



# Fundamentals of Deep Learning

Part 4: Data Augmentation and Deployment





# Agenda

- Part 1: An Introduction to Deep Learning

---
- Part 2: How a Neural Network Trains

---
- Part 3: Convolutional Neural Networks

---
- Part 4: Data Augmentation and Deployment

---
- Part 5: Pre-Trained Models

---
- Part 6: Advanced Architectures

## Recap of the Exercise

### Analysis

- CNN increased validation accuracy
- Still seeing training accuracy higher than validation

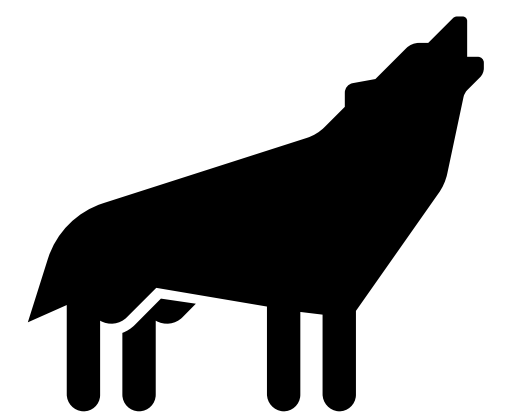
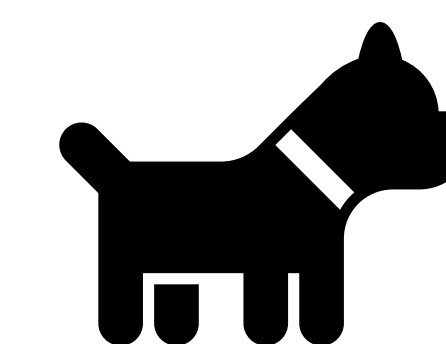
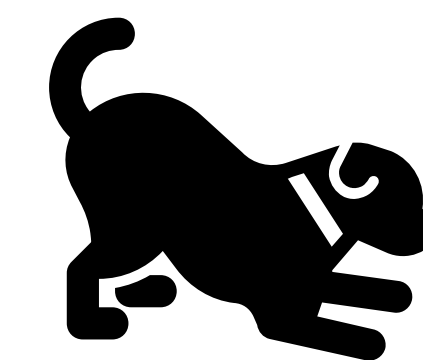
## Recap of the Exercise

### Analysis

- CNN increased validation accuracy
- Still seeing training accuracy higher than validation

### Solution

- Clean data provides better examples
- Dataset variety helps the model generalize







