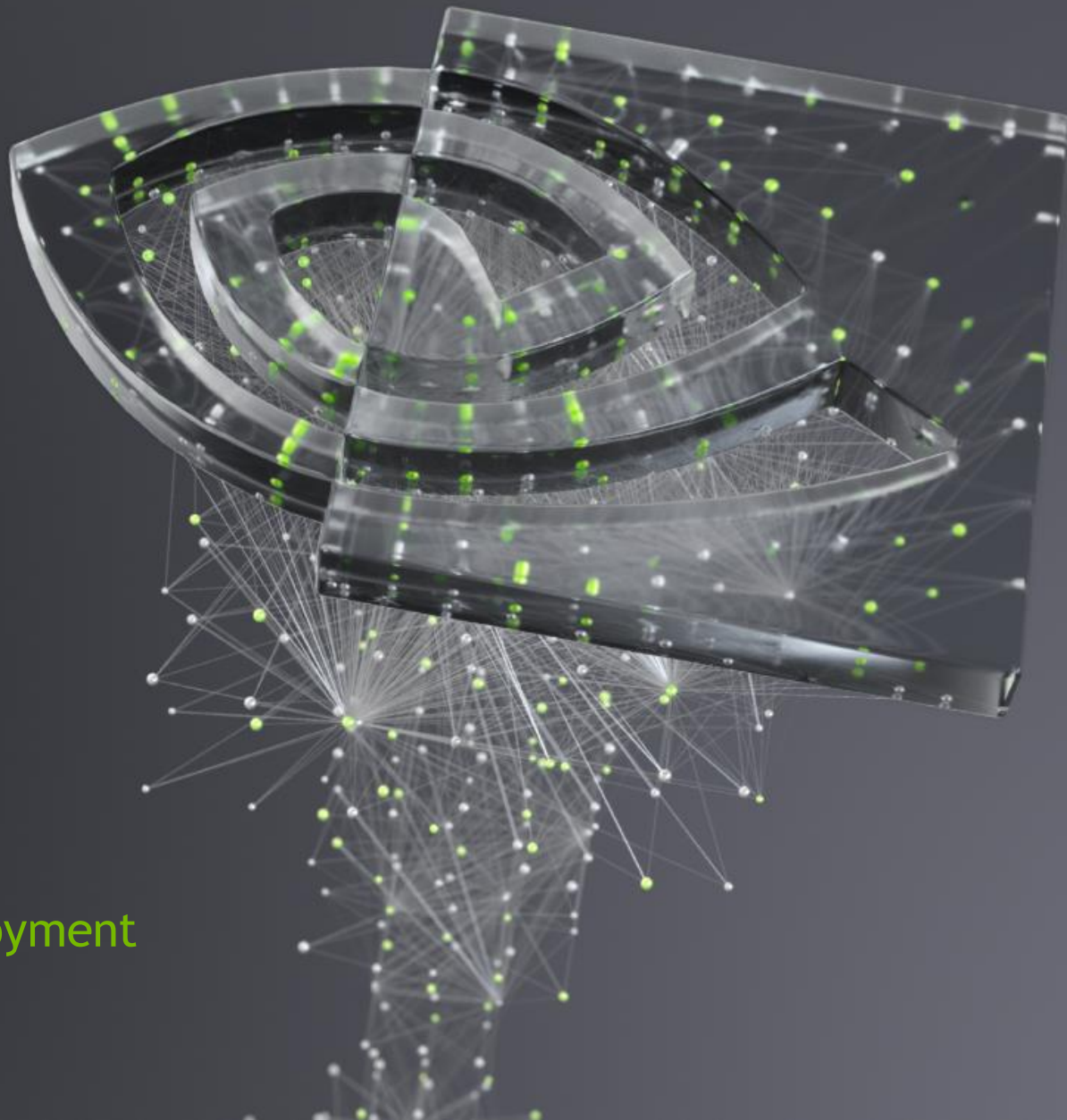




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# FUNDAMENTALS OF DEEP LEARNING

Part 4: Data Augmentation and Deployment



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# 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

