

# Guessing artists from paintings

A deep learning approach

SECTION

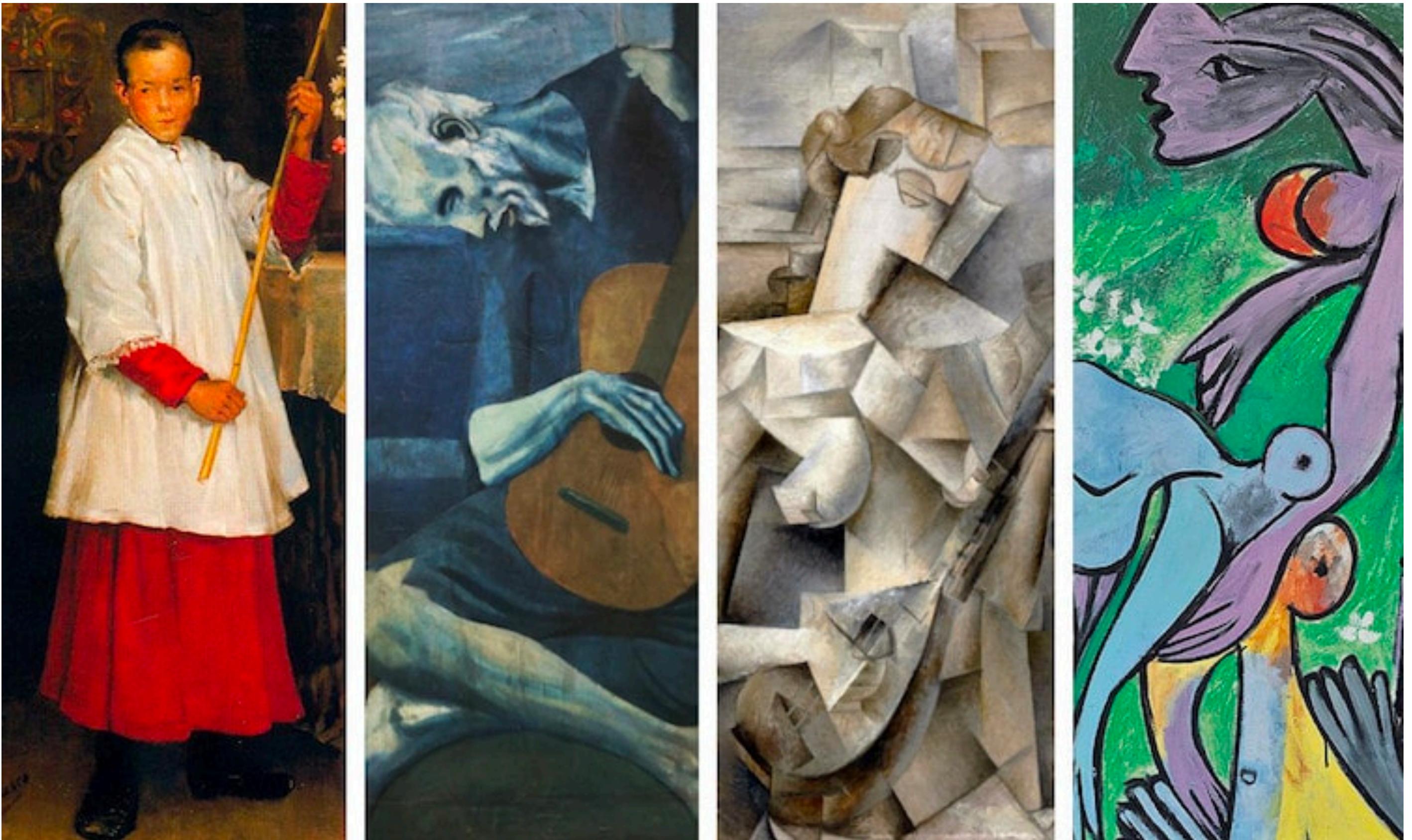
# Background

# Scope

Throughout an artist career, changes in style, technique and subject. This makes it really challenging at times for a museum to classify an acquisition of unknown origin.

Picasso for example is well known for his breadth of styles as seen on the right.

# The Evolution of Picasso's style throughout the years



# Realism

# Cubism

# Can a model do better than this guide?

If The Images Have A Dark Background And Everyone Has Tortured Expressions On Their Faces, It's Titian



