



# 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

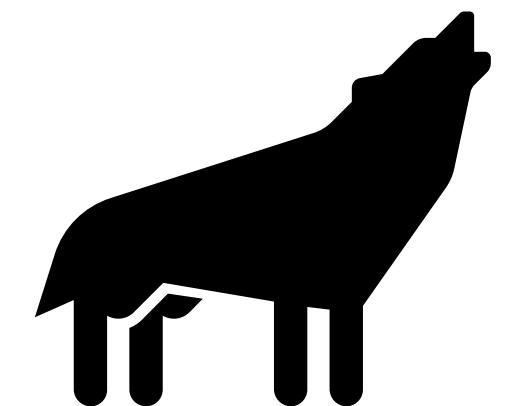
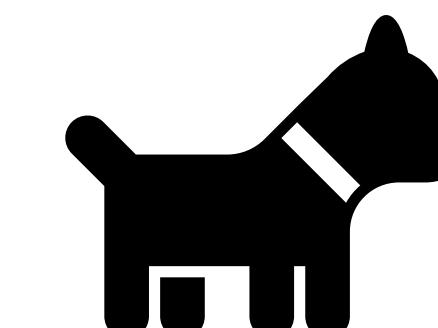
# Recap of the Exercise

## 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



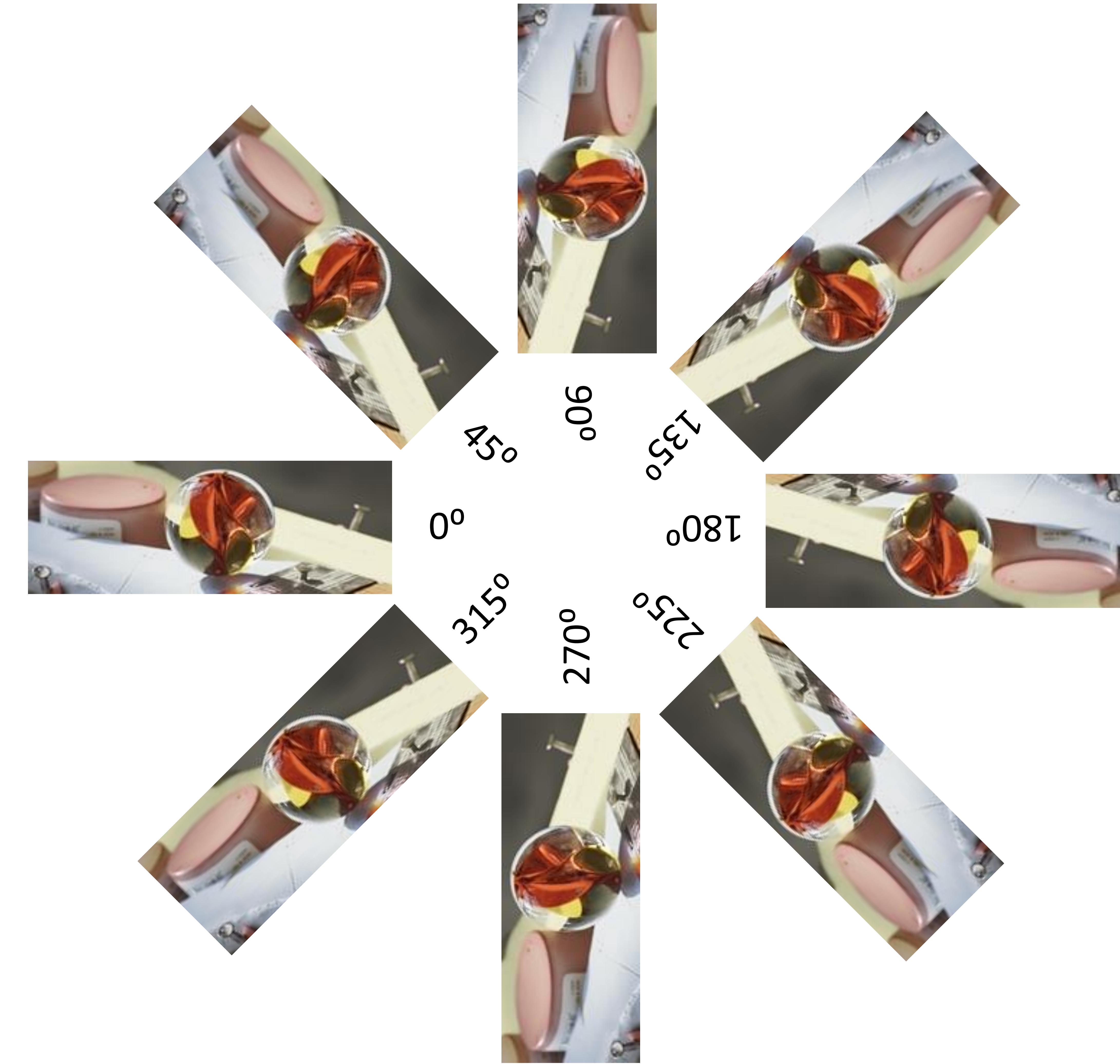