# AGENDA – PART 4

- Data Augmentation
- Model Deployment

# 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

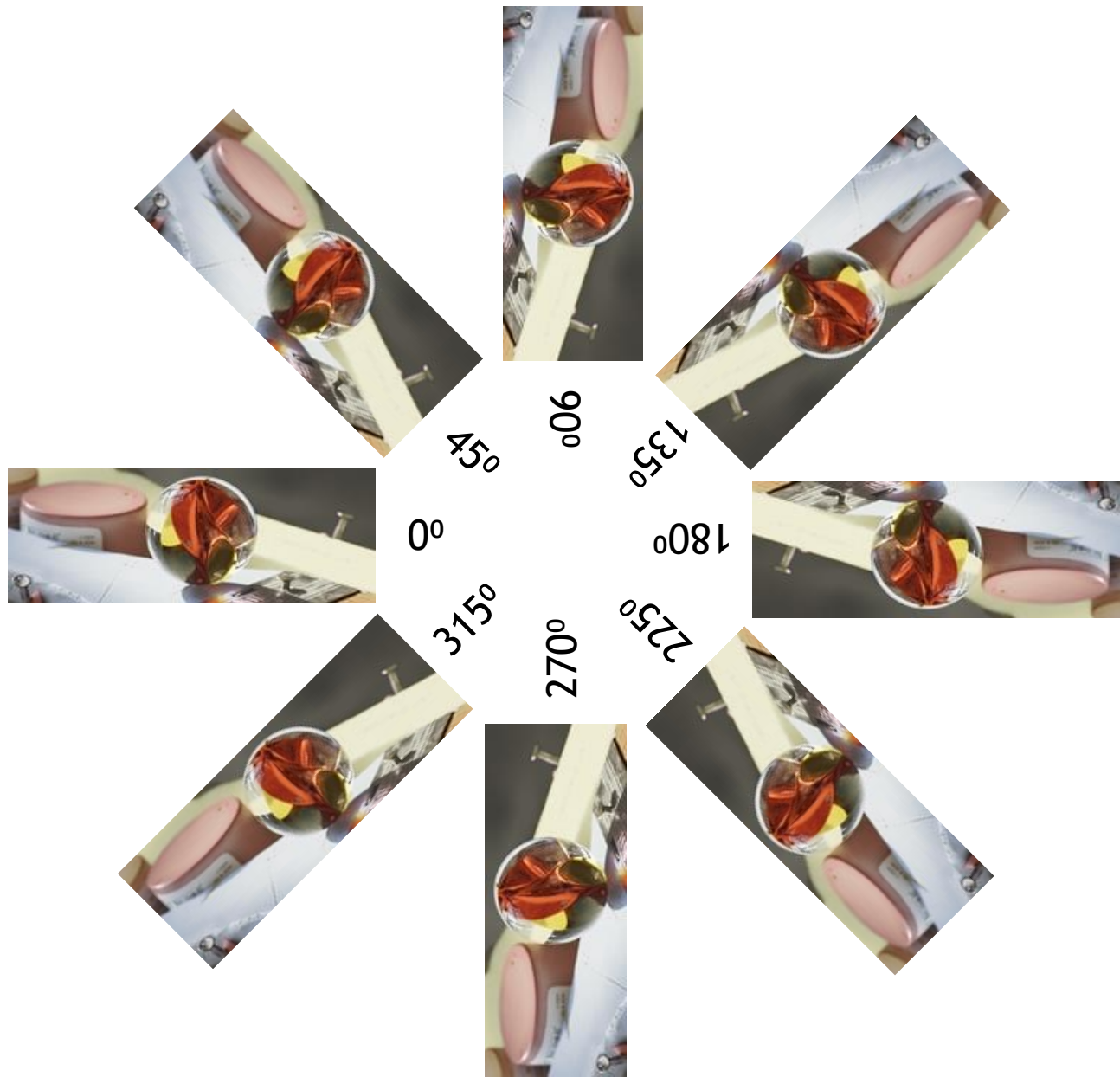


Vertical Flip

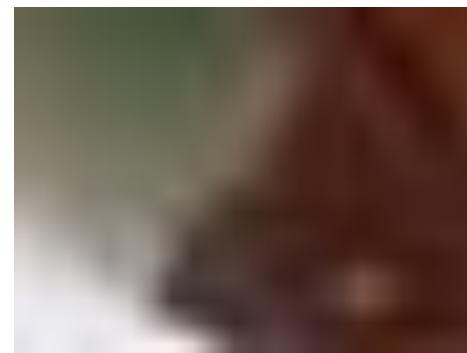
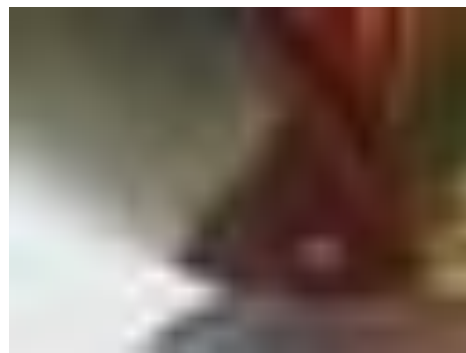
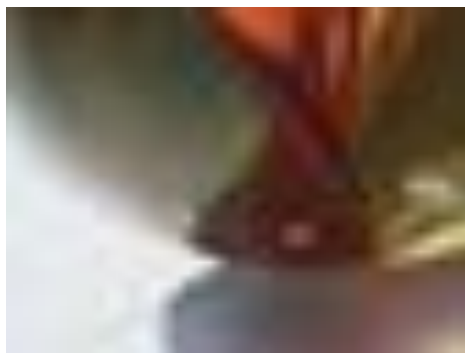