# **Data Augmentation**



# Data Augmentation





# Image Flipping

Horizontal Flip

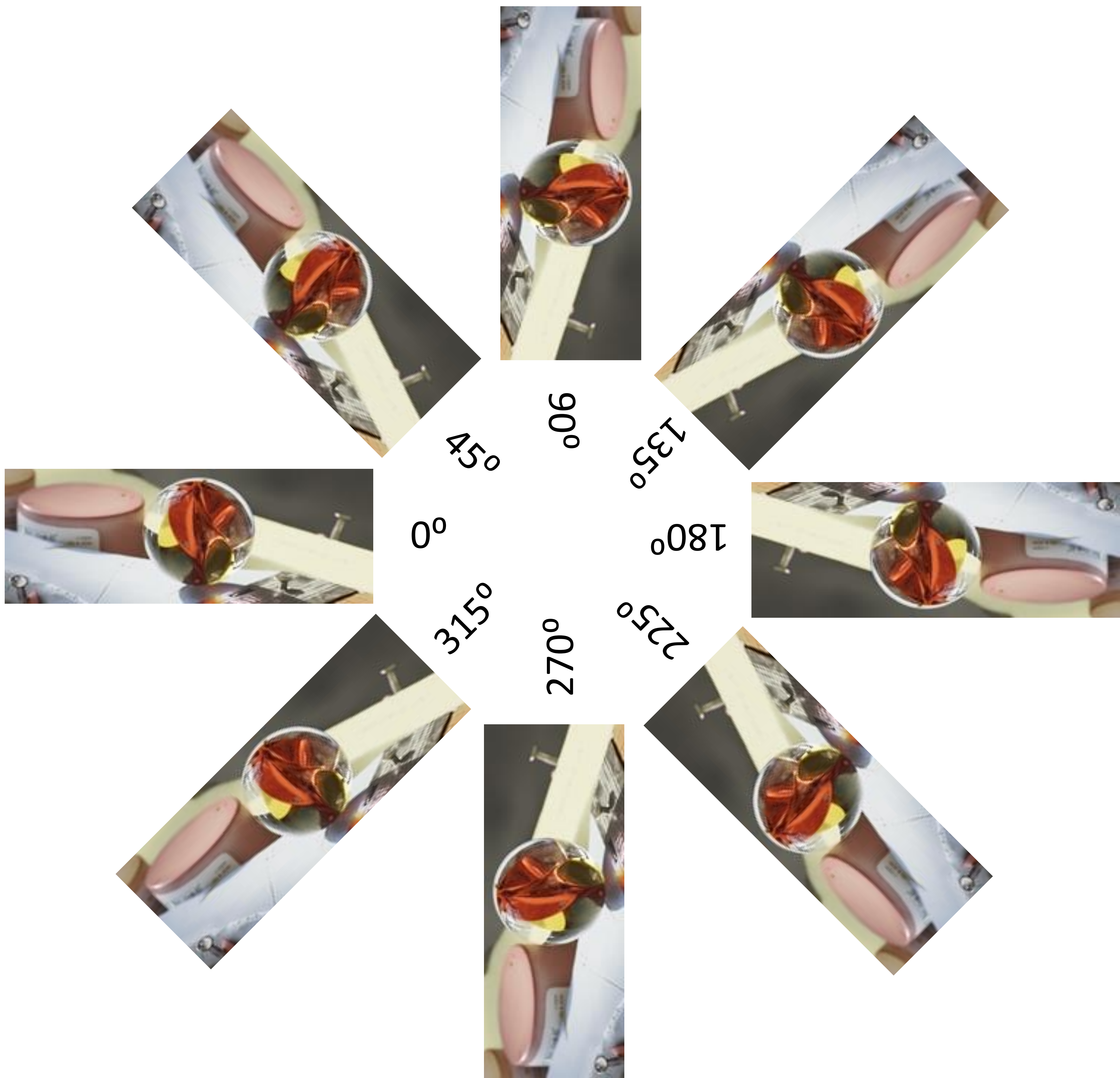