# Image Flipping

Horizontal Flip

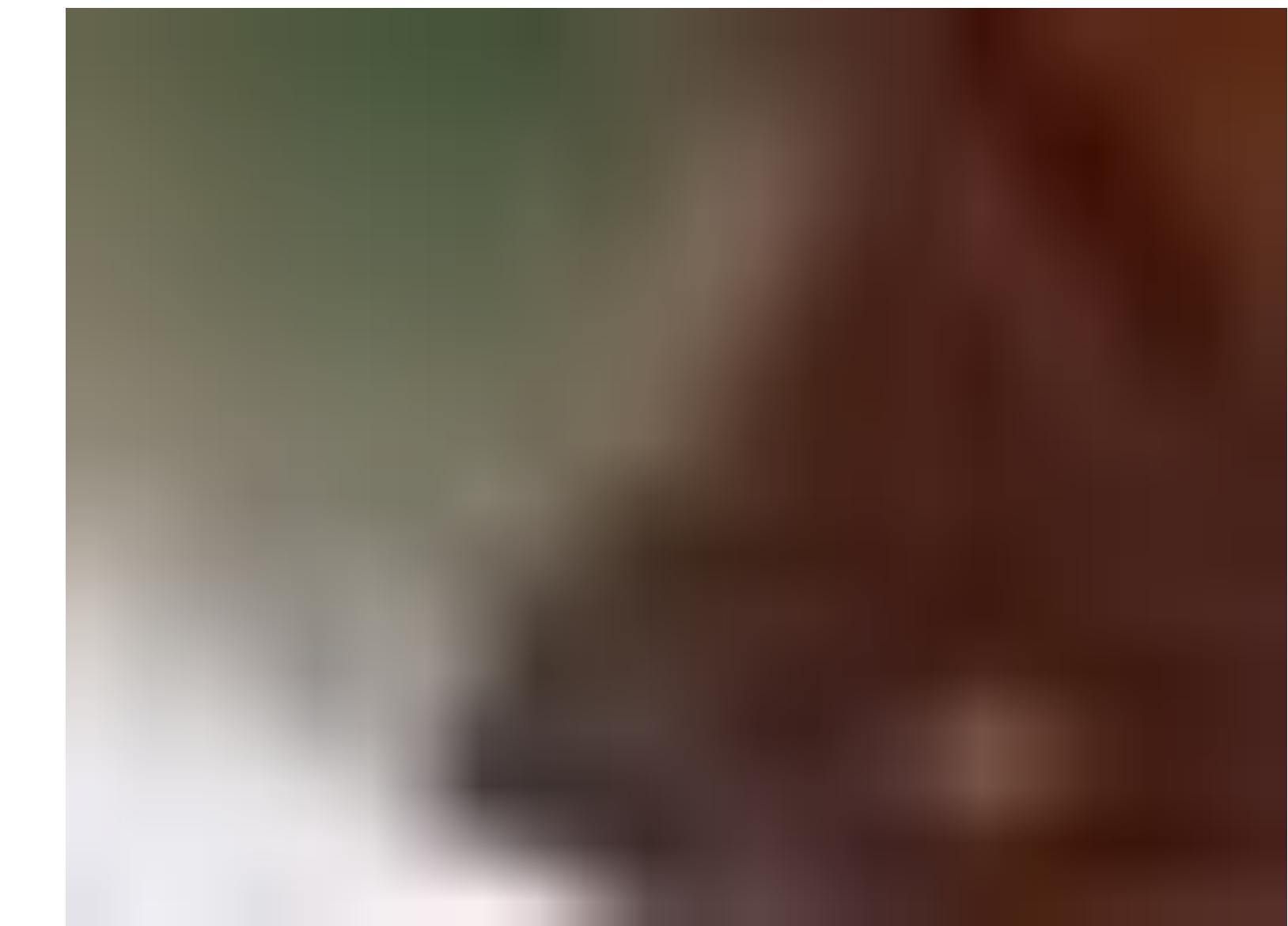
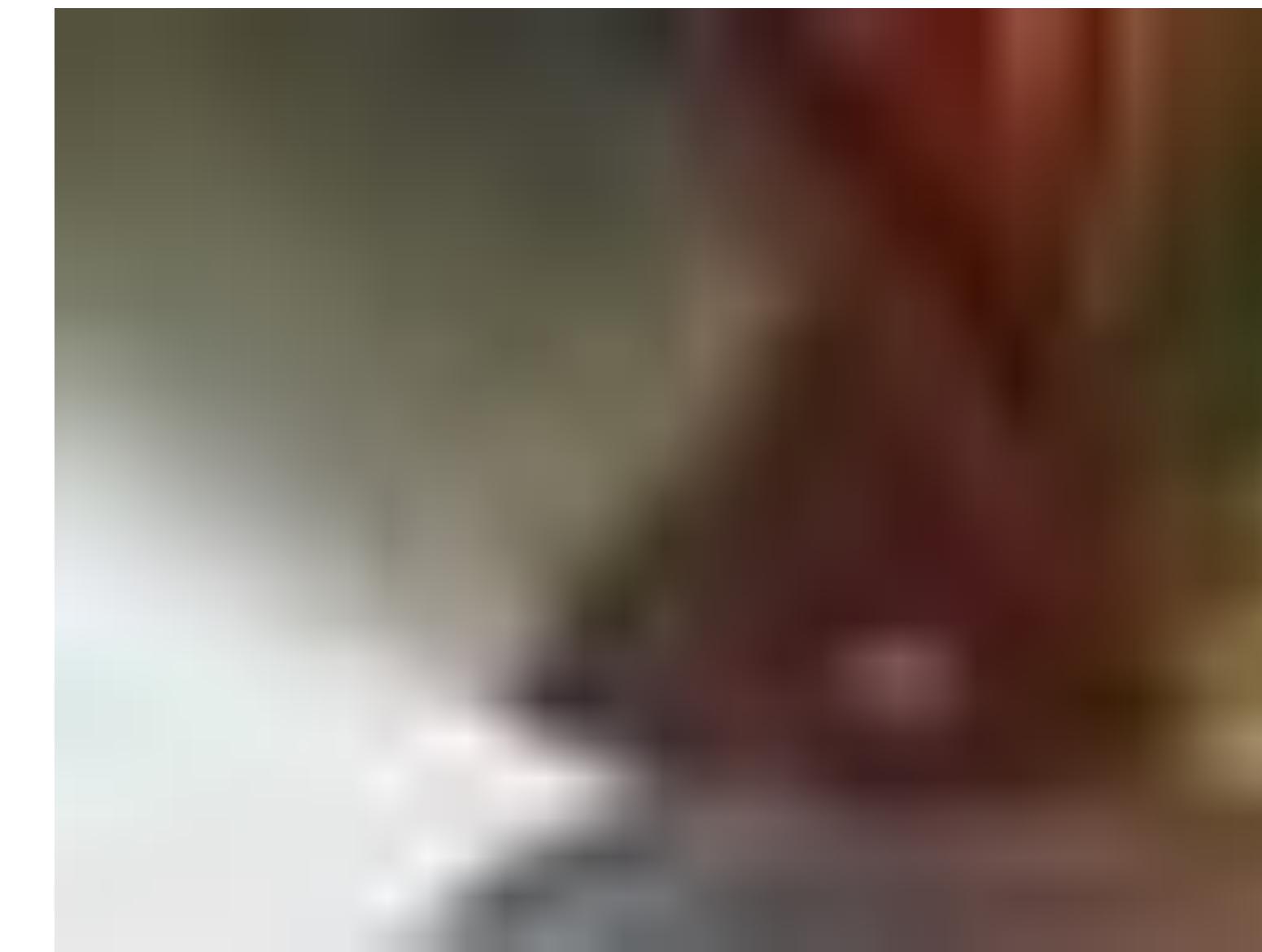
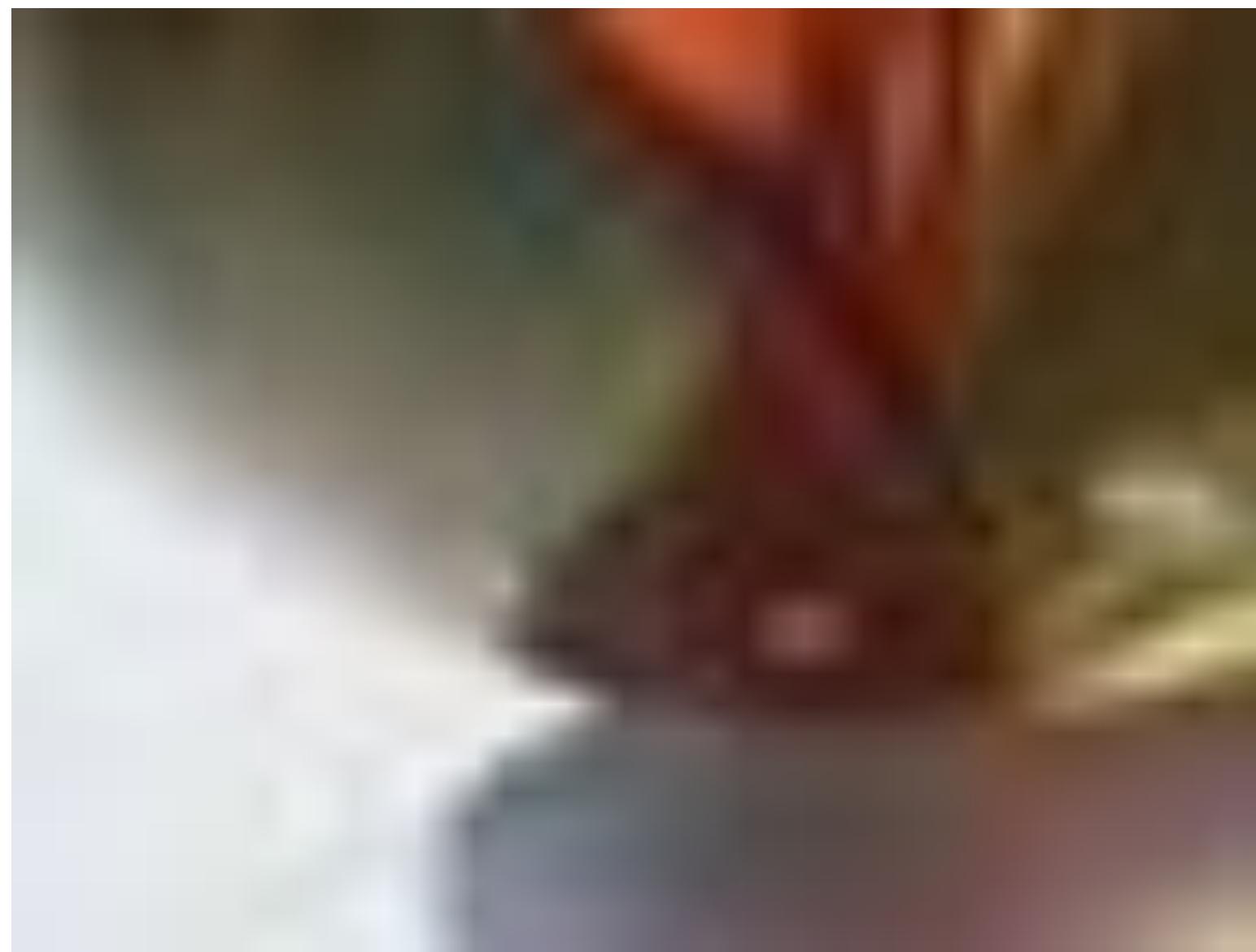