# ROTATION



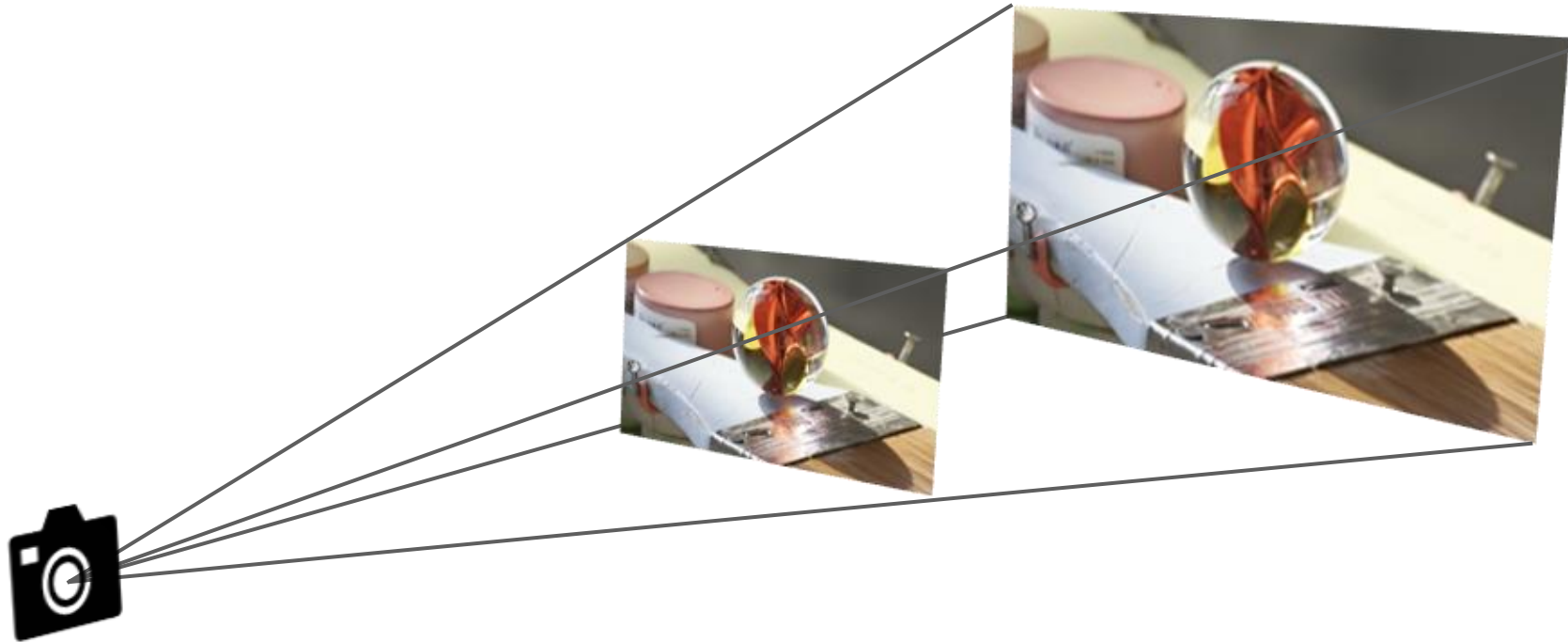
# ZOOMING



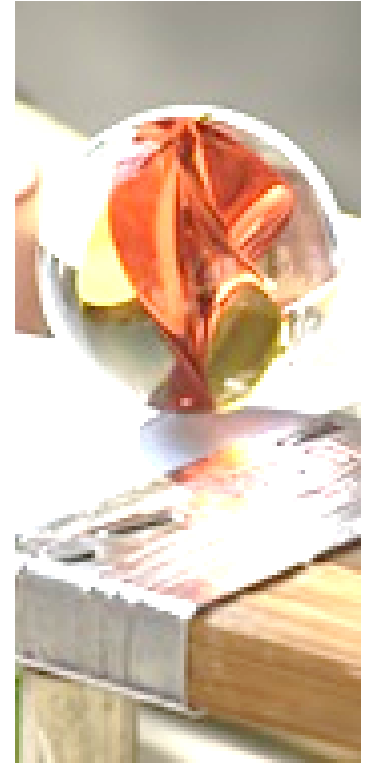
# WIDTH AND HEIGHT SHIFTING



# HOMOGRAPHY



# BRIGHTNESS





# CHANNEL SHIFTING