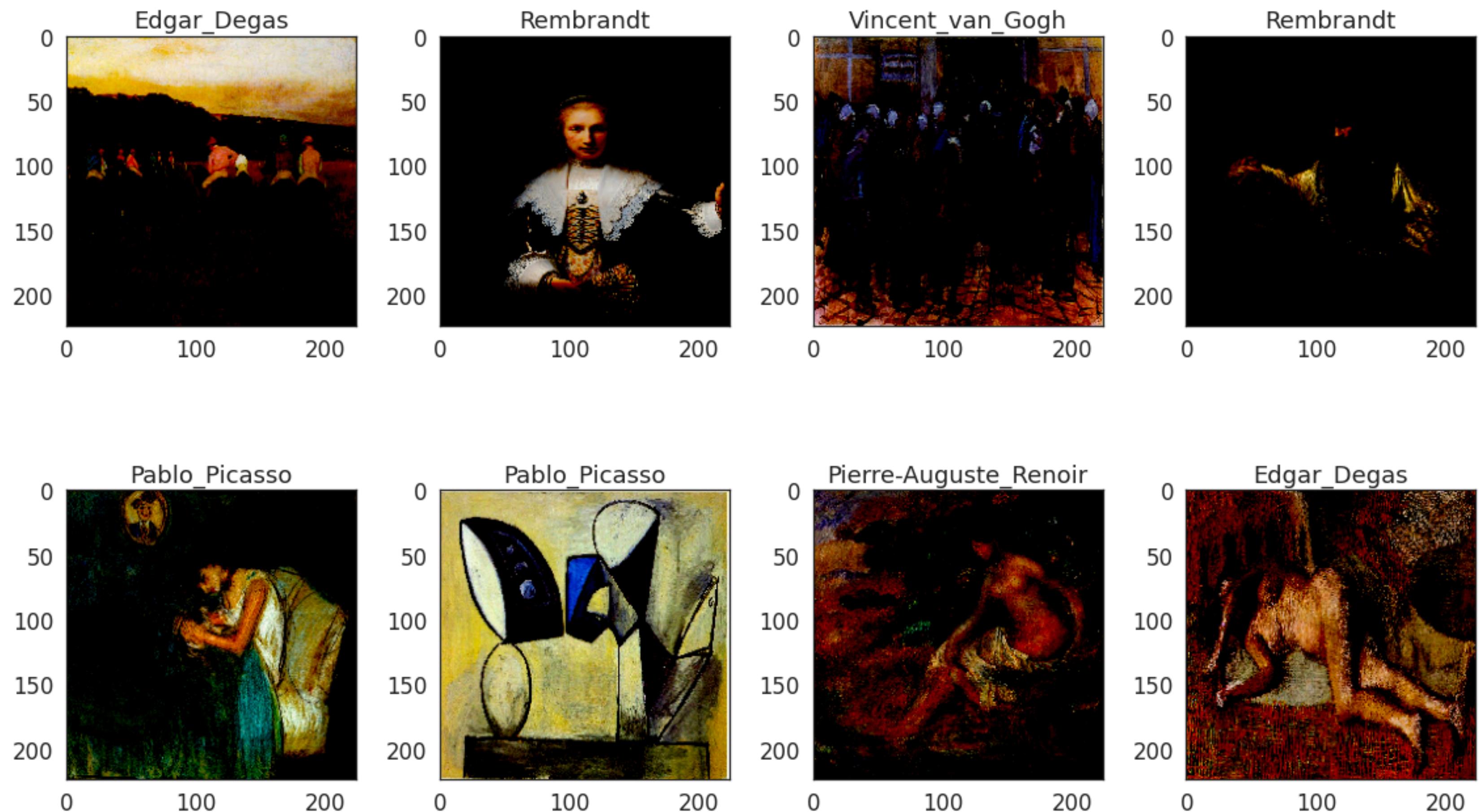
Dappled Light And Unhappy Party-Time People, Then It's Manet



# Data

The data consists of images from 11 artists: Picasso, Degas, Rembrandt, Van Gogh, Renoir, Durer, Titian, Gaugin, Sisley, Goya, Chagall.

Movements wide in style and techniques are reflected in the dataset: from **cubism** with Picasso to **impressionism** with Degas to **Renaissance** with Titian.



A random sample of images from a batch

# Methodology

## EDA

Quick EDA to get single out low quality images and plot class distribution



01

02



03

04

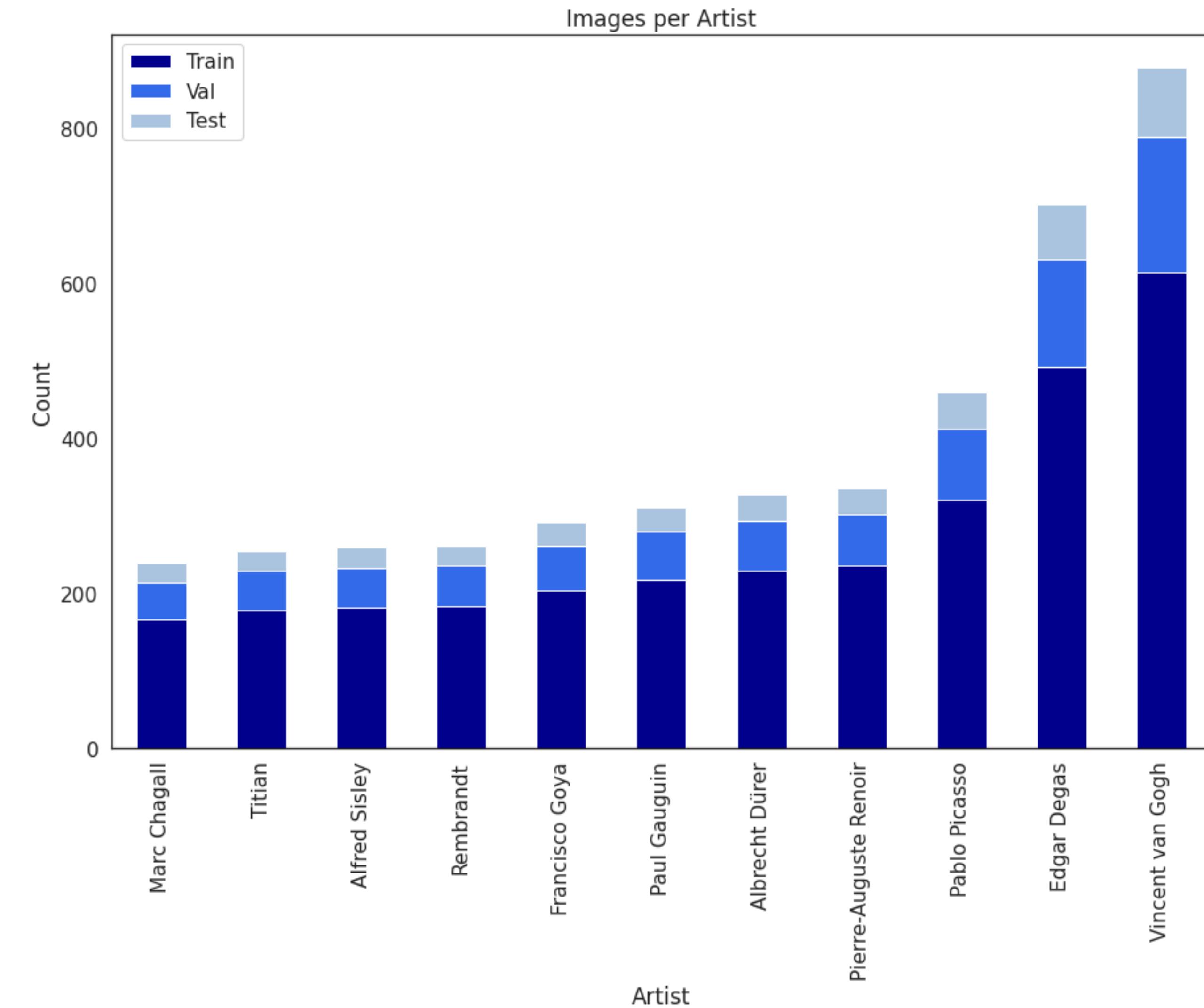


## Pre-Processing

Scaling of the data if needed based on model requirements. Testing out image augmentation.

