

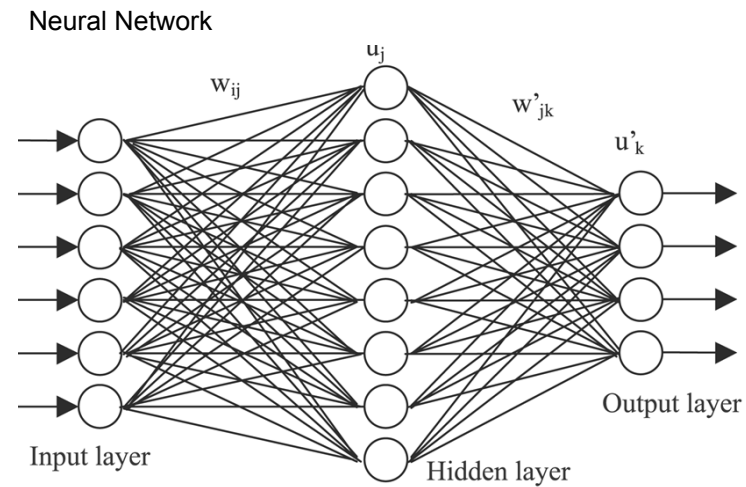
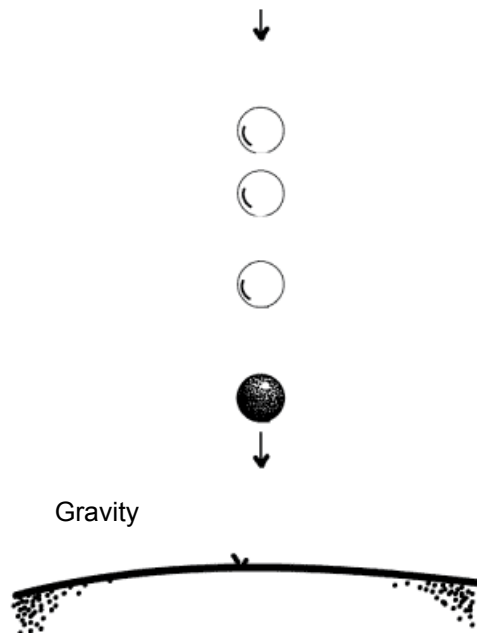
Learn Intuitive Physics From Videos with Multi-scale CGANs



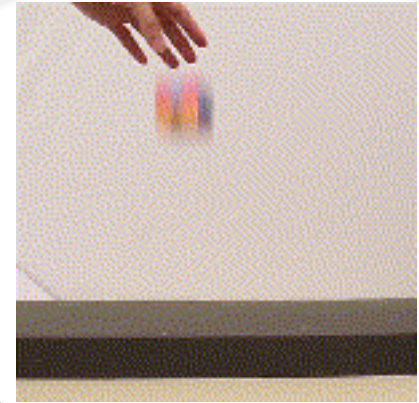
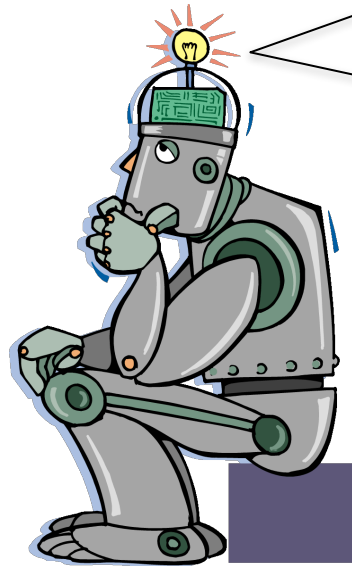
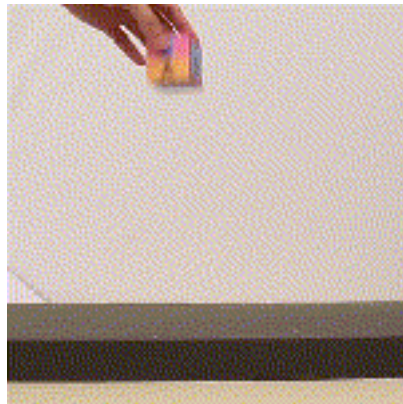
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Yunlong Song, Rong Zhi