Vertical Flip

# Rotation



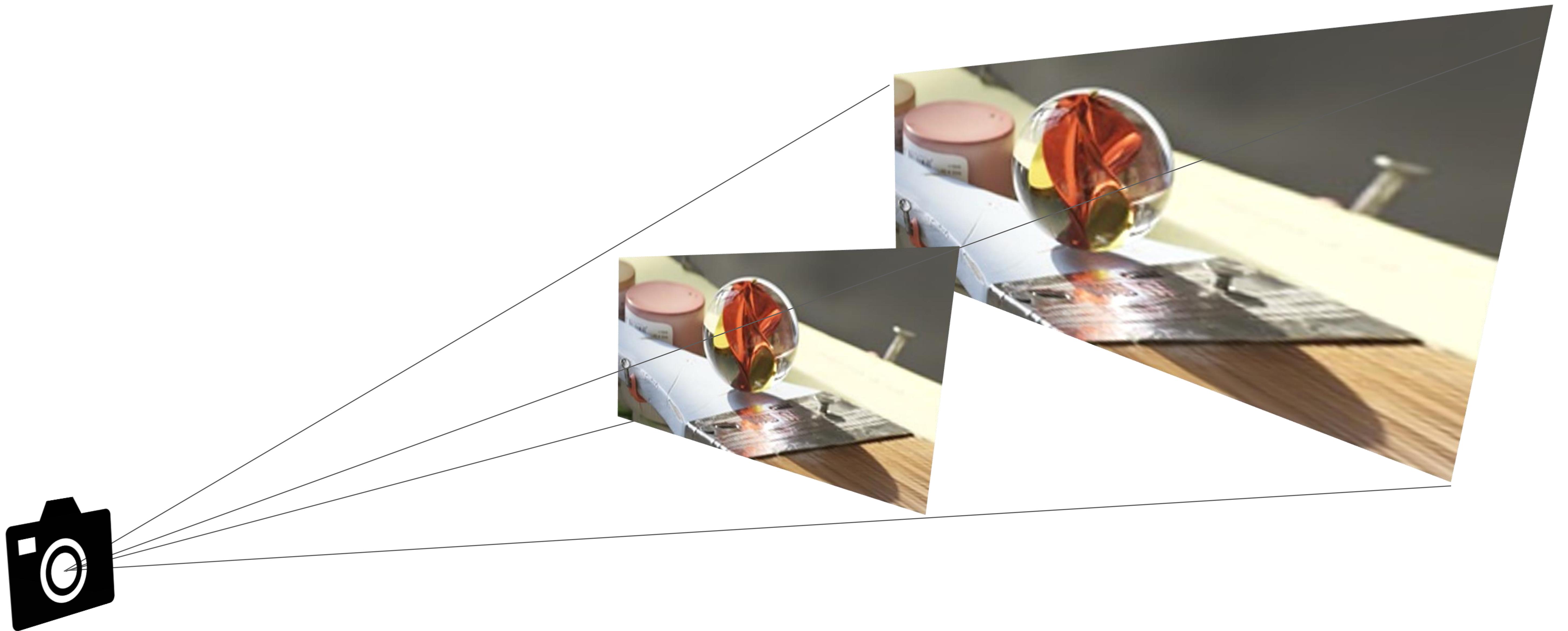
# Zooming



