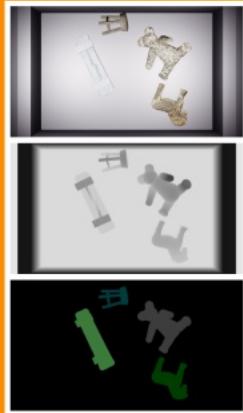
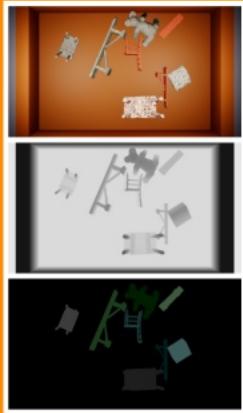
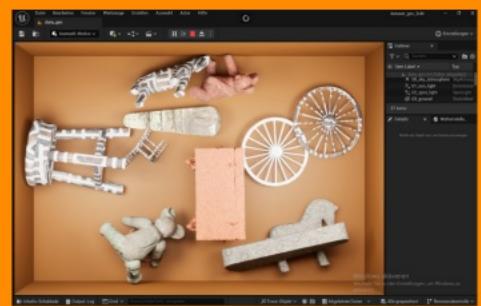
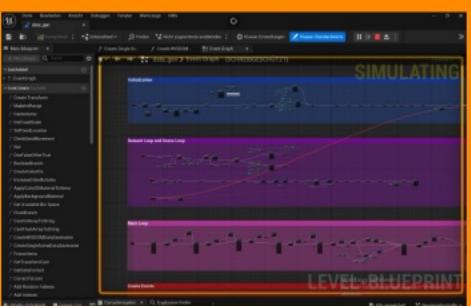


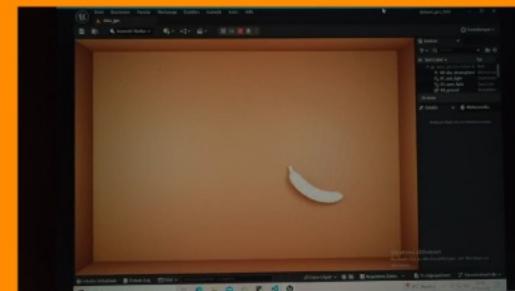
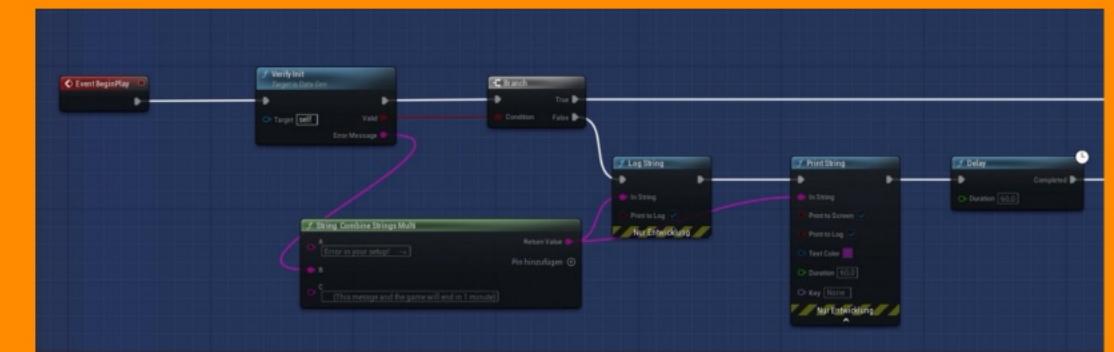
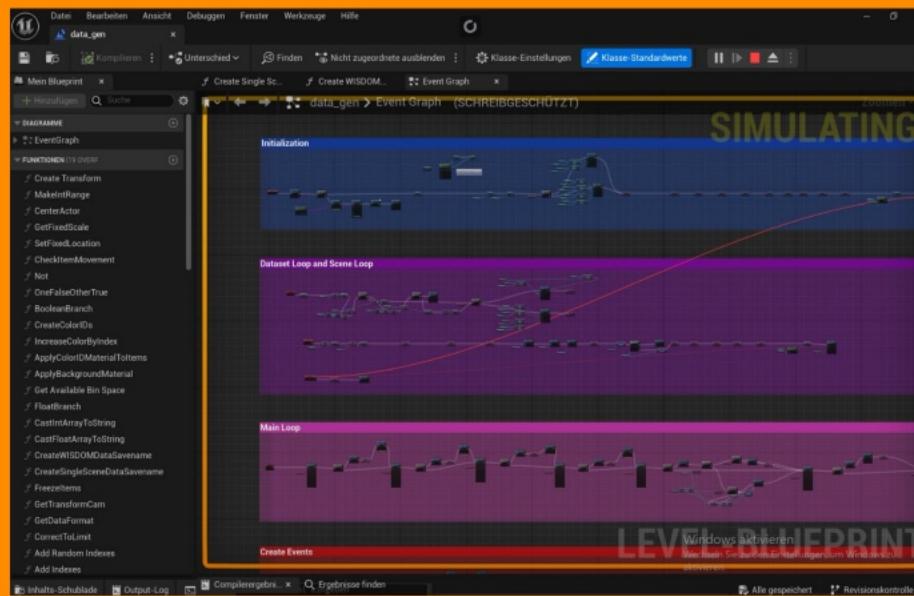
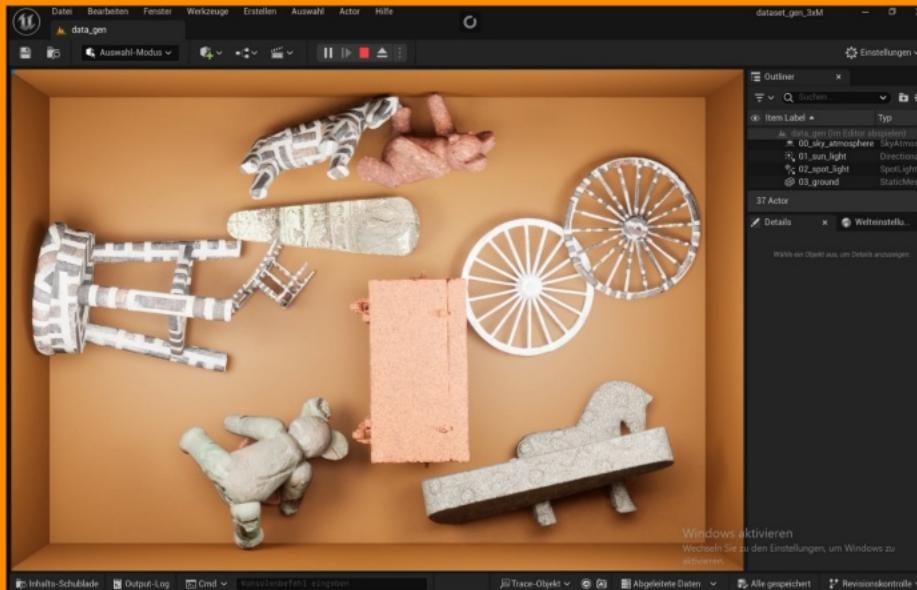
**9x Datasets**