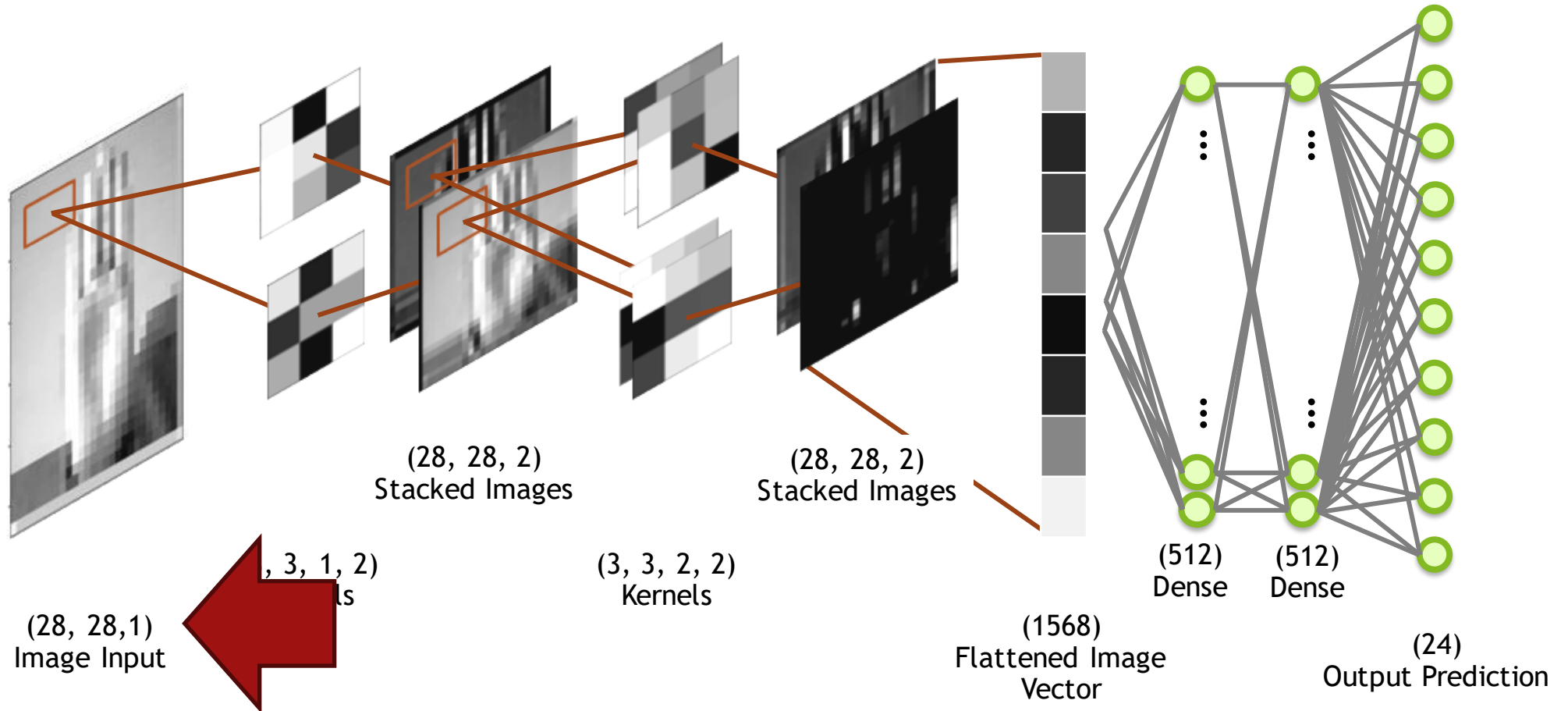






MODEL DEPLOYMENT

# MODEL DEPLOYMENT



# MODEL DEPLOYMENT

Training  
Batch Input



Convolution

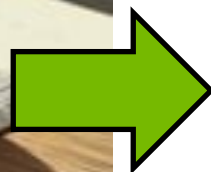
Max Pooling

...