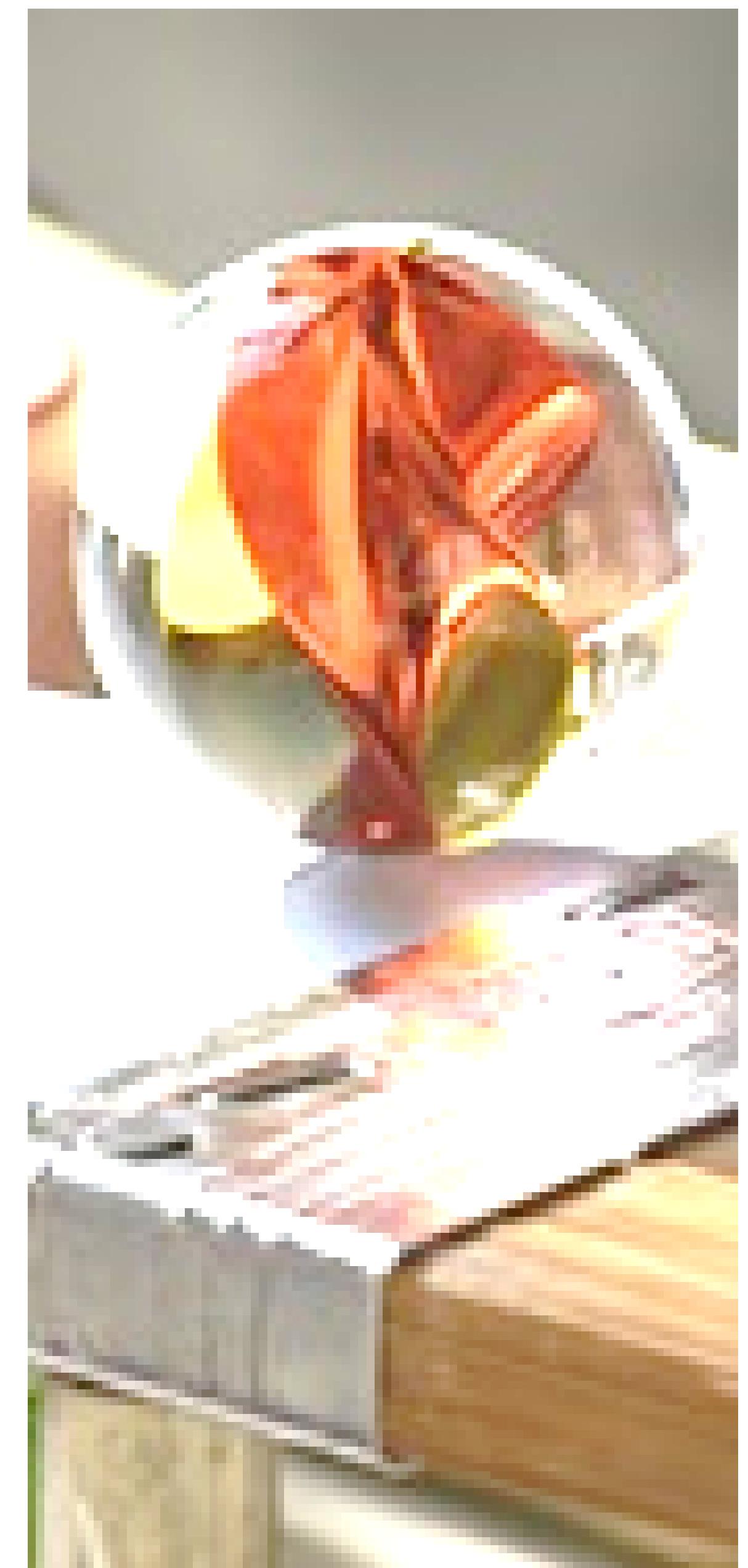
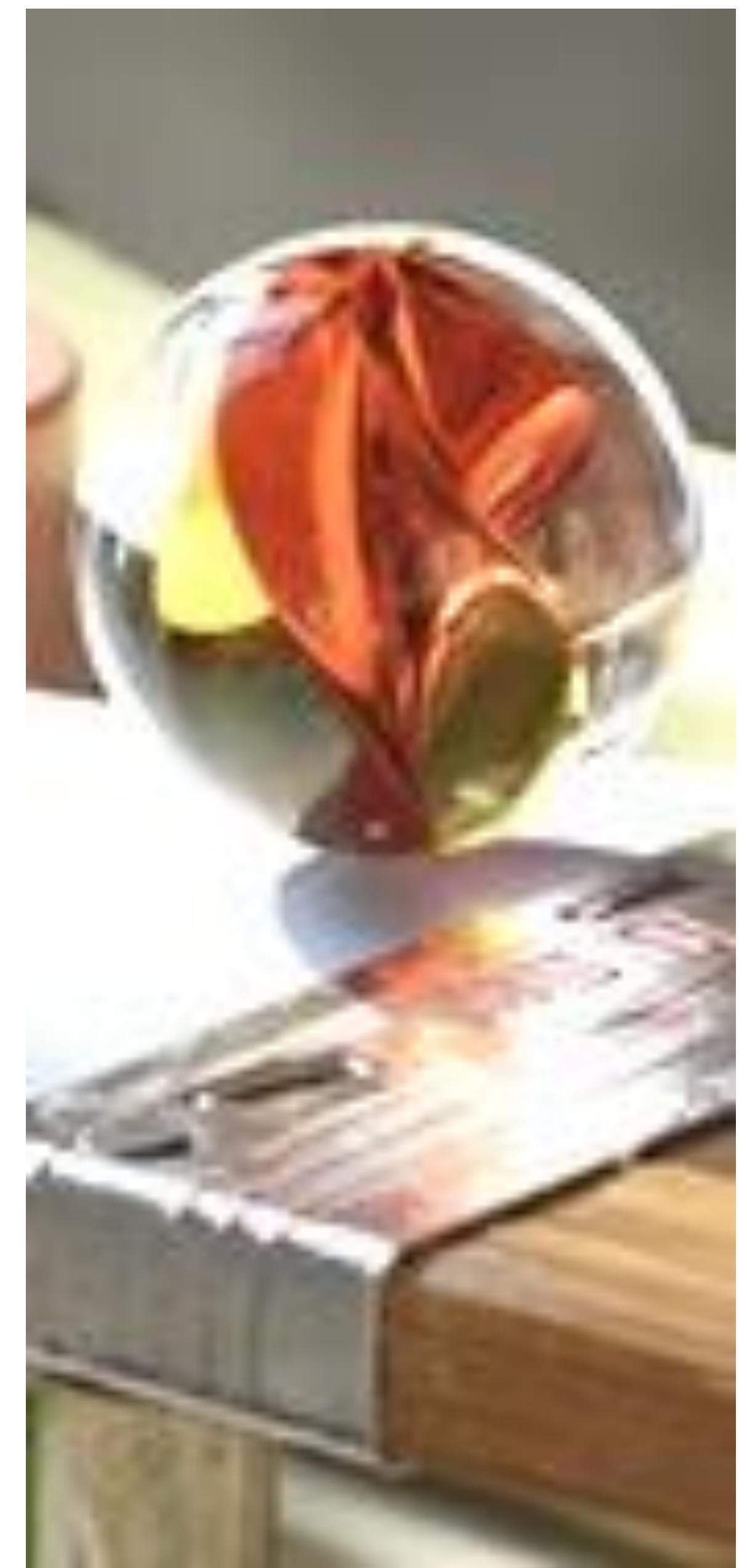
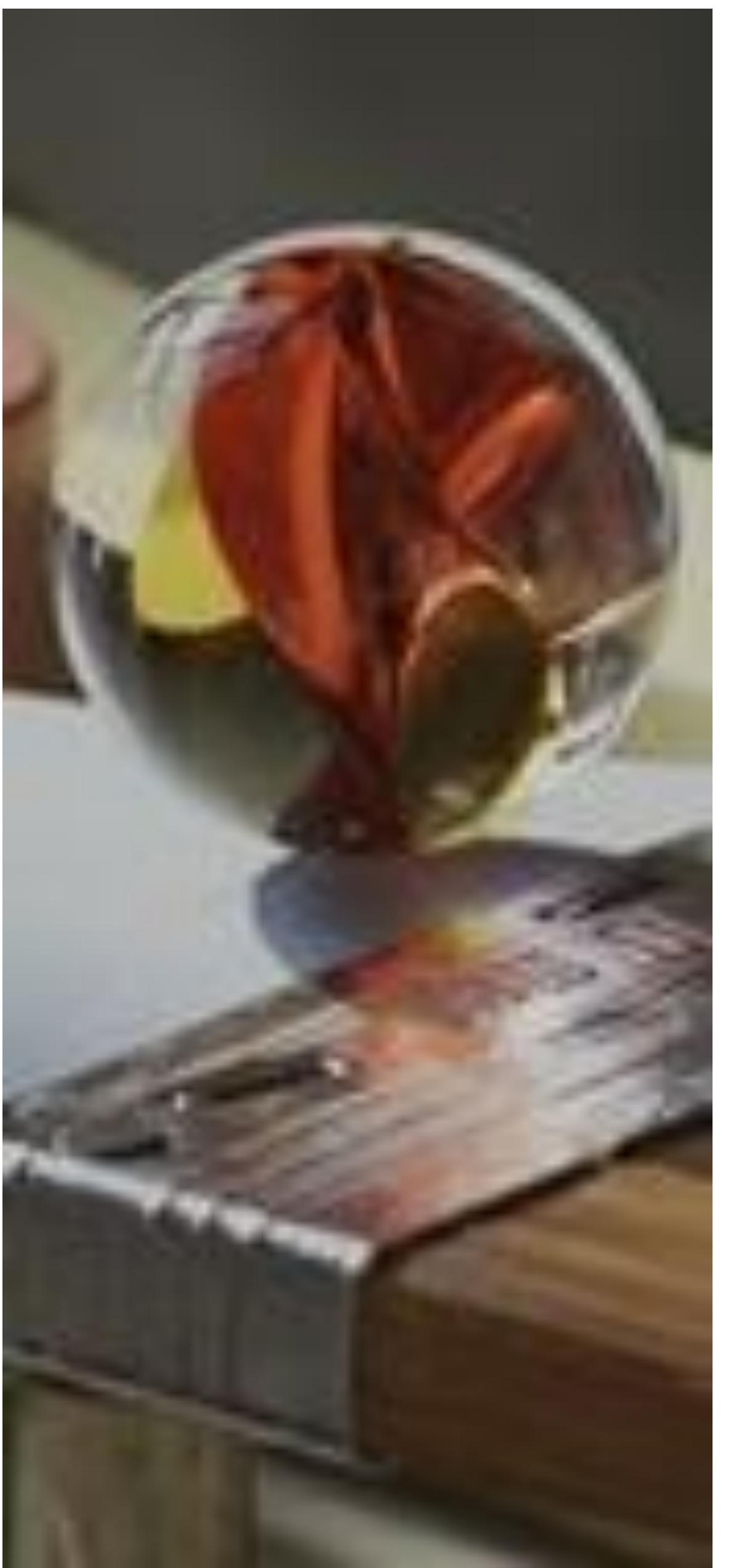