Vertical Flip



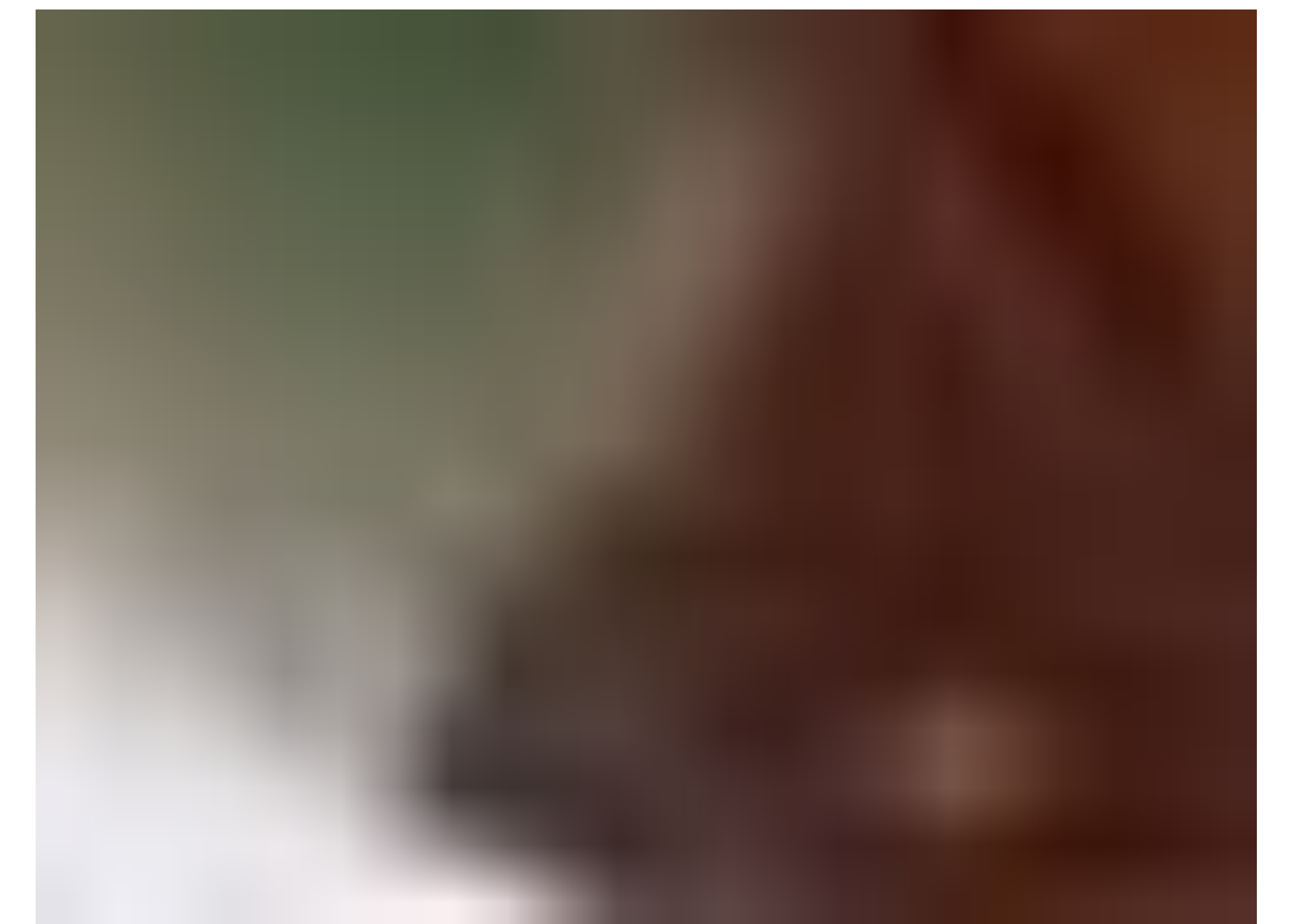
