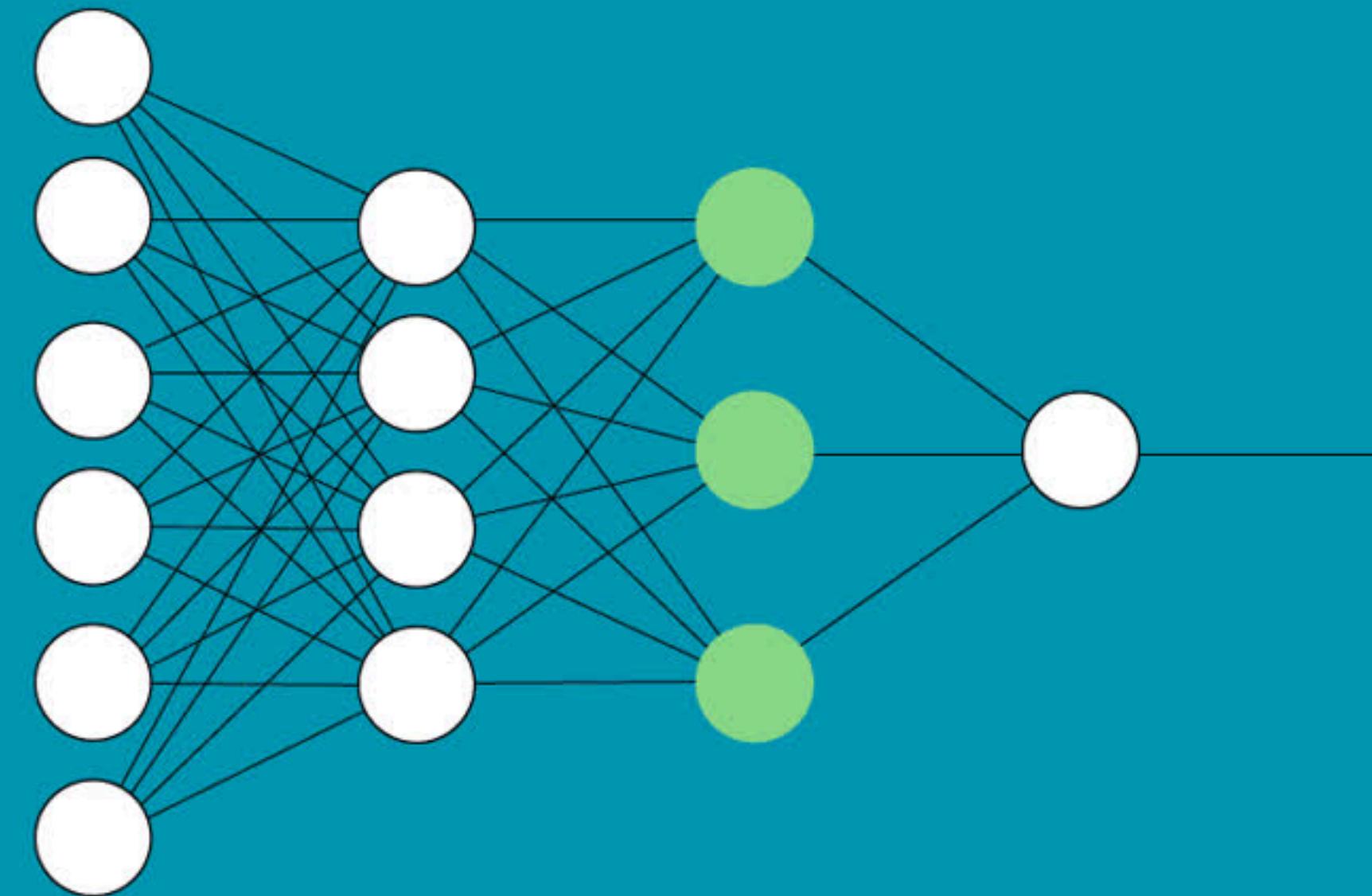
An input image is fed through the network and the values of the weights are multiplied by the values extracted from the images.