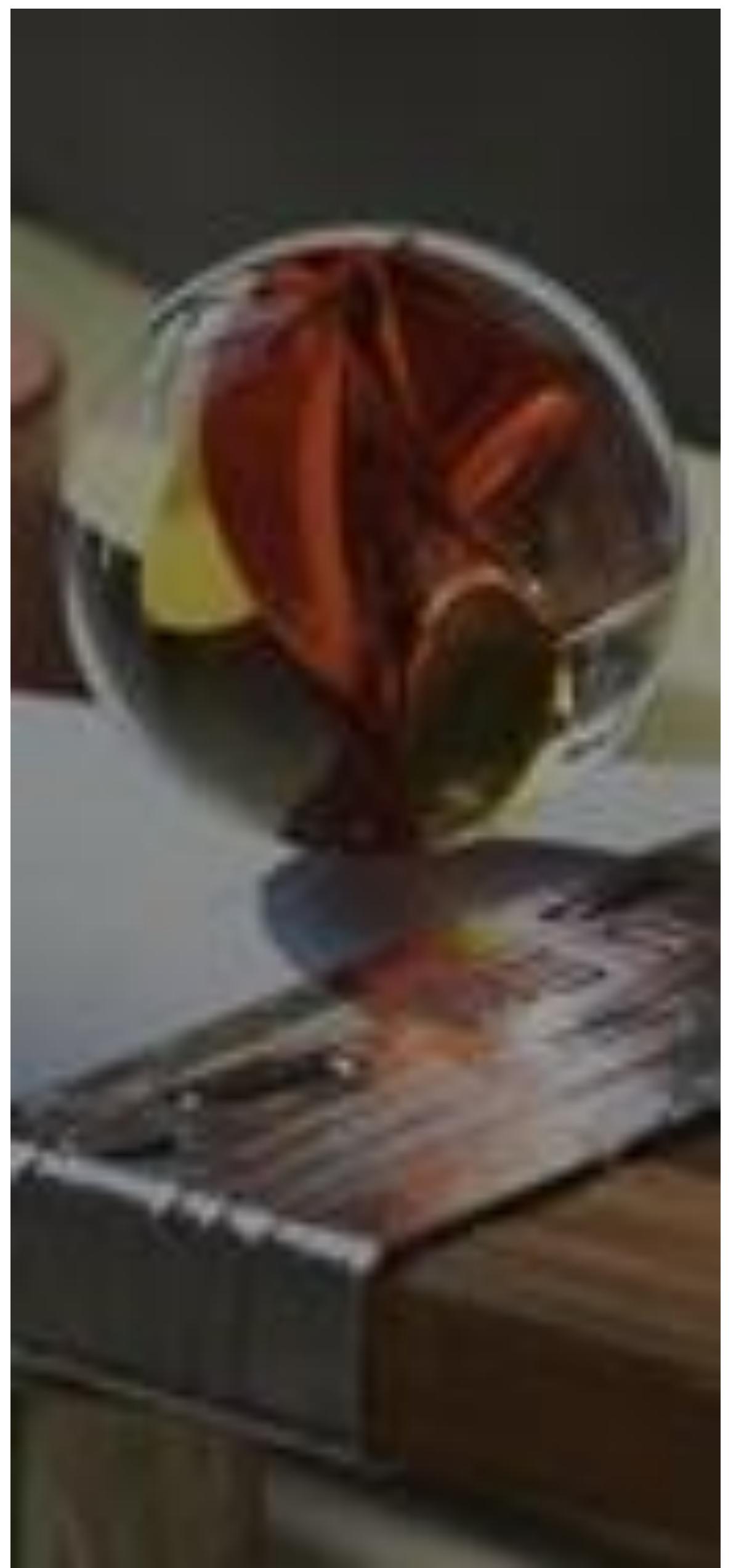
## Width And Height Shifting