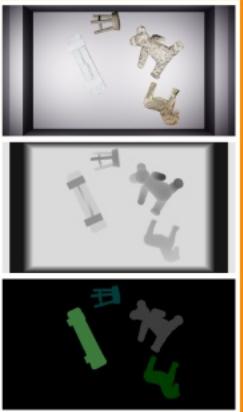
**9x Datasets**



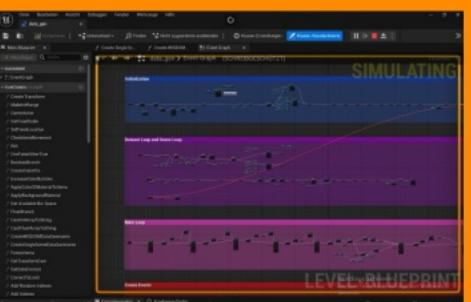
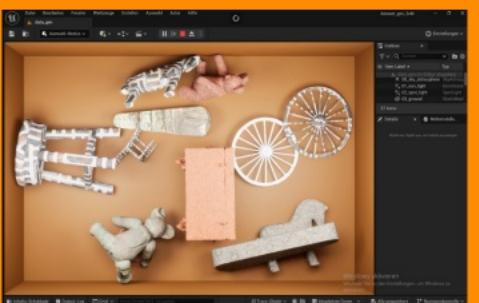
# 9x Datas

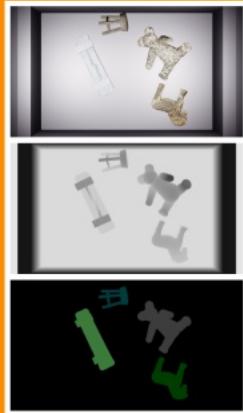
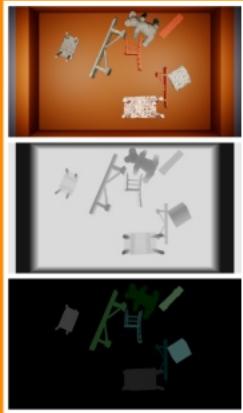
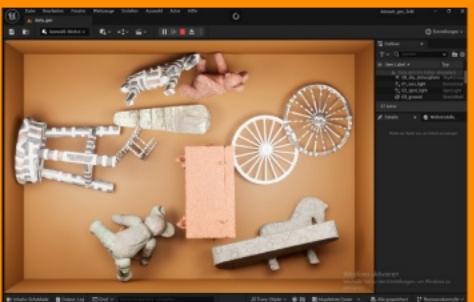






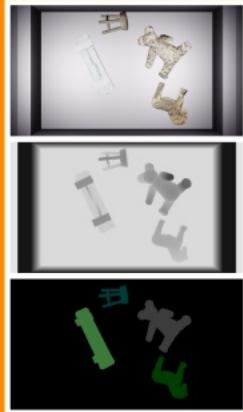
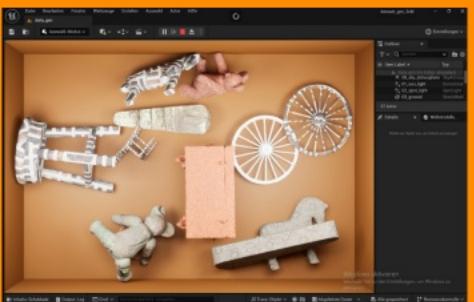
**9x Datasets**





**9x Datasets**





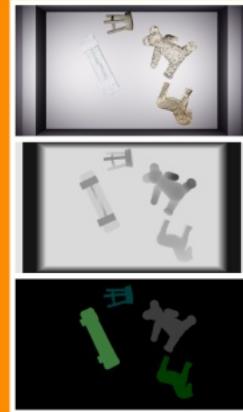
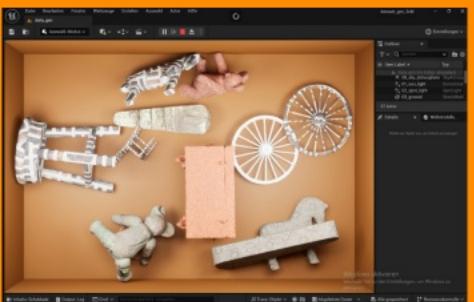
**9x Datasets**