# Metrics: Recall is used to evaluate performance

As seen on the chart on right, the classes are imbalanced. As a result, I'll report on **Recall** in addition to **loss** and **accuracy**.



SECTION

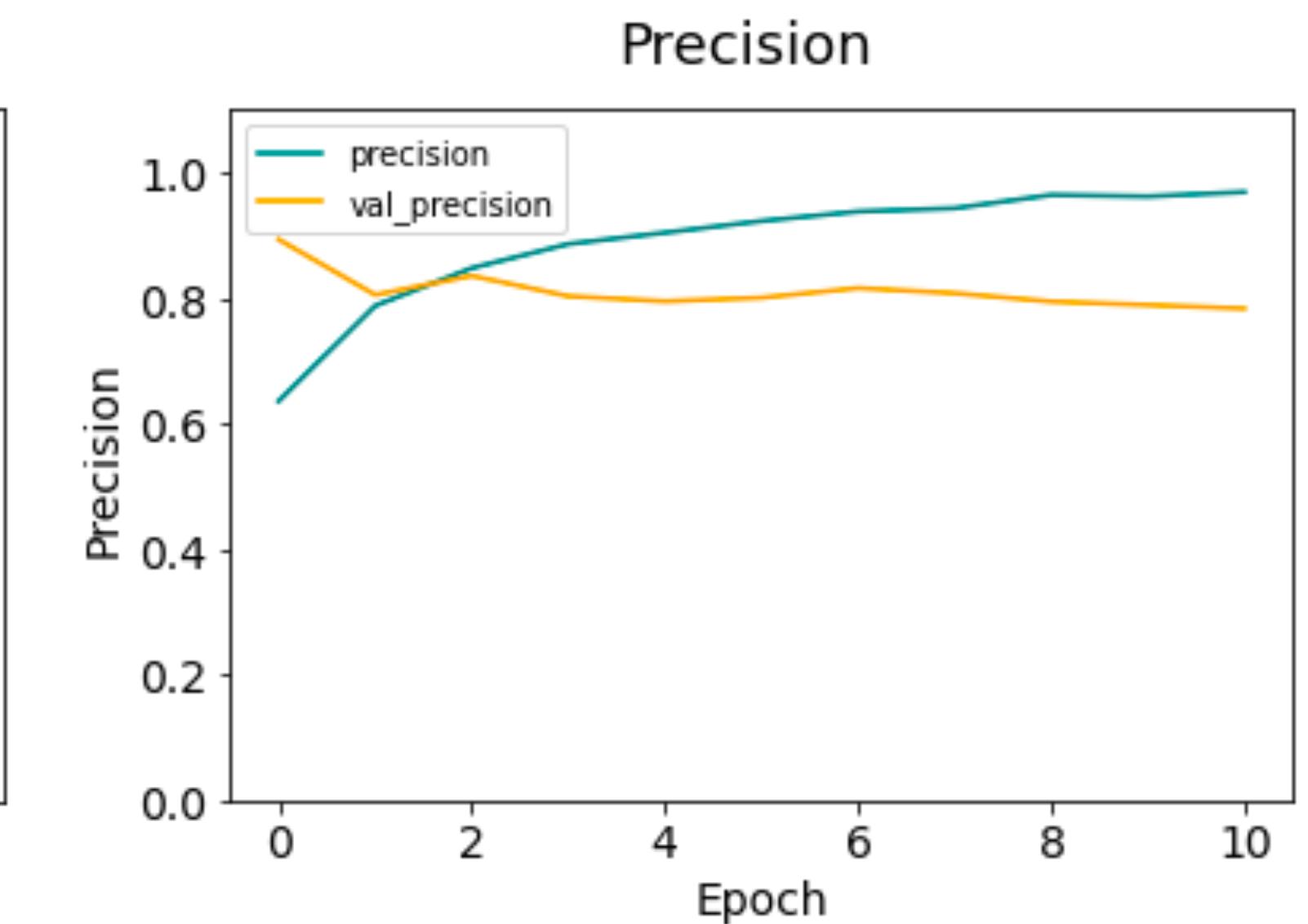
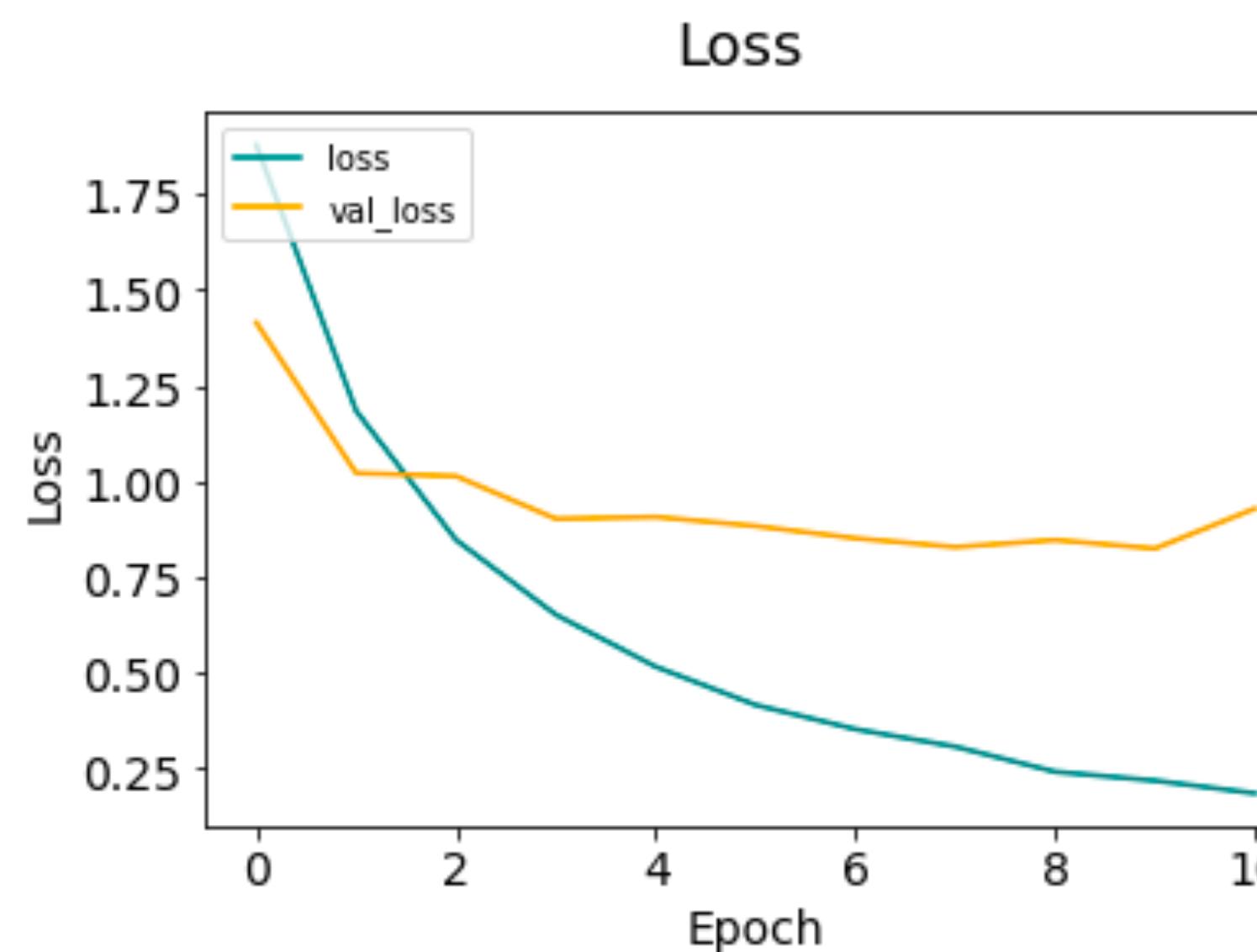
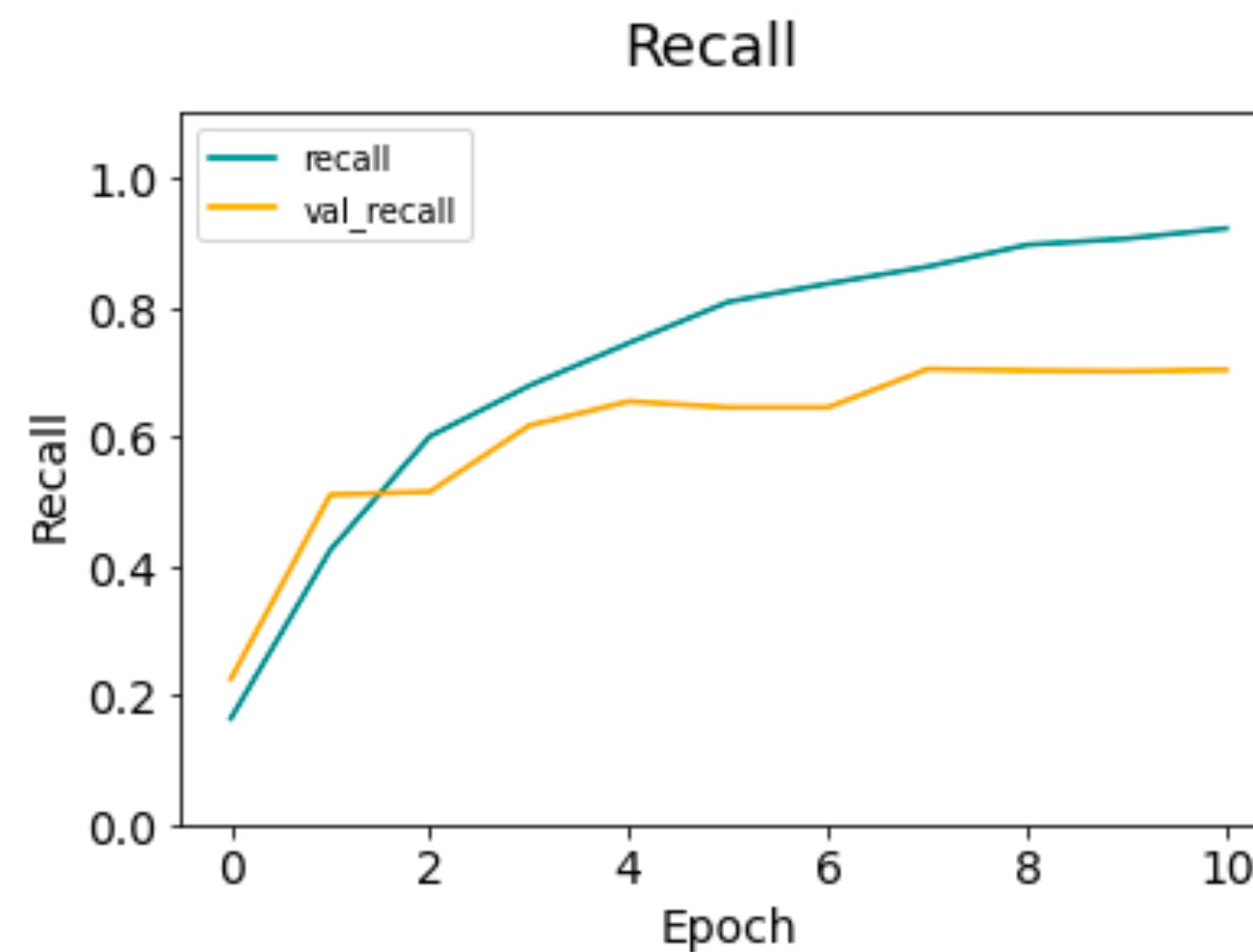
# Model iteration