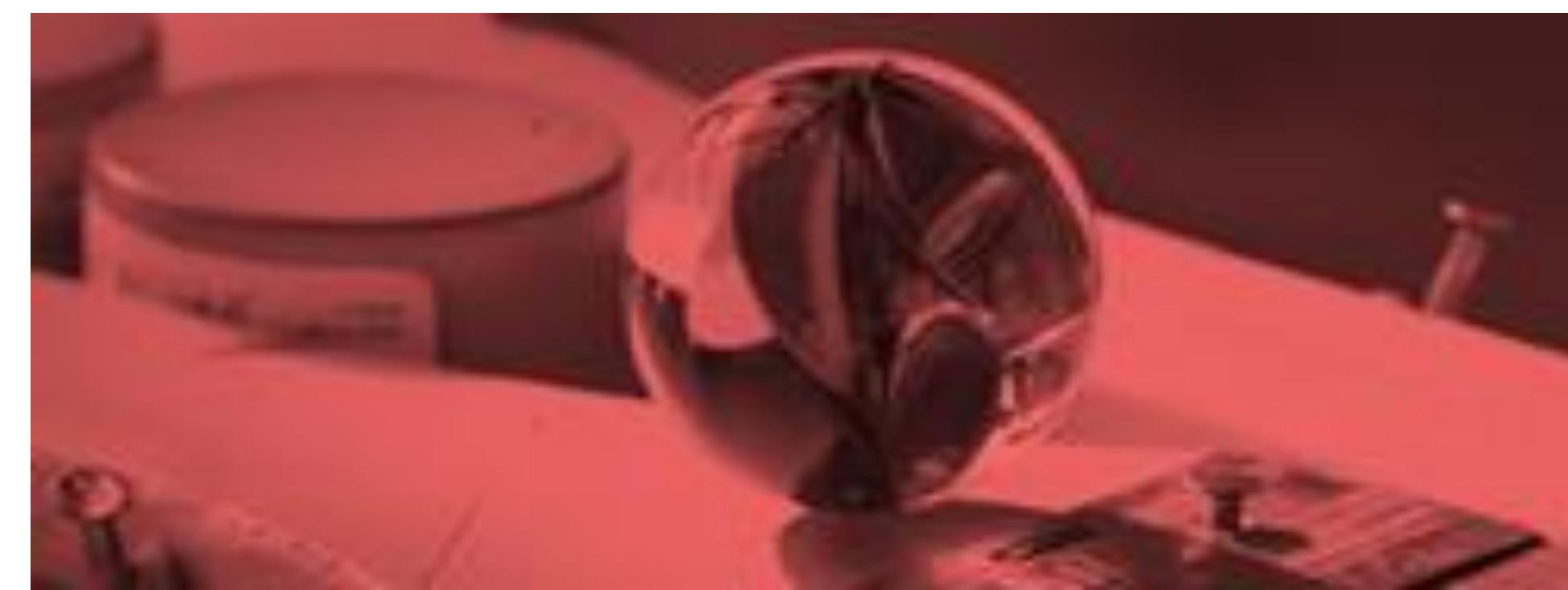
# Homography



# Brightness

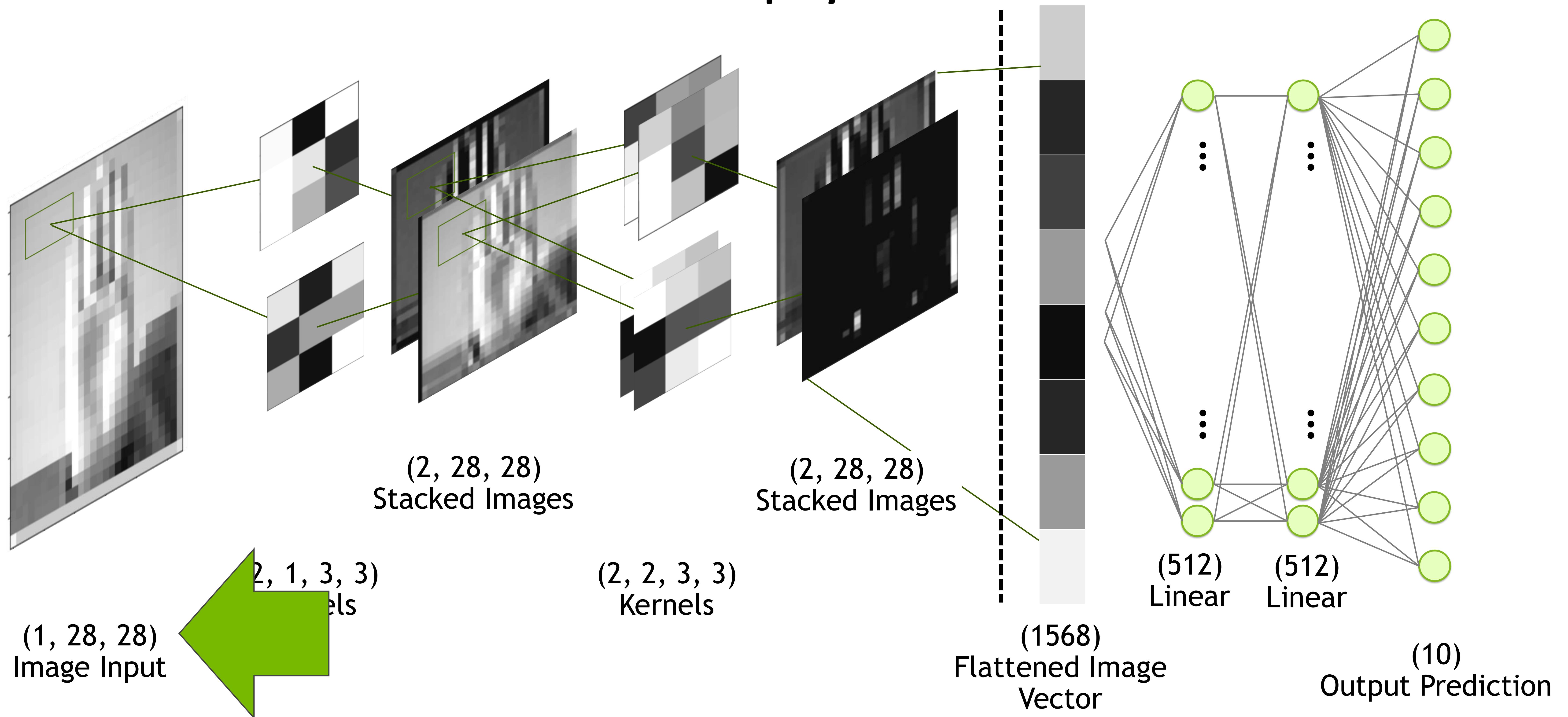


# Channel Shifting



# **Model Deployment**

# Model Deployment



# Model Deployment

Training Batch  