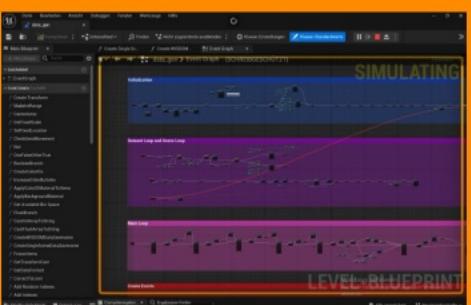
10  
80  
160

10  
80  
160





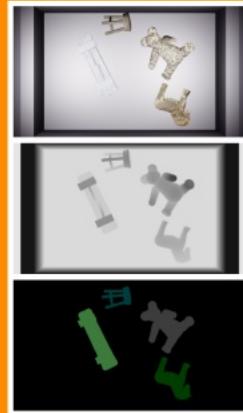
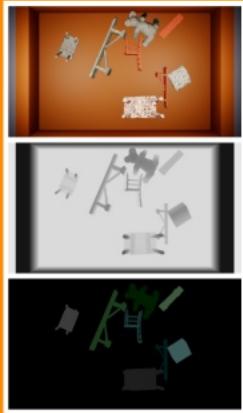
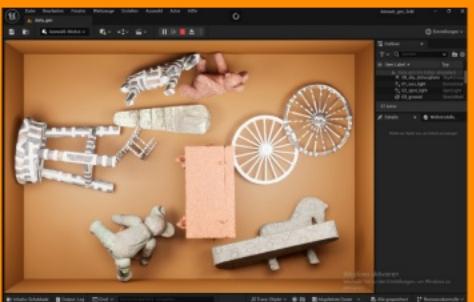
**9x Datasets**



3D-Models

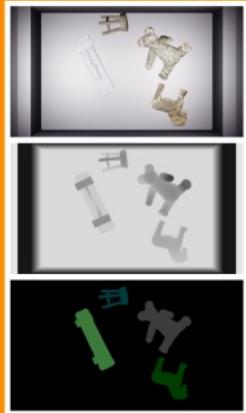
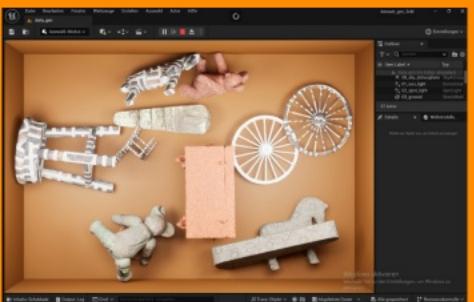
Materials/  
Textures

10  
80  
160



**9x Datasets**

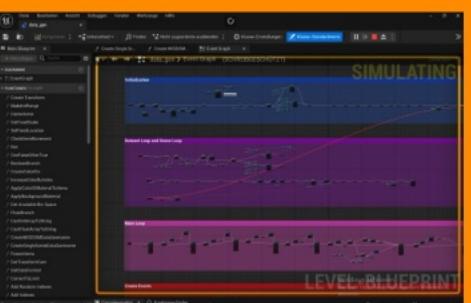


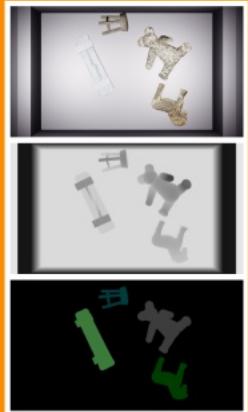
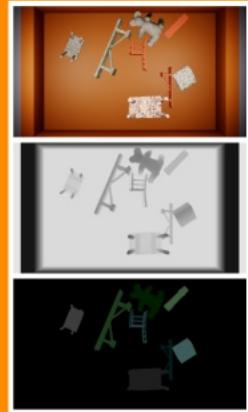
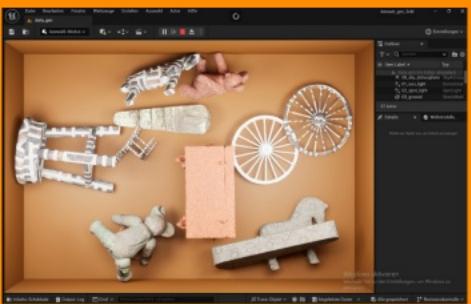