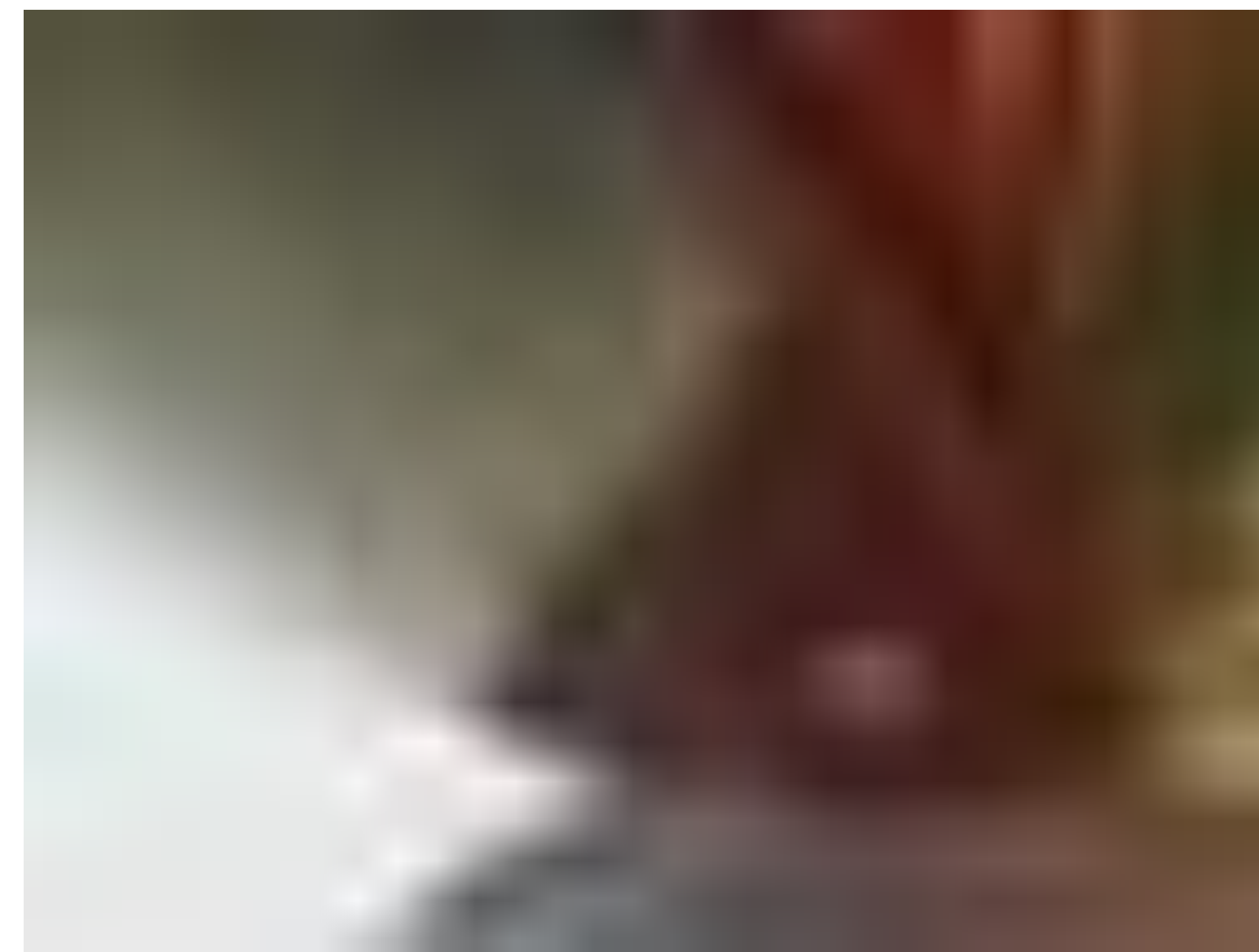
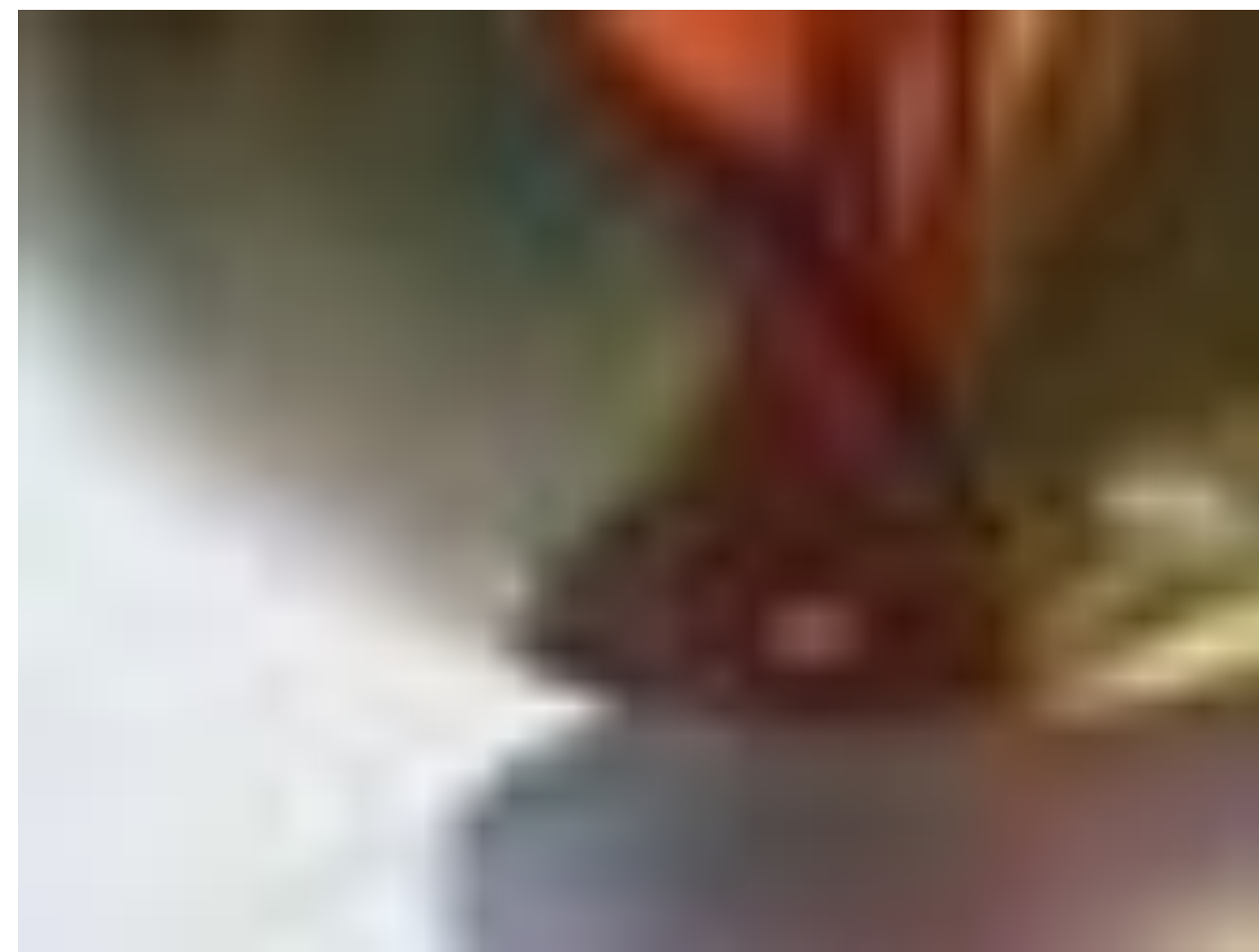