# Leveraging transfer learning for improved efficiency

I experimented with ResNet50, MobilNetV2 and VGG19 combined with new top layers to predict artists.

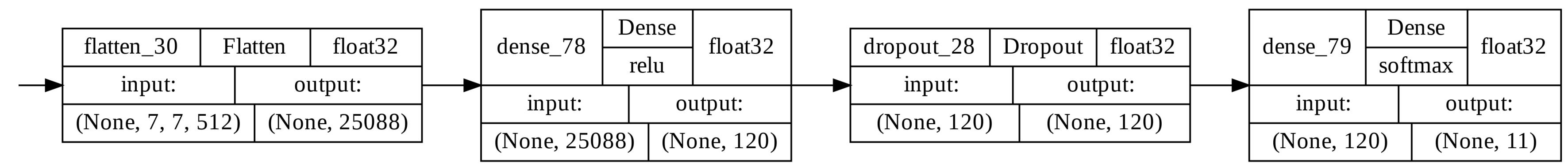
Model	Size(MB)	Train Recall	Val Recall
MobileNetV2	14	1	0.77
ResNet50	98	0.97	0.73
VGG16	528	0.92	0.70

# VGG16 does best in terms of tradeoff between performance and overfitting



# Model Architecture - Top Layers

VGG16  
excluding top layers

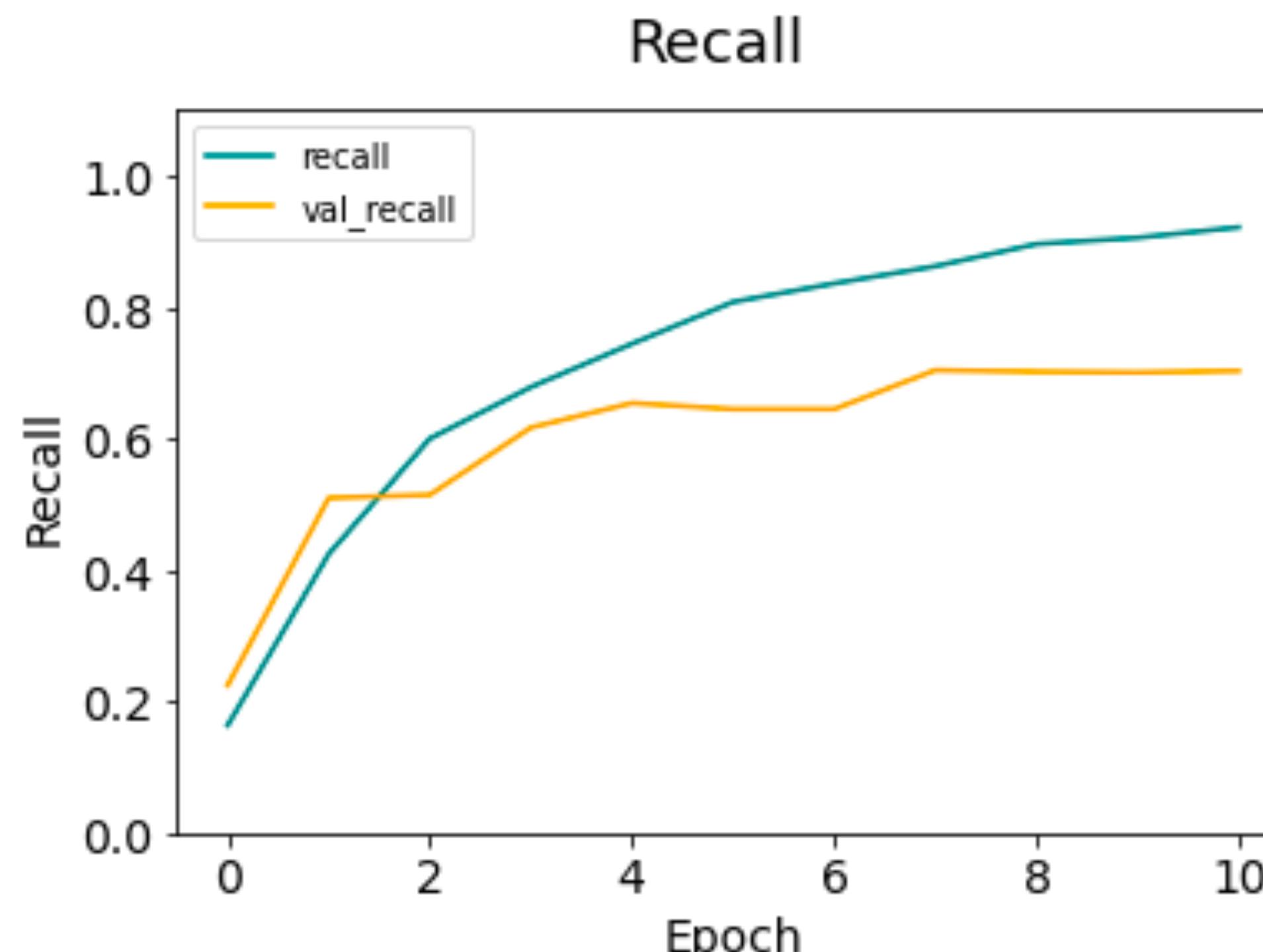


Pre-trained - ImageNet

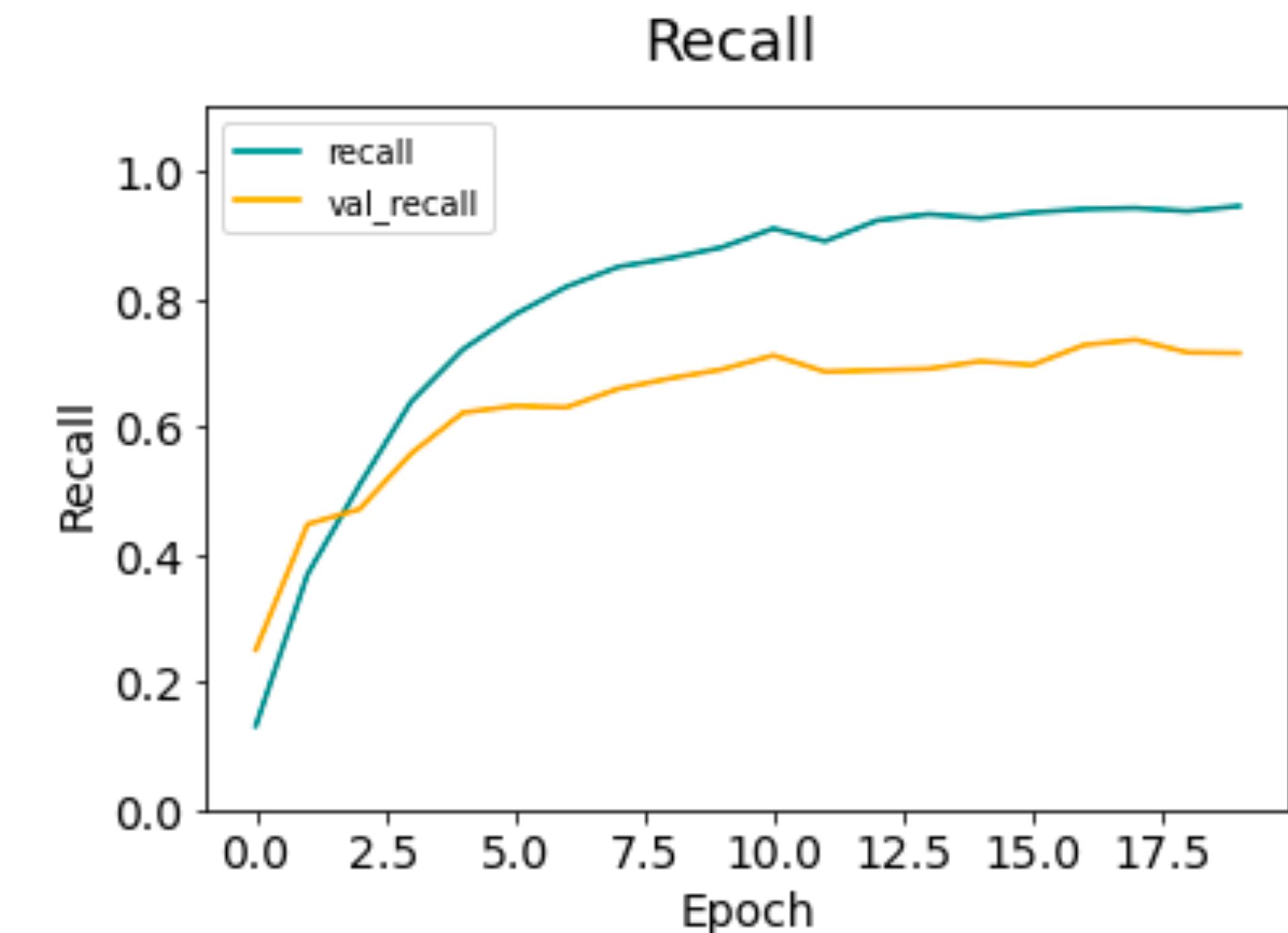
New Fully Connected Block

# Trying to account for imbalance with class\_weights doesn't lead to a remarkable improvement

With class weights recall only goes up to 0.71 from 0.7



Before class\_weights

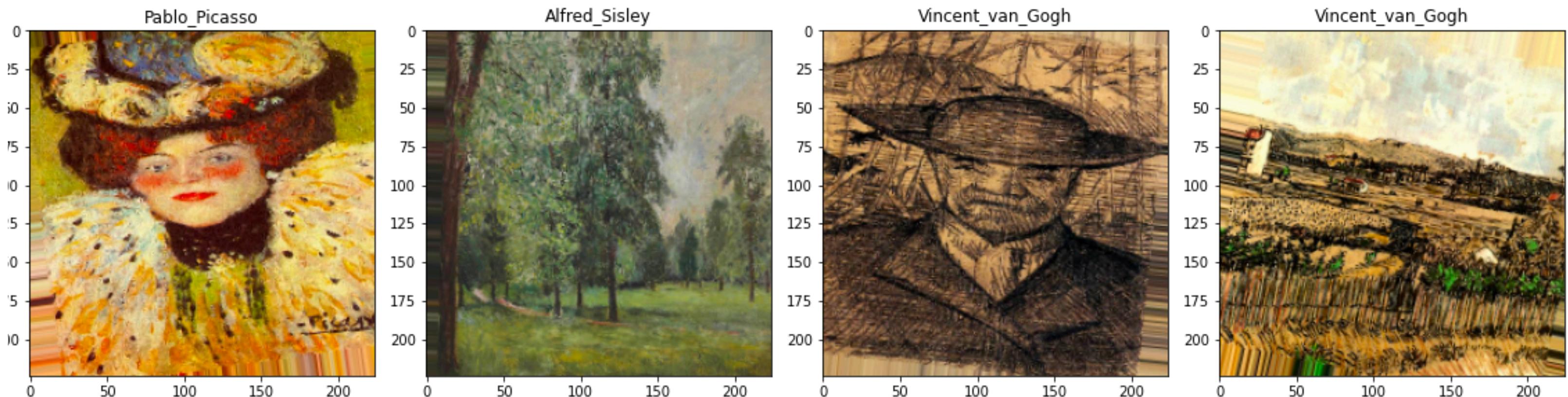
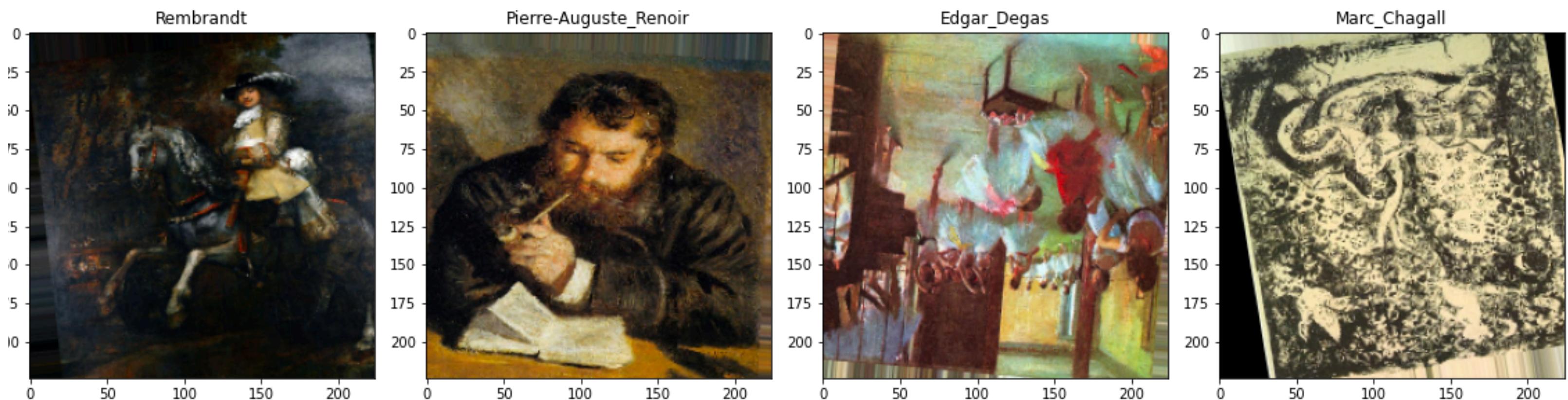