# Training the Neural Network



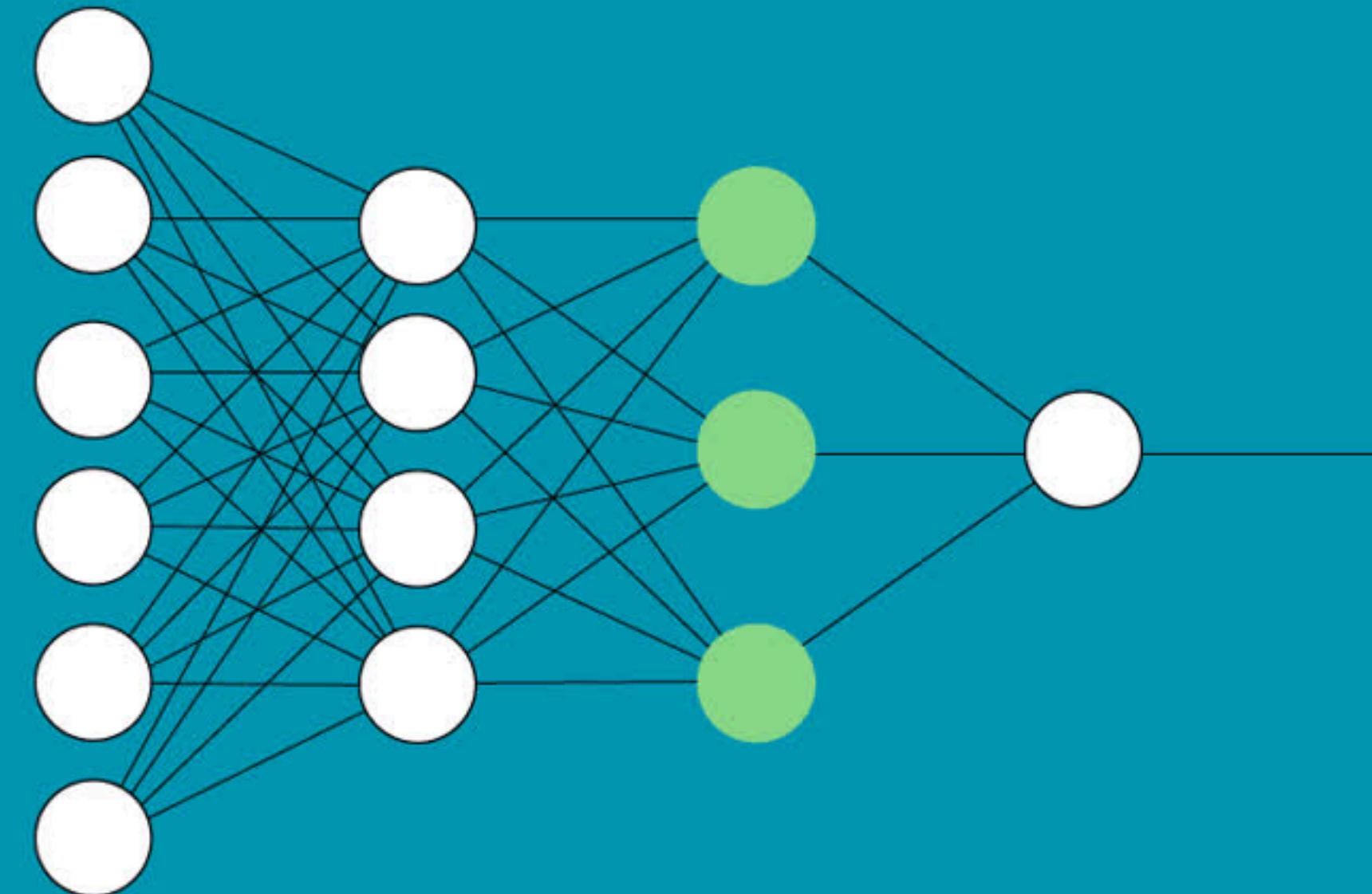
The network makes a prediction and compares it to a known label, which in this project is whether or not the artist has dementia.

# Training the Neural Network

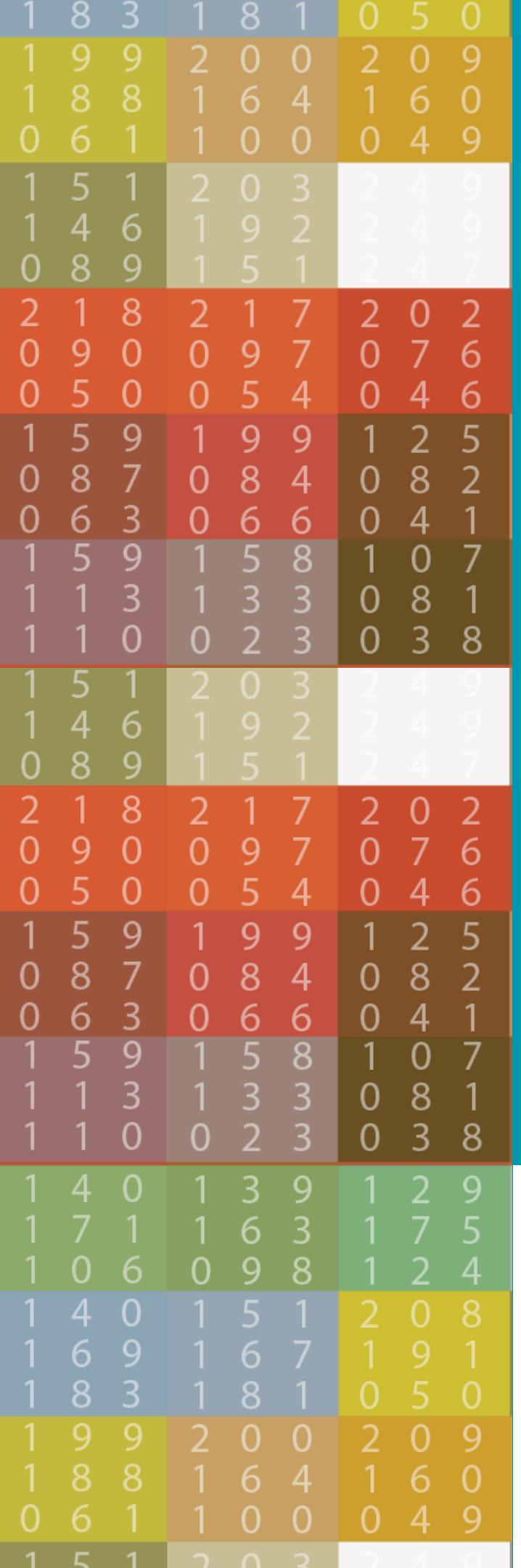


The prediction is either right or wrong and feedback is sent back through the network to update the values of the weights accordingly.

# Training the Neural Network



This process happens repeatedly, resulting in a more accurate prediction over time. This is how the network learns.



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