Rotation





# Zooming



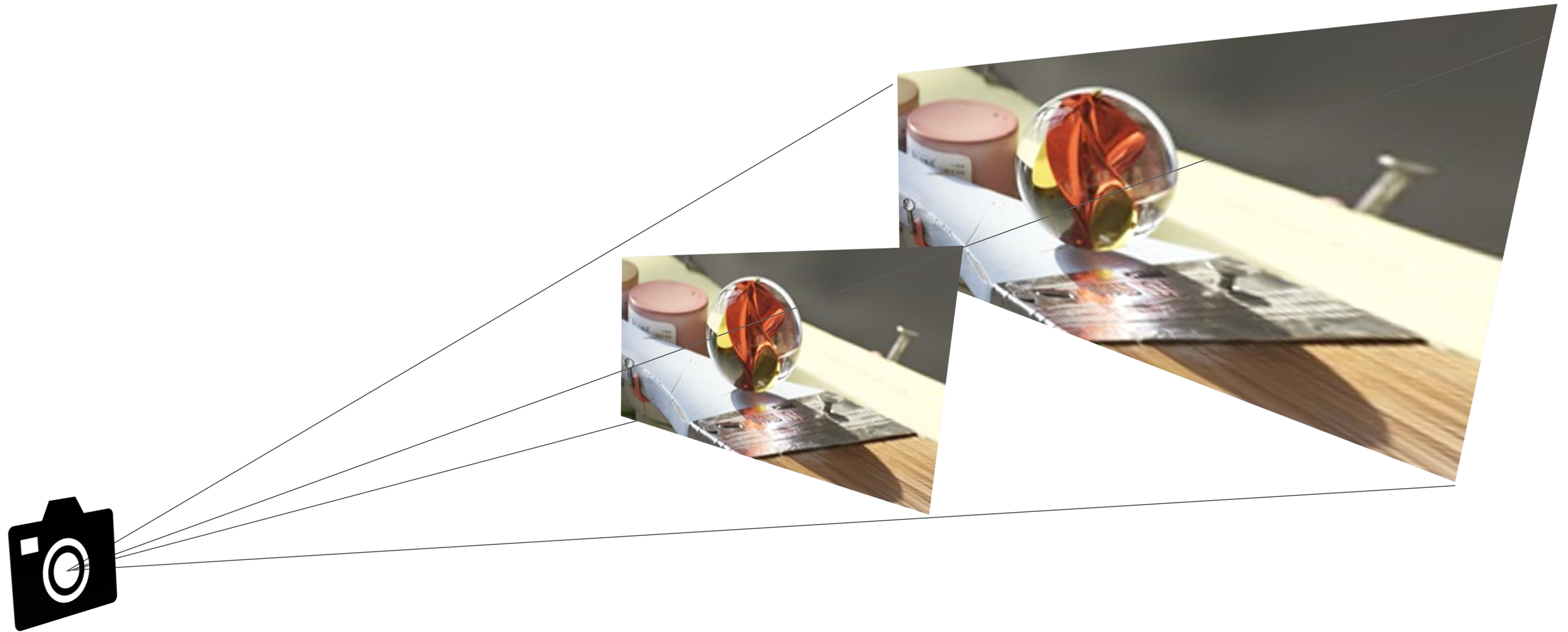


## Width And Height Shifting



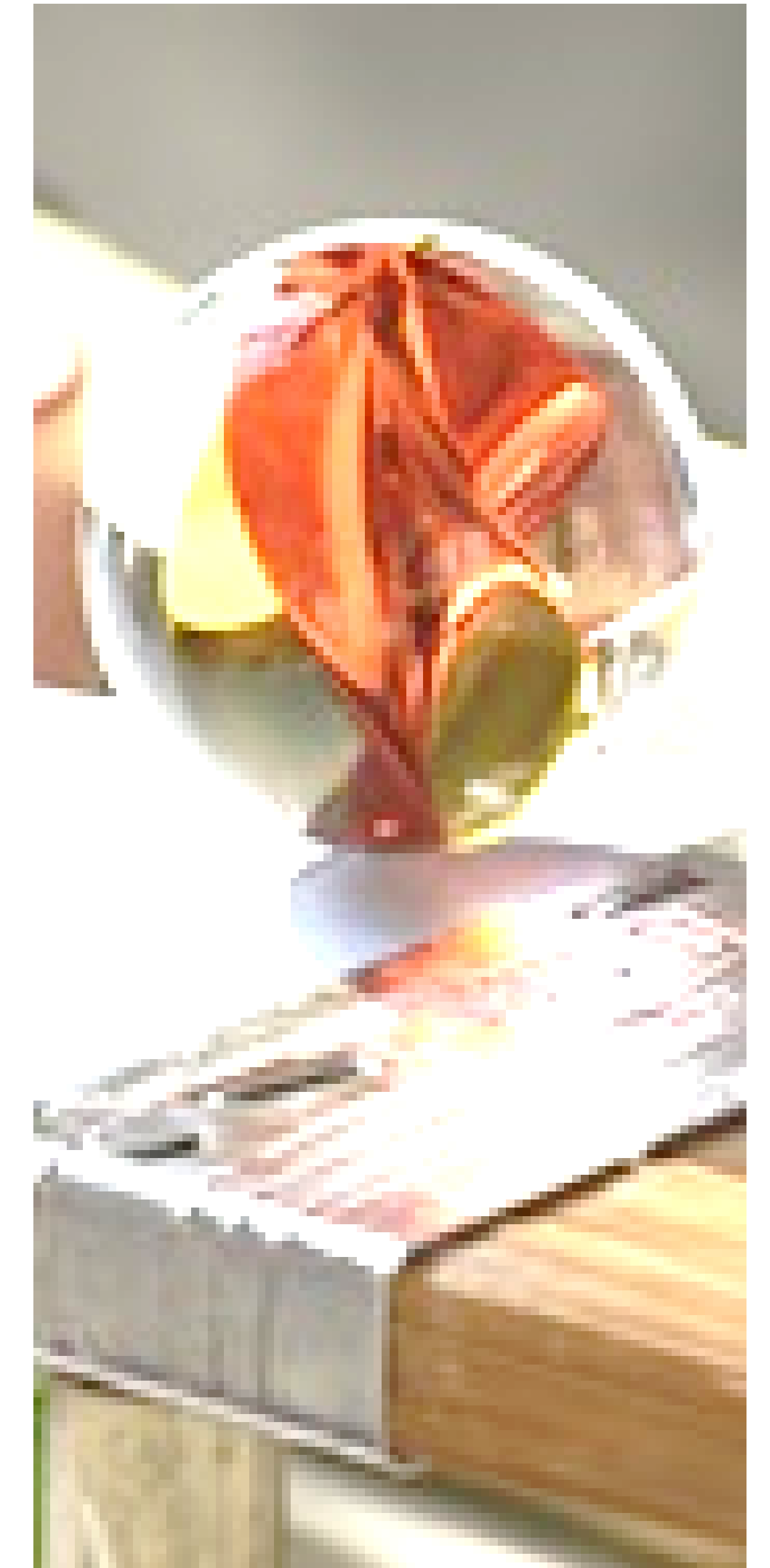