Supervisor: Boris Belousov



Motivation

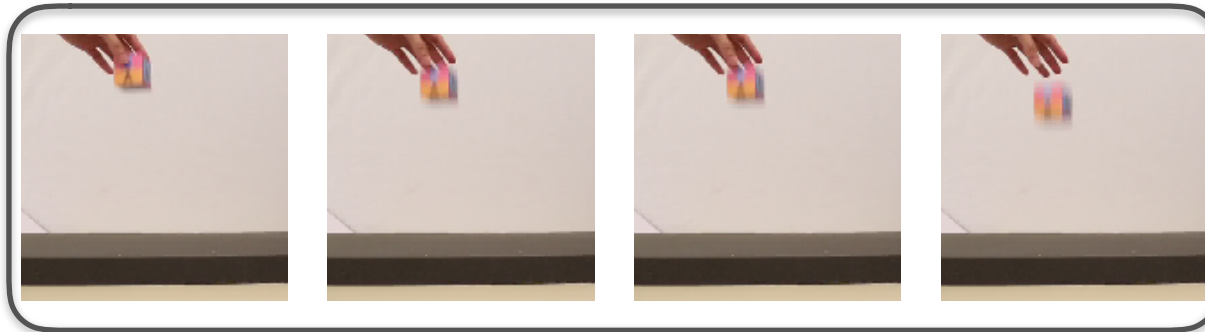


Outline

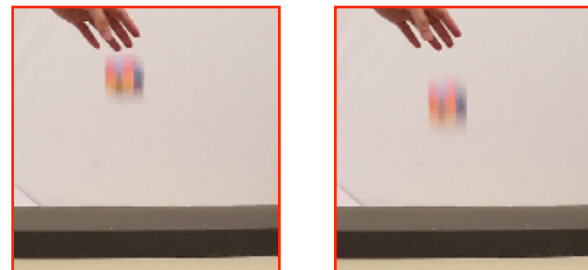
1. Introduction
2. Method
3. Experiments
4. Future Plan
5. Questions