Input



Convolution

Max Pooling

...

# Model Deployment

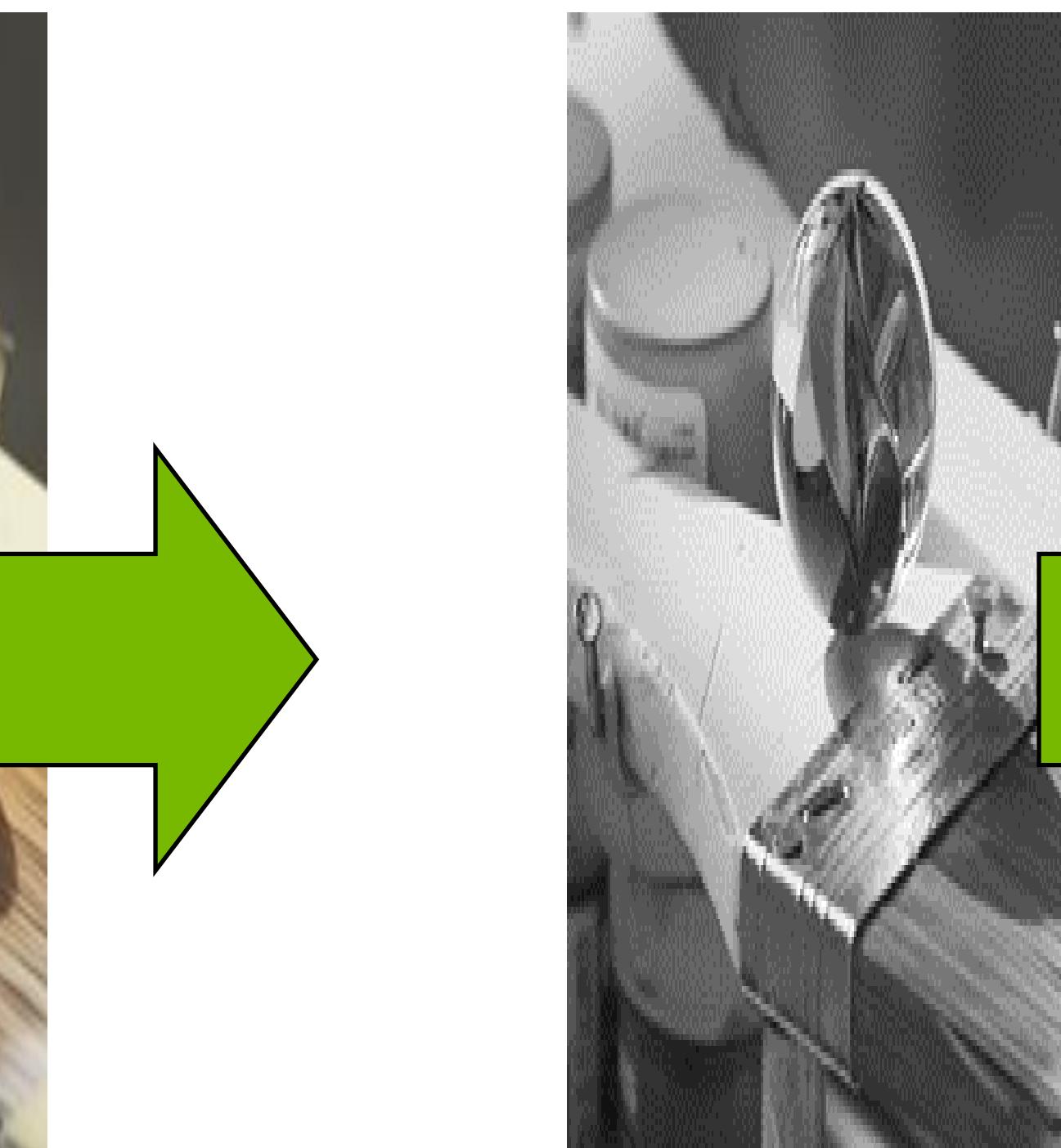


(3, 287, 433)

Resize



(3, 220, 155)



(1, 220, 155)

Greyscale



(1, 1, 220, 155)

“Batch”



**Let's Try It Out!**