After class\_weights

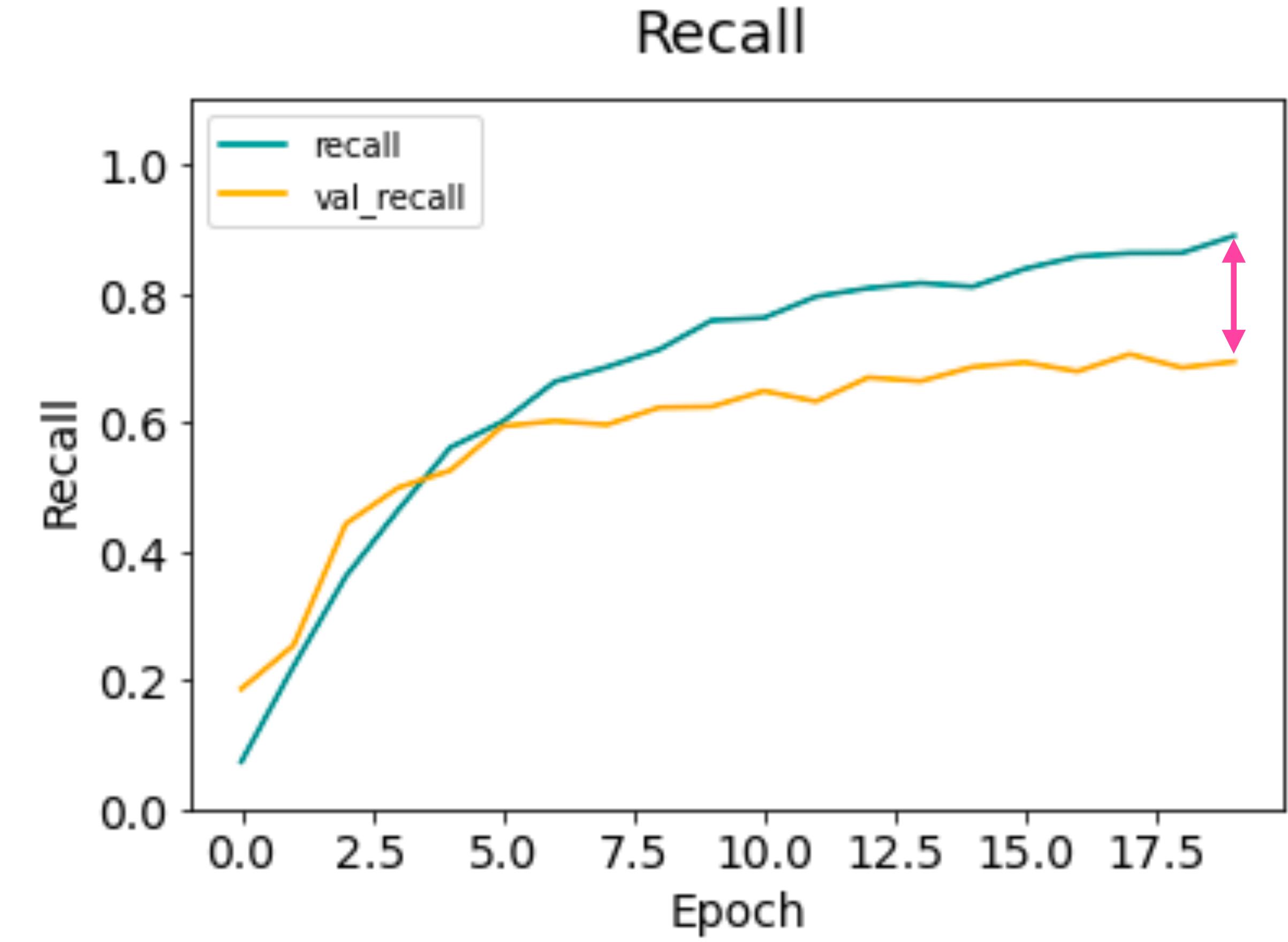
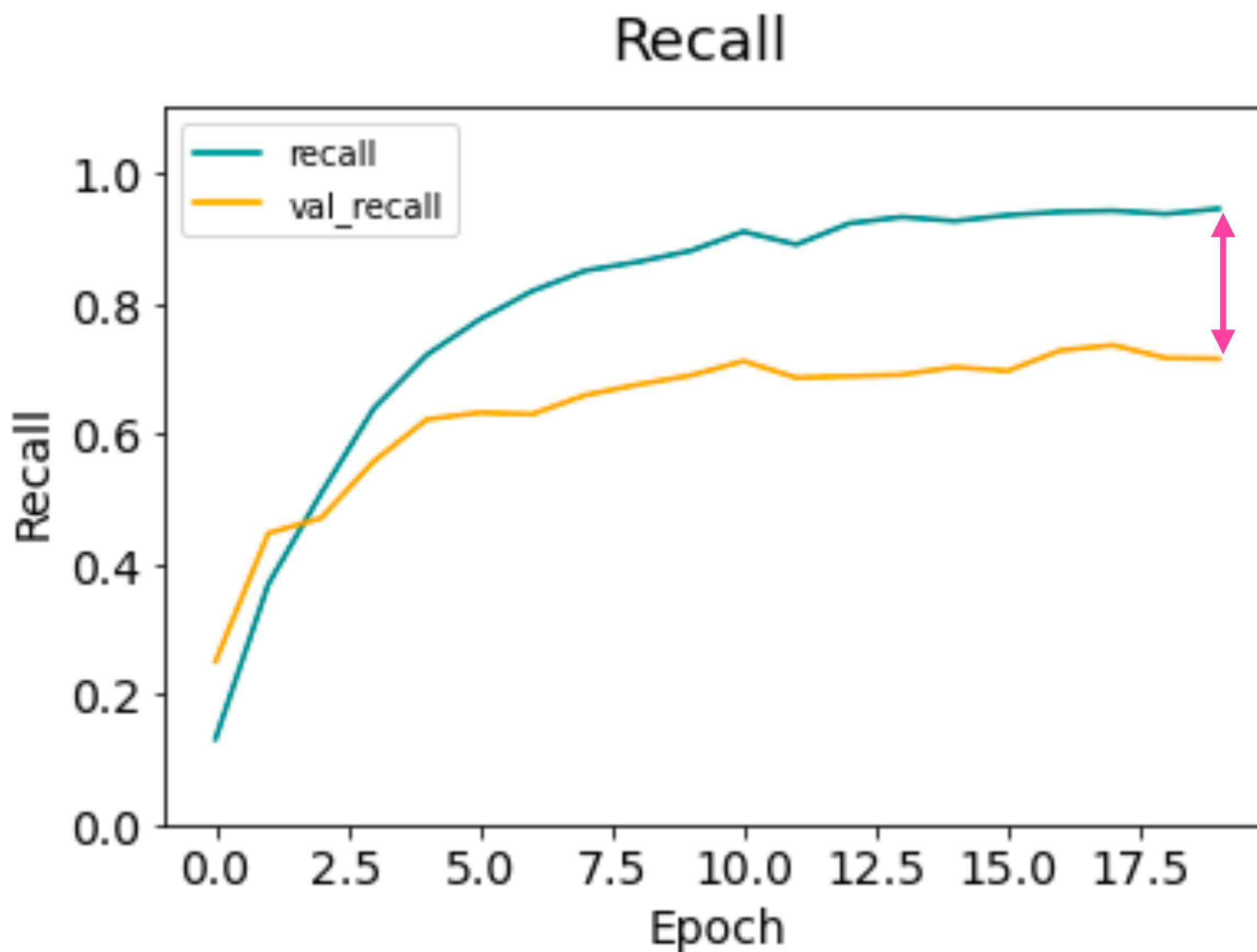
# Testing out image augmentation to reduce overfitting