# Homography





# Brightness





# Channel Shifting



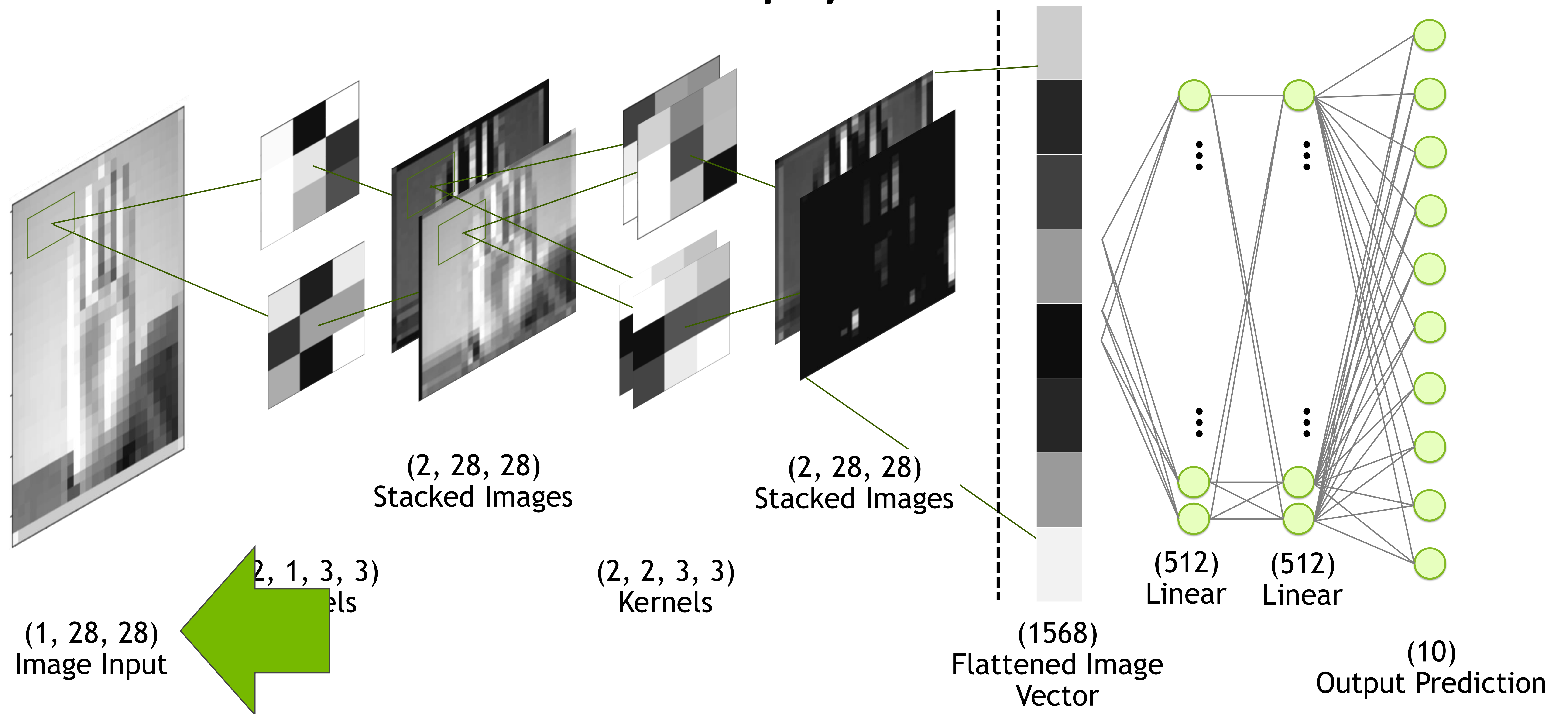




# Model Deployment



# Model Deployment





# Model Deployment

Training Batch  