Introduction

- **Task:**



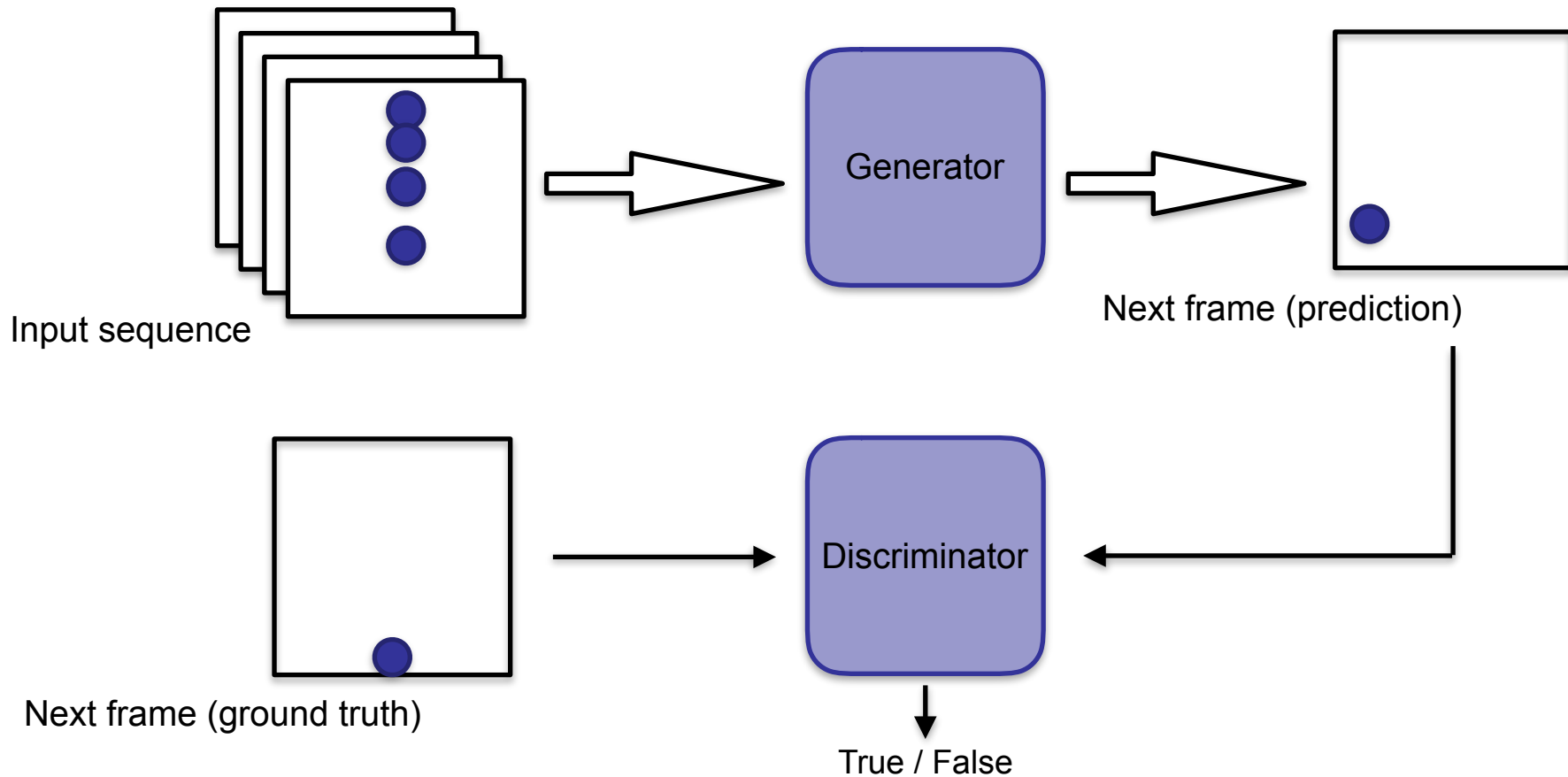
↓
**Deep
Neural
Network**



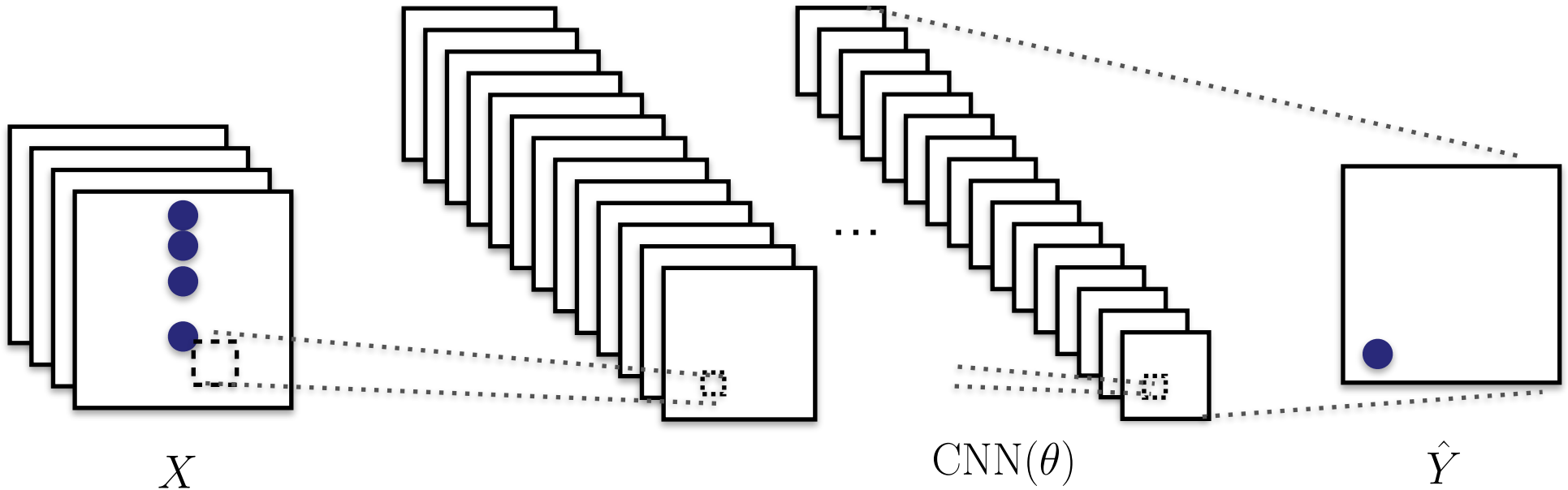
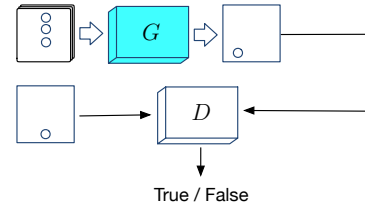