Transformation applied:

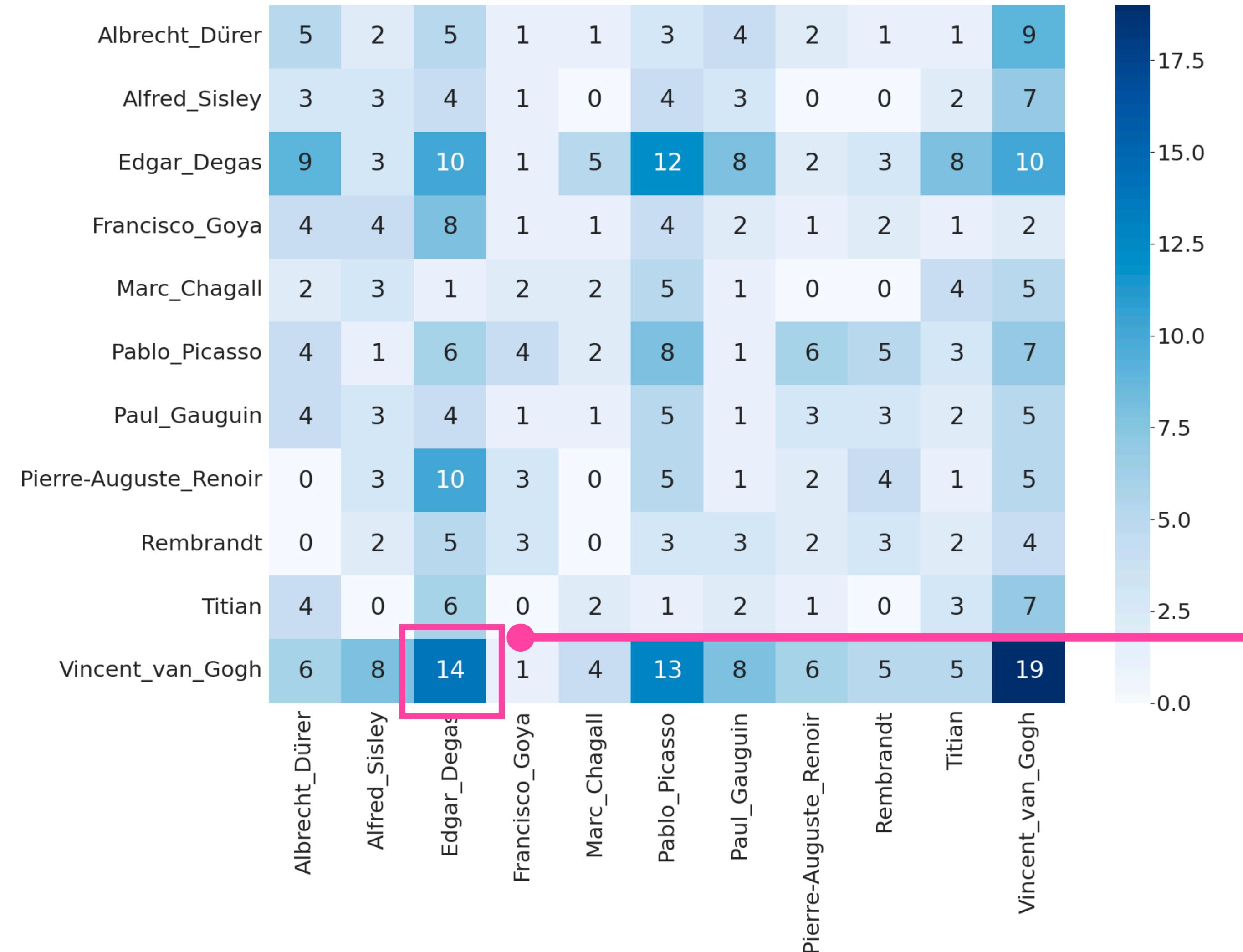
```
rotation_range = 20  
width_shift_range = 0.01  
height_shift_range = 0.01  
horizontal_flip = True  
vertical_flip = True
```



# While image augmentation doesn't really improve performance, it reduces overfitting



# Confusion Matrix



**Van Gogh and Degas are the most confused:**

- Both impressionists with Degas more traditional.
- Subject of both are people.

# Next Steps

**The model could still use some improvement, I would like to test two approaches:**

- **Continue fine-tuning top layers**
- **Leverage weight from a more specialized task: example on a museum collection**

**Thank you**