Input



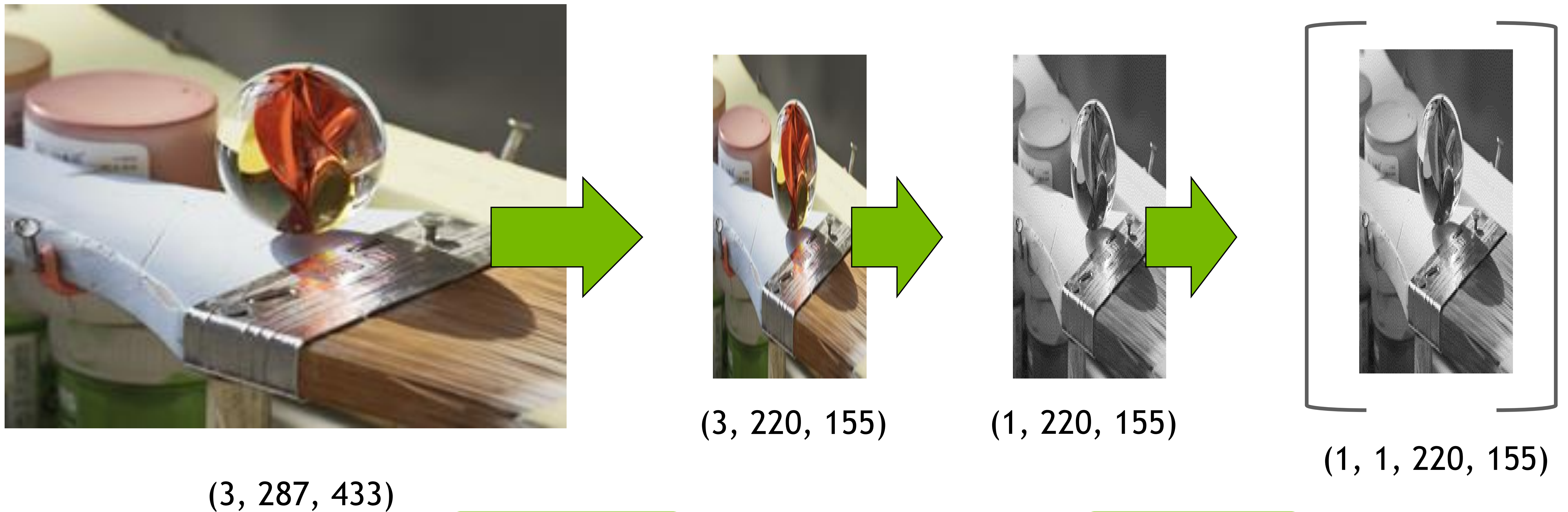
Convolution

Max Pooling

...



# Model Deployment



Resize

Greyscale

“Batch”





**Let's Try It Out!**



