Physics 101: Learning Physical Object Properties from Unlabeled Videos

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What can we learn from this video?
Understanding Dynamic 3D Scenes

• What can we learn from this video?
  • 3D object shapes
  • Physical events
  • Physical object properties
    • Masses
    • Coefficients of frictions

• Humans recover rich information from short videos.

• Generalization: Humans easily answer questions like
  • What will happen next?
A Simple Scenario in the Real World

• Galileo’s inclined surface experiment
Rich Physics in Simple Scenarios
More Scenarios

Ramp

I. Initial setup  
II. Before collision  
III. At collision  
IV. After collision  
V. Final result

Spring

I. Initial setup  
II. After extension

Bounce

I. Initial setup  
II. At collision  
III. Bounce

Liquid

I. A floating object  
II. A sunk object
Physics 101: Objects

<table>
<thead>
<tr>
<th>Category</th>
<th>Images</th>
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</thead>
<tbody>
<tr>
<td>Plastic Block</td>
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<tr>
<td>Foam</td>
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<td>Hollow Wood</td>
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<td>Wooden Pole</td>
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<td>Plastic Doll</td>
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<td>Rubber</td>
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Pictures are at the same scale within each category but not across categories.
Physics 101: Dataset

Different scenarios from different viewpoints
Physics 101: Videos
Physics 101

• 101 objects
• 5 scenarios
• 3 viewpoints
• 4K events
• >10K videos