**9x Datasets**



= 9 Datasets





**9x Datasets**



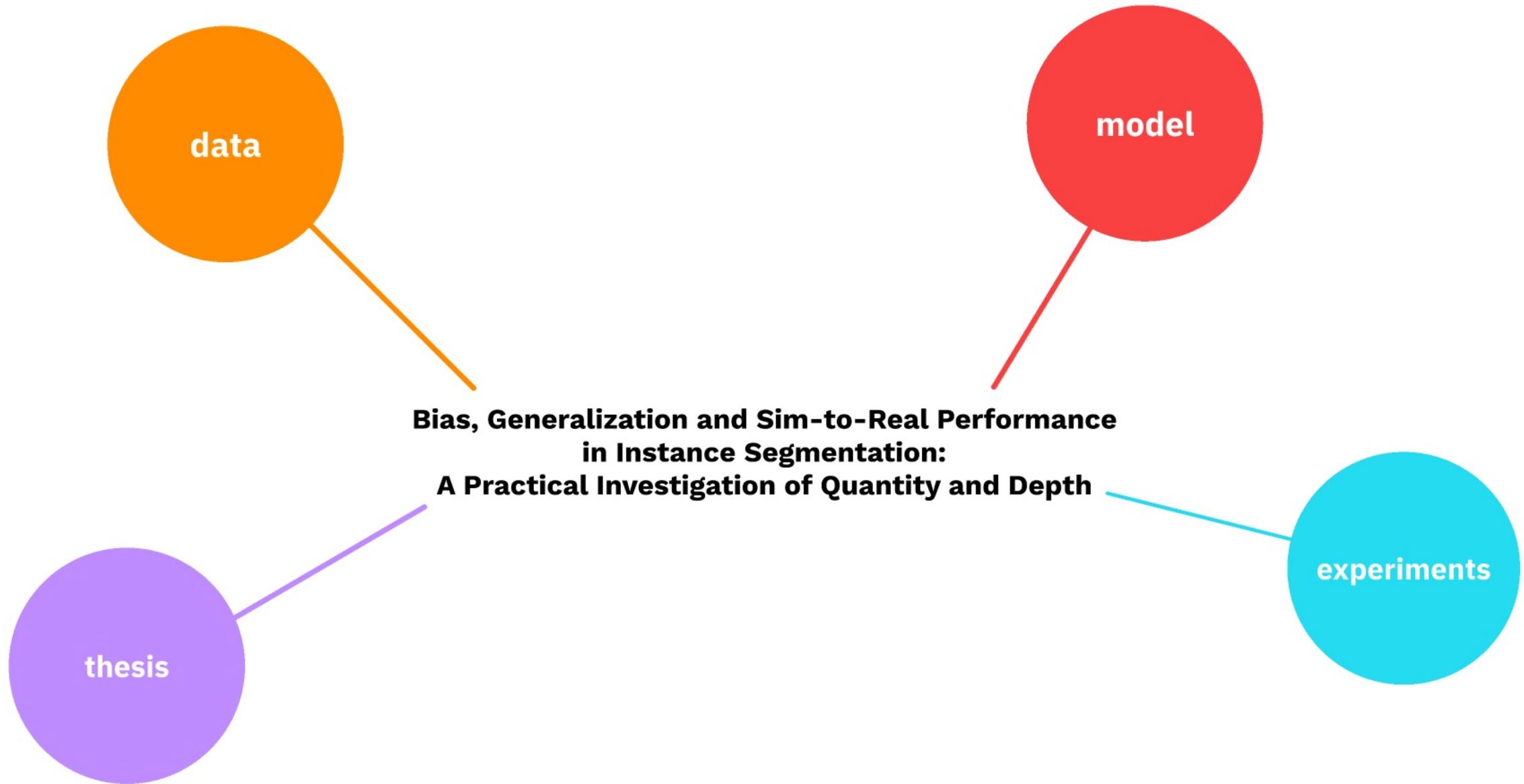
**20.000 Images** per Dataset

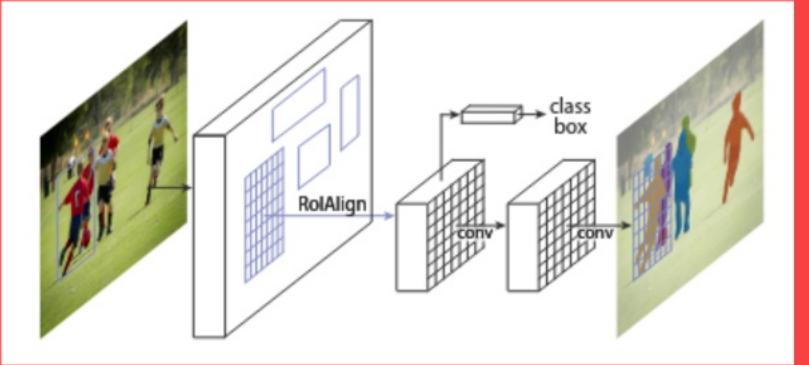


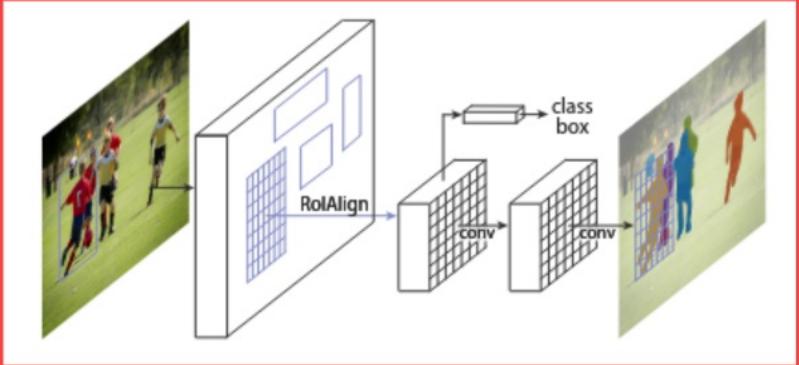
= 9 Datasets





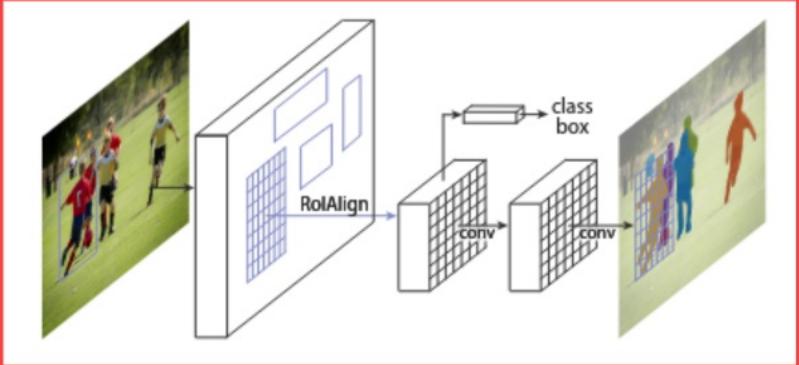






**9x RGB**



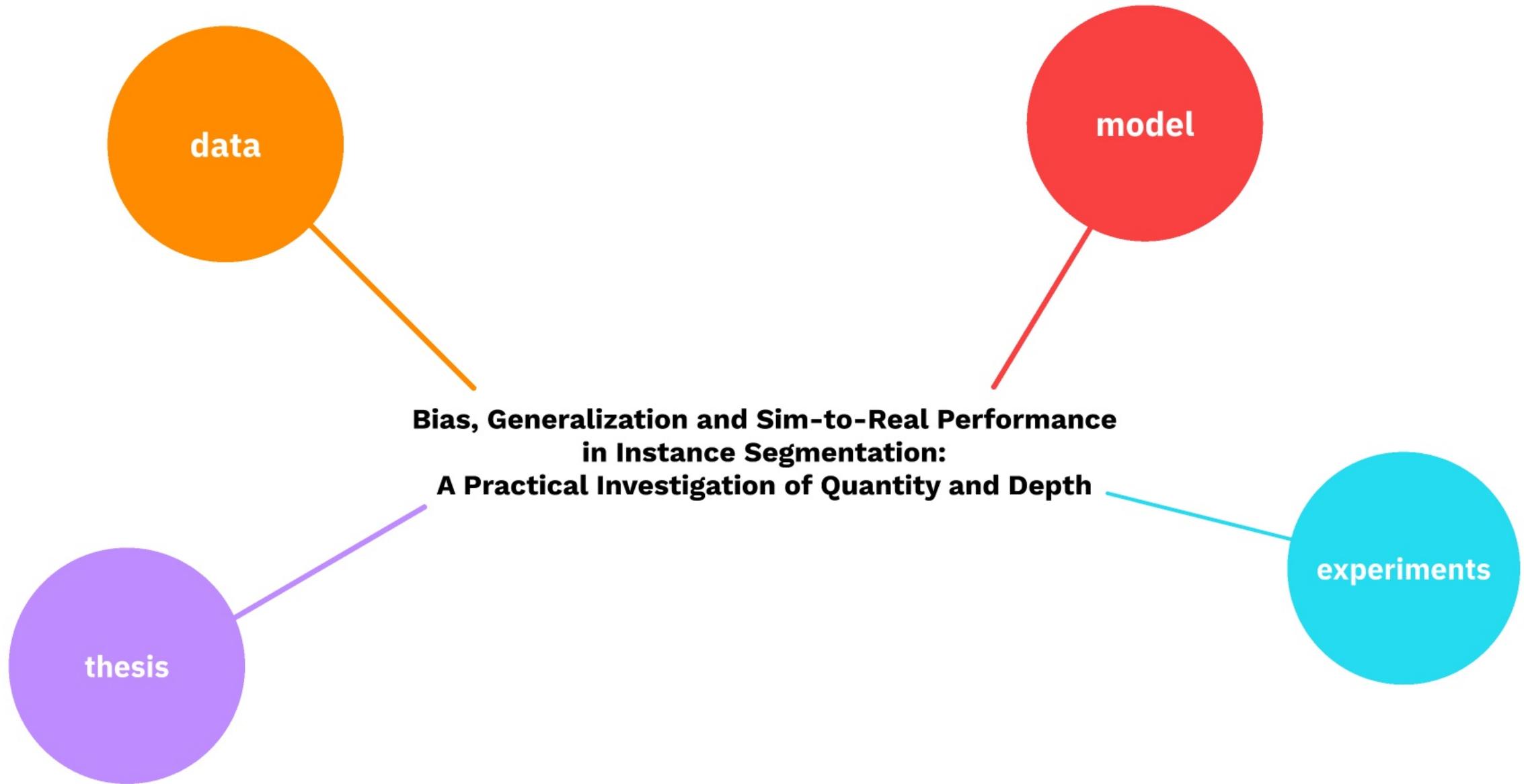


**9x RGB**



**9x RGB + Depth**





**Hypothesis 1**

**Hypothesis 2**

**Hypothesis 3**





+





+



+



**Texture  
bias**

**Shape  
bias**



+



**Texture  
bias**



+

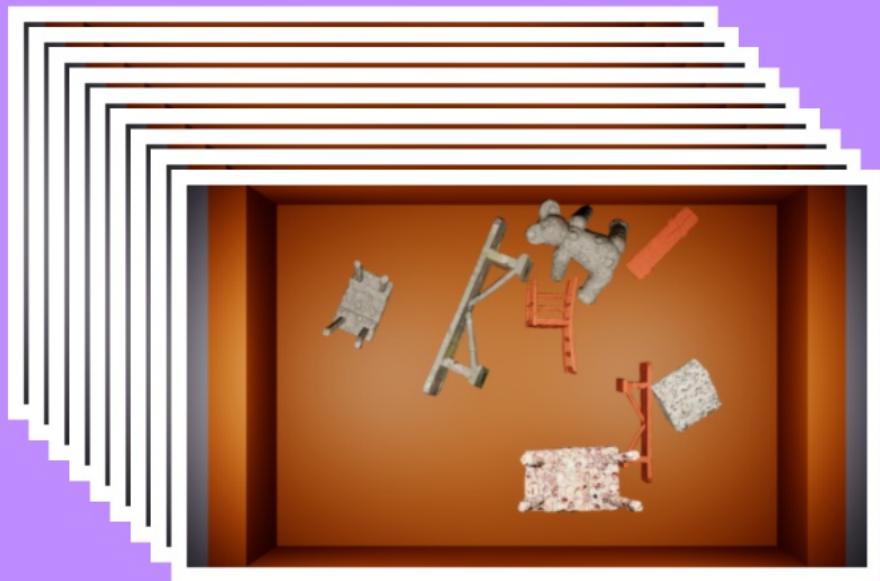


**Shape  
bias**

**Accuracy,  
Generalization,  
Sim-to-real**







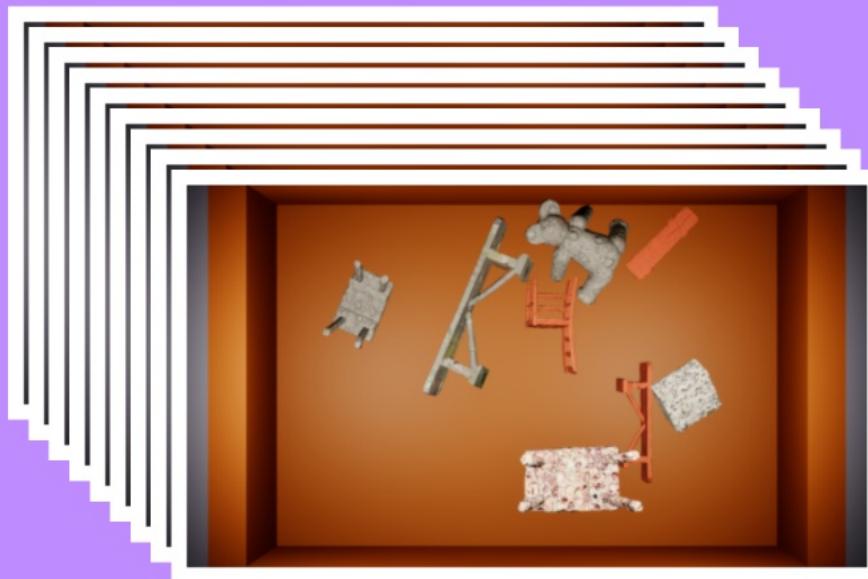
3D-Models

160



Materials/  
Textures

160



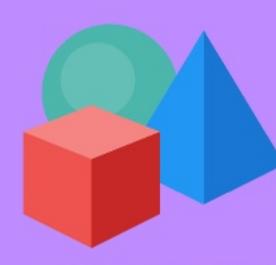
3D-Models

160



Materials/  
Textures

160



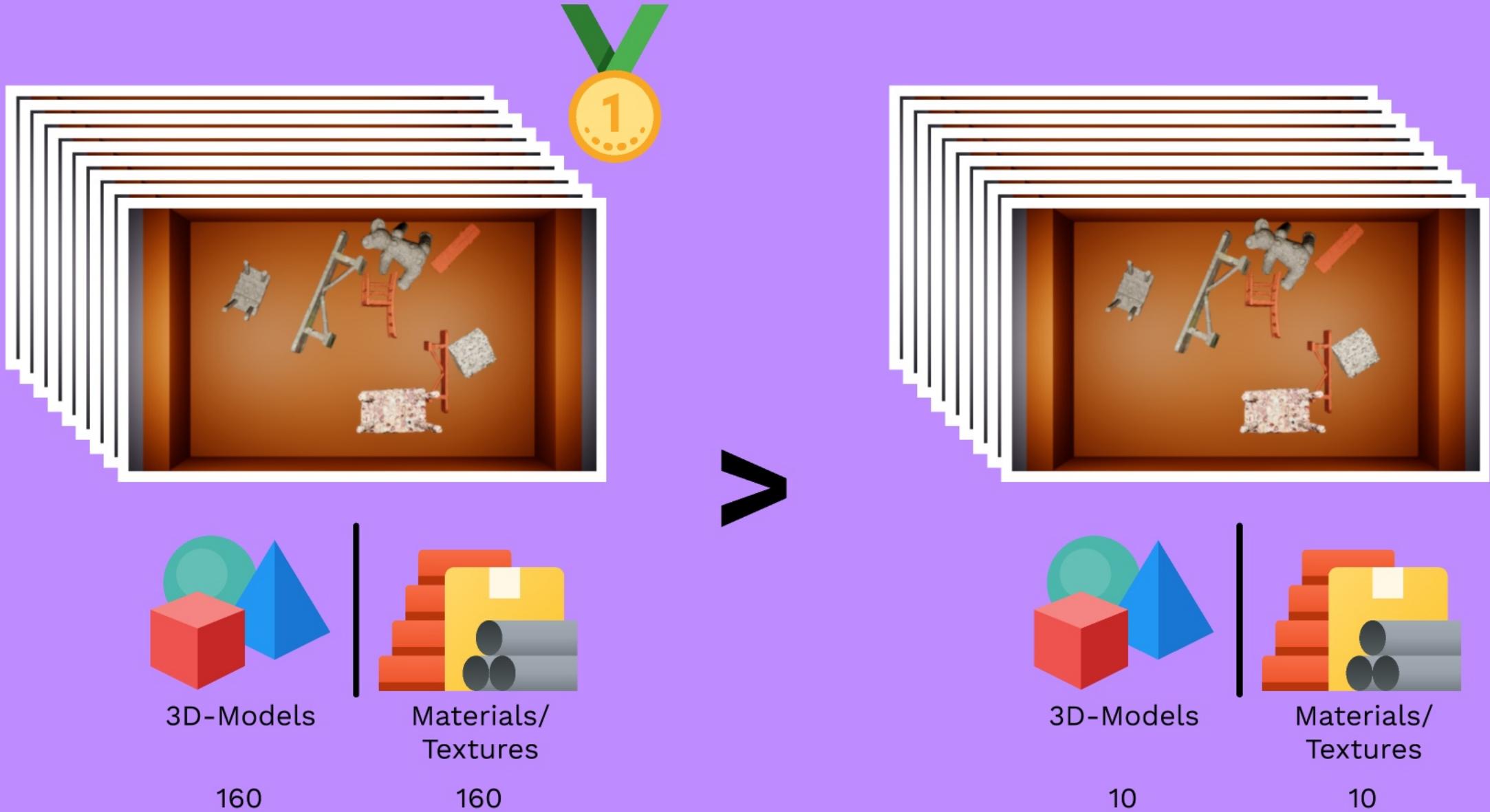
3D-Models

10



Materials/  
Textures

10







3D-Models

160



Materials/  
Textures

160



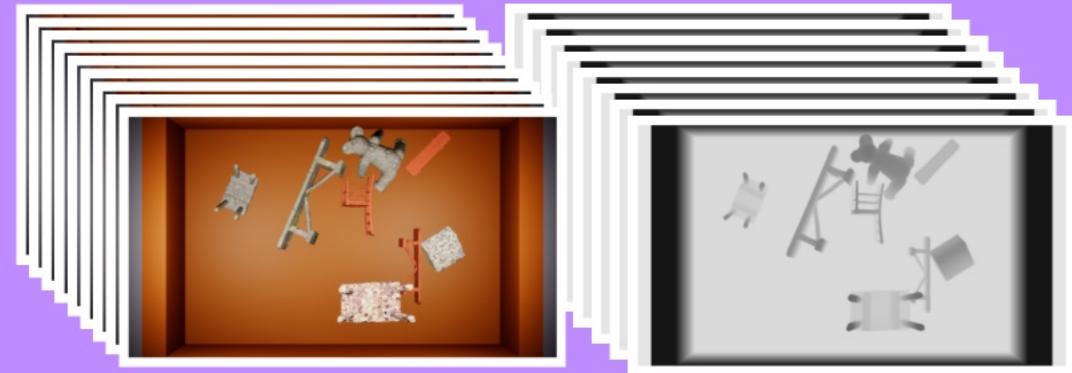
3D-Models

160



Materials/  
Textures

160



3D-Models

10



Materials/  
Textures

10



3D-Models

160



Materials/  
Textures

160



3D-Models

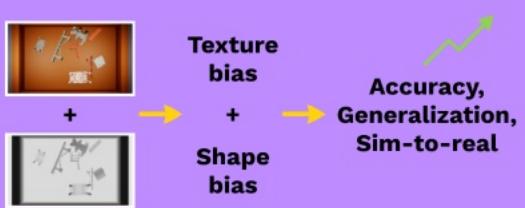
10



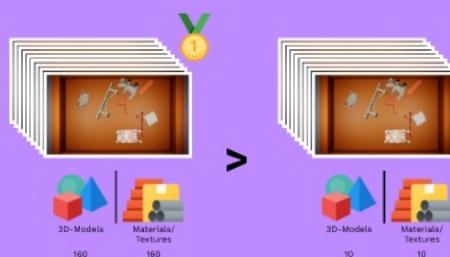
Materials/  
Textures

10

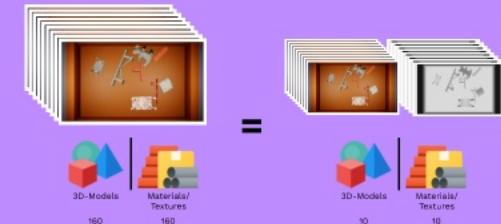
## Hypothesis 1



## Hypothesis 2

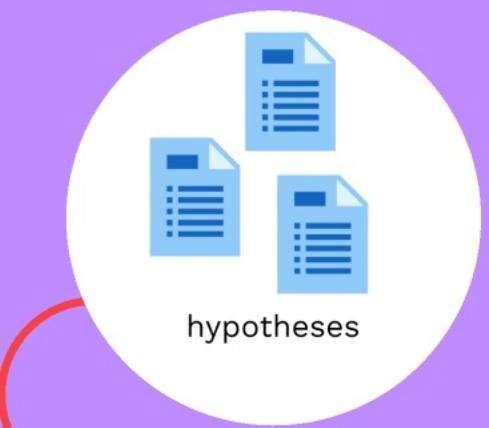


## Hypothesis 3









**1. Texture-Shape Bias**



**1. Texture-Shape Bias**

**2. Does the results get better?**



hypotheses

### 1. Texture-Shape Bias

In-Distribution

### 2. Does the results get better?

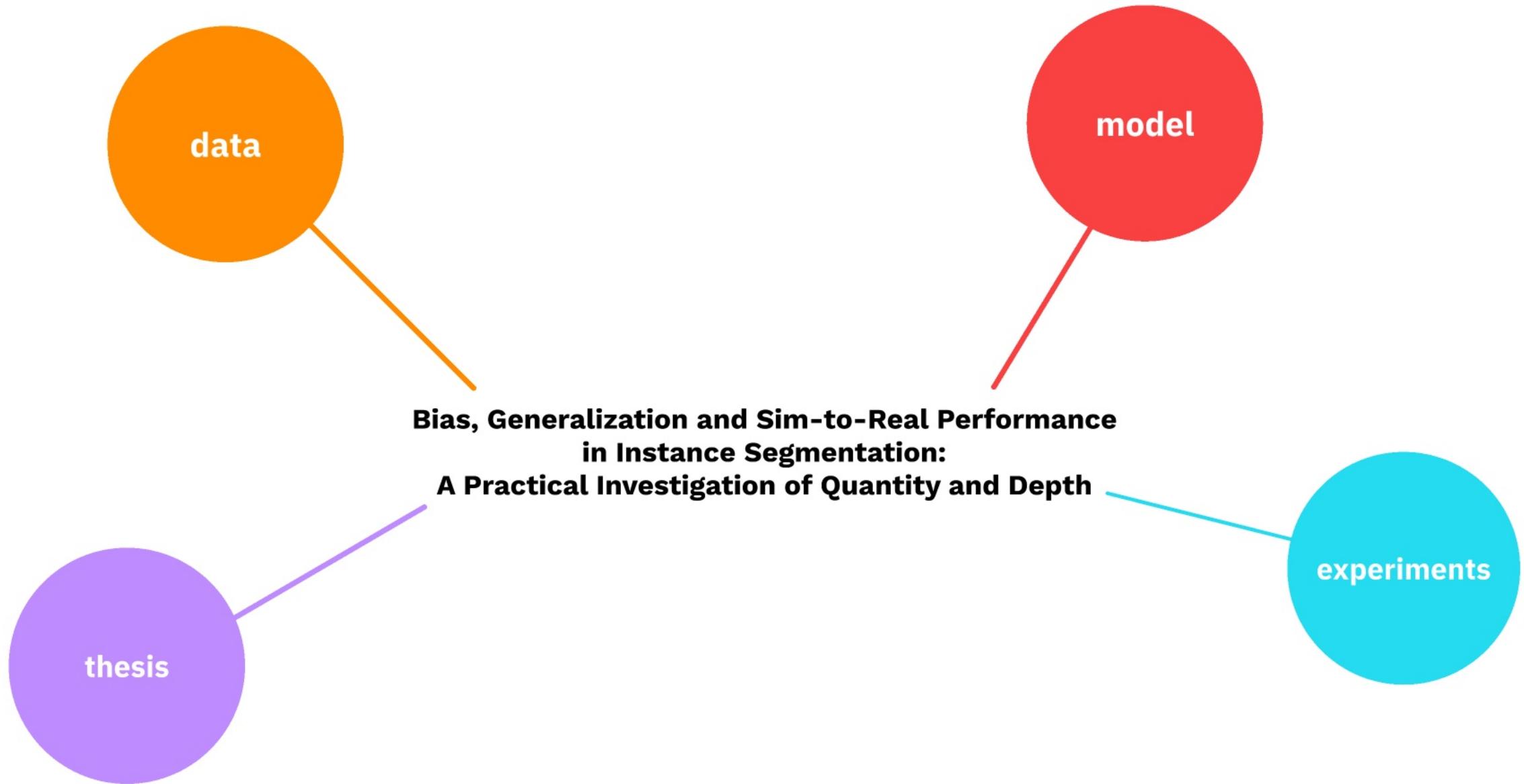


**1. Texture-Shape Bias**

In-Distribution

**2. Does the results get better?**

**3. Sim-to-real ability**





Outlier Data Test



Novel vs. Known  
Combinations



Sim-to-Real Test



Idea:

**Confusing Data,  
where we see if the model prefers texture or shape**