Method: Generative Adversarial Networks (GANs)



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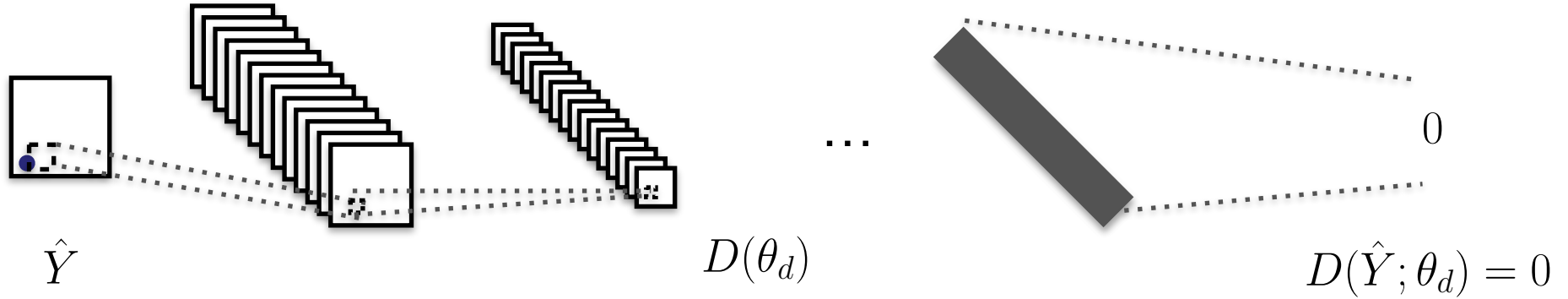
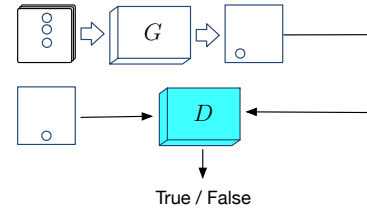
Method: GANs (Generator)



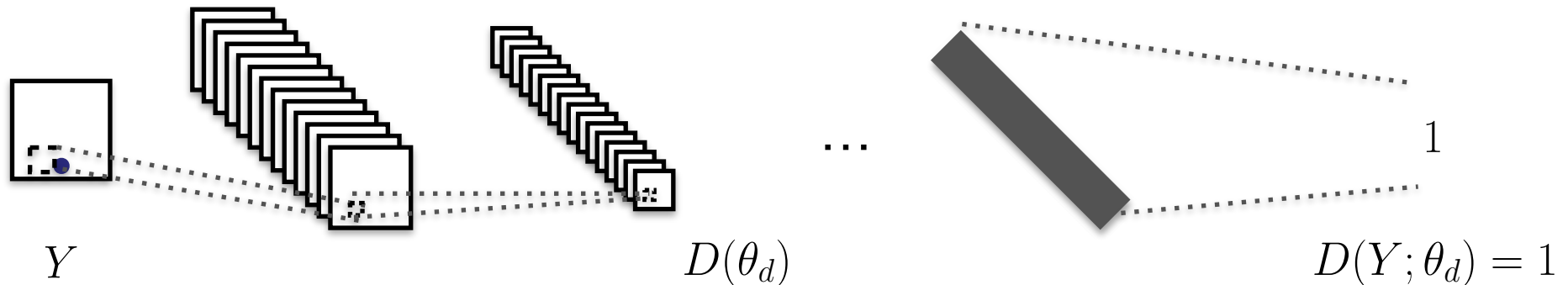
$$\hat{Y} = \text{CNN}(X; \theta)$$

$$\min_{\theta} L_2 = \sqrt{\sum_i (Y_i - \hat{Y}_i)^2}$$

Method: GANs (Discriminator)

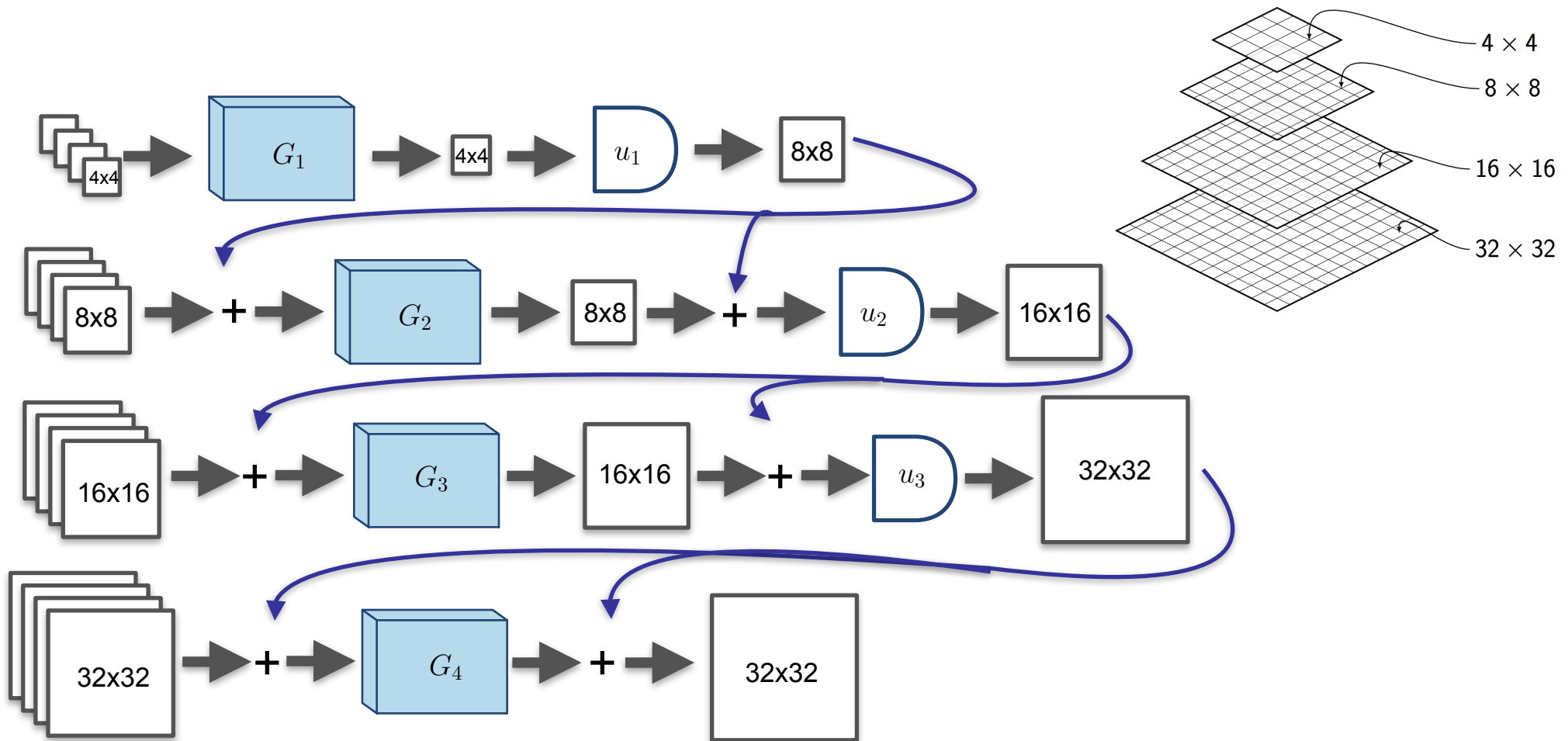


$$\max_{\theta_d} V = \mathbb{E}[\log(1 - D(\hat{Y}, \theta_d))]$$

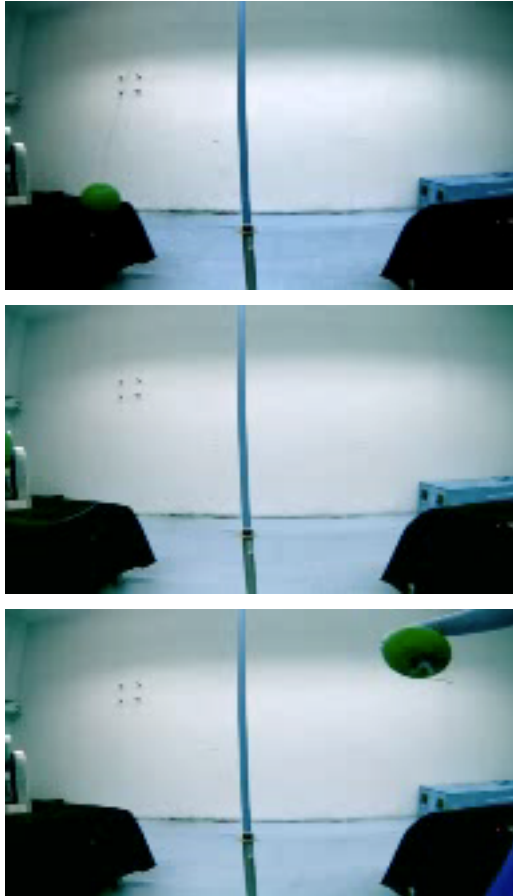


$$\max_{\theta_d} V = \mathbb{E}[\log D(Y, \theta_d)]$$

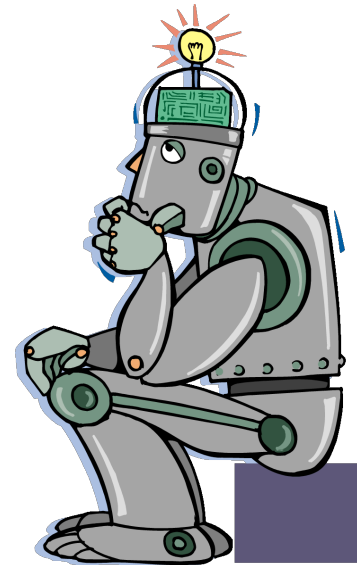
Method: Multi-scale Conditional GANs



Experiments: Tetherball Dataset

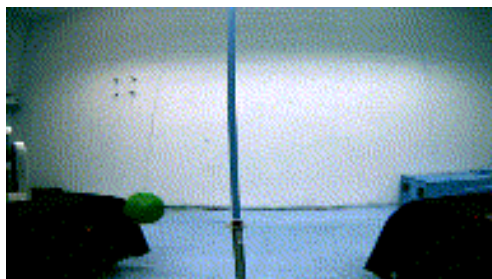


Training
→

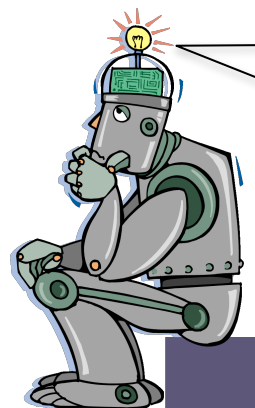


Experiments: Tetherball Dataset

Input: 4 frames



Testing
→



Predictions: 7 frames



Ground truth: 7 frames

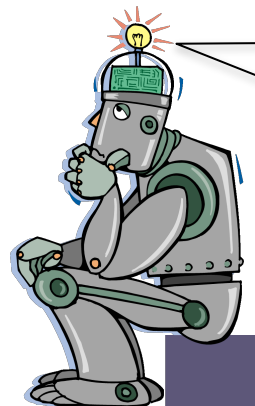


Experiments: Tetherball Dataset

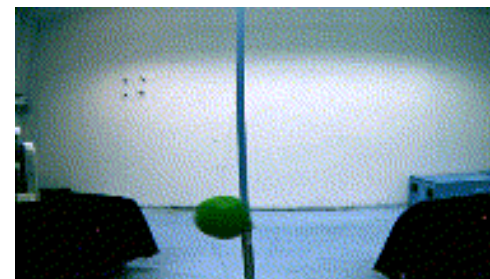
Input: 4 frames



Testing
→



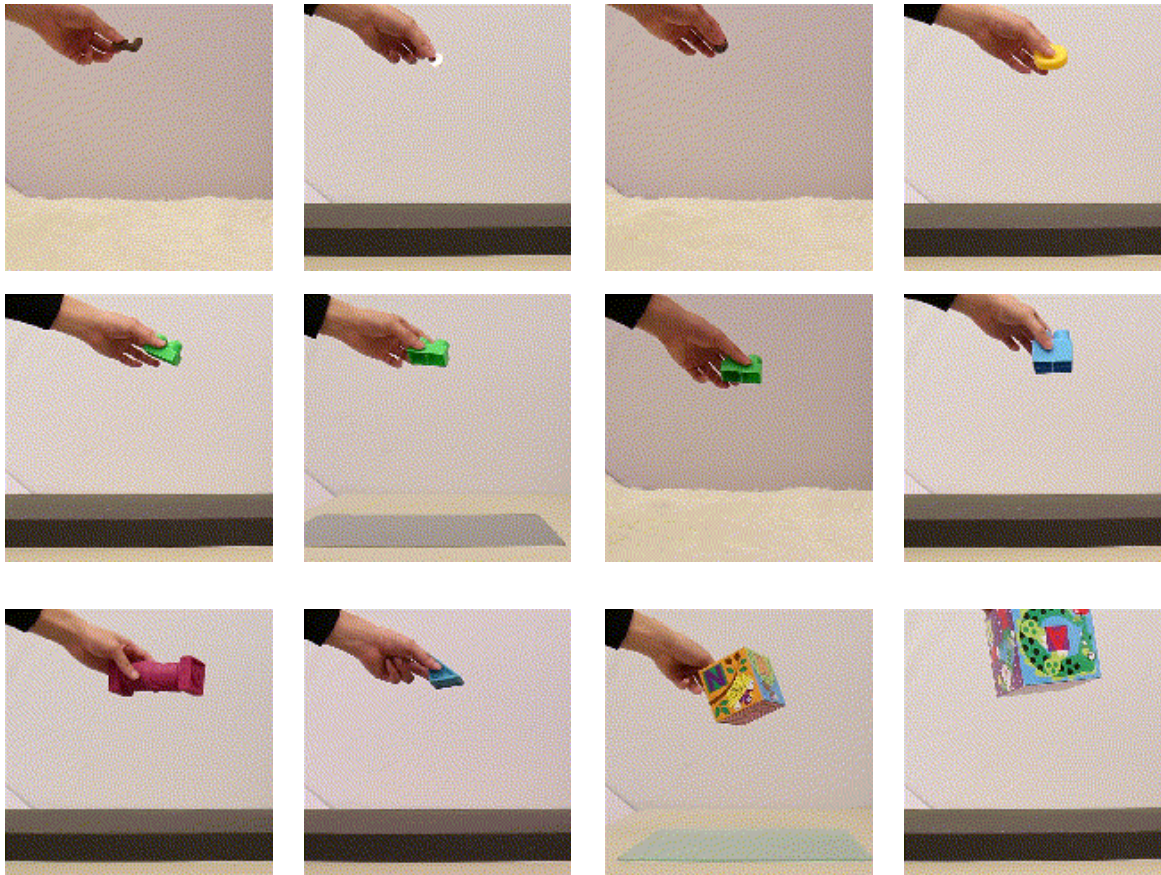
Predictions: 7 frames



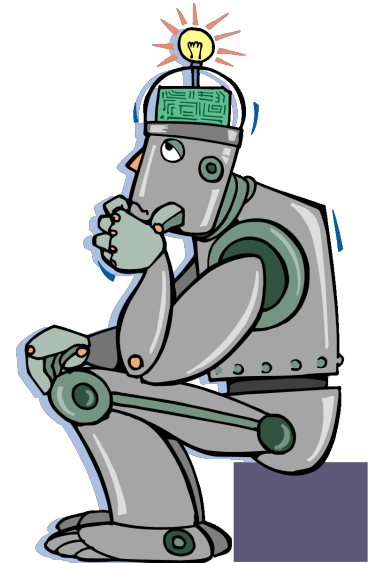
Ground truth: 7 frames



Experiments: Physics101 Dataset