# MODEL DEPLOYMENT



(287, 433, 3)



(220, 155, 3)



(220, 155, 1)



(1, 220, 155, 1)

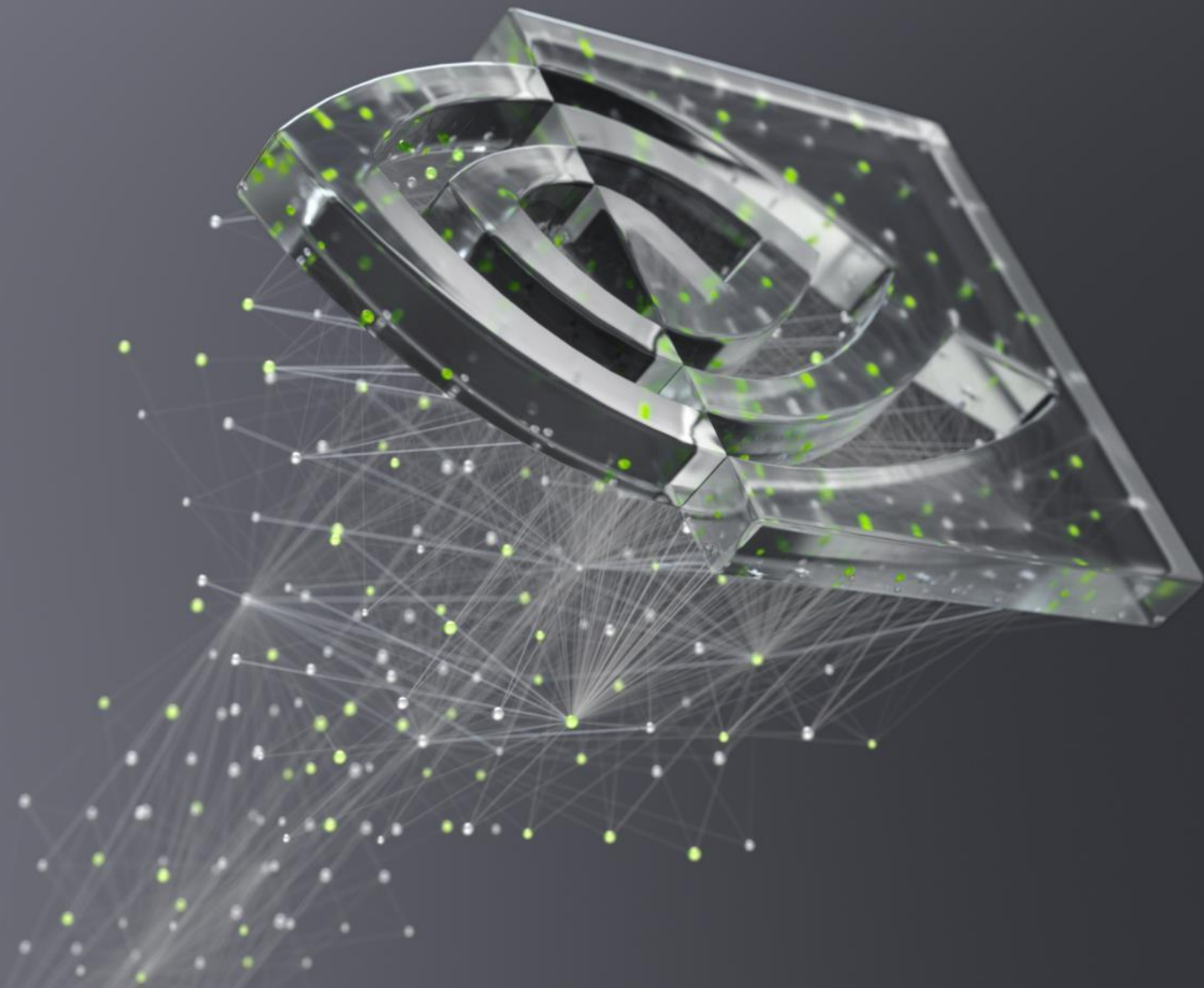
Resize

Greyscale

“Batch”



LET'S TRY IT OUT!



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