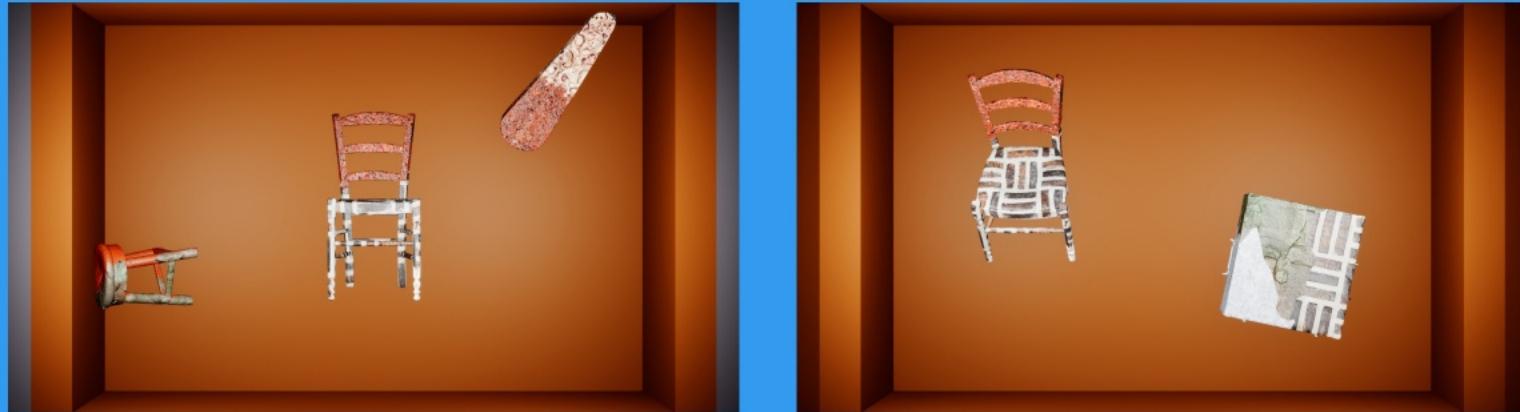
Idea:

**Confusing Data,  
where we see if the model prefers texture or shape**



Idea:

**Confusing Data,  
where we see if the model prefers texture or shape**



Idea:

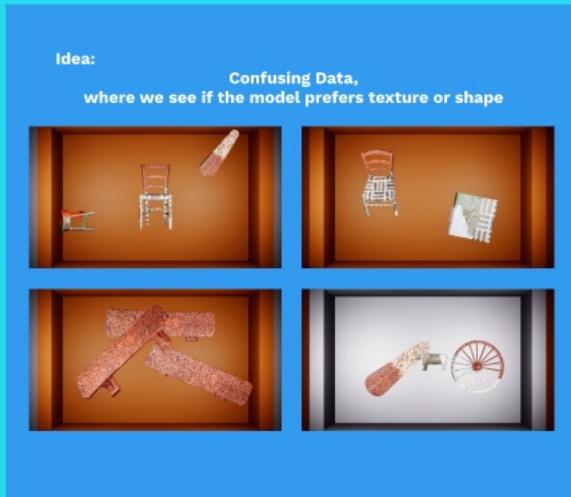
**Confusing Data,  
where we see if the model prefers texture or shape**



Idea:

**Confusing Data,  
where we see if the model prefers texture or shape**





Outlier Data Test



Novel vs. Known  
Combinations