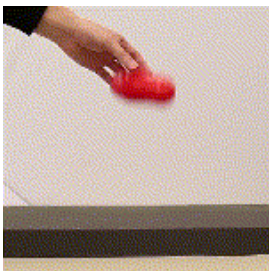
Training
→



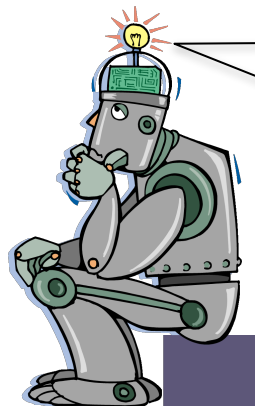
...

Experiments: Physics101 Dataset

Input: 4 frames



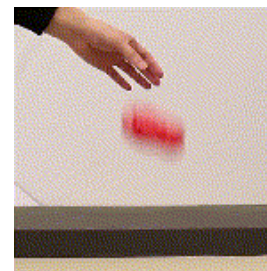
Testing
→



Predictions: 7 frames

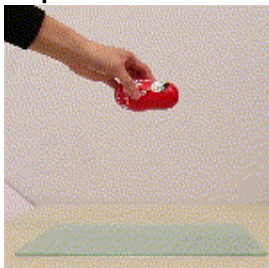


Ground truth: 7 frames

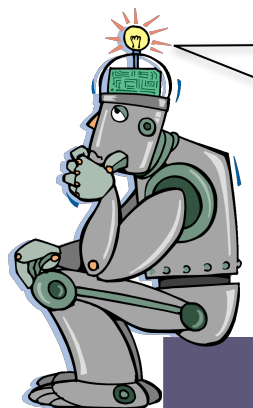


Experiments: Physics101 Dataset

Input: 4 frames



Testing
→



Predictions: 7 frames



Ground truth: 7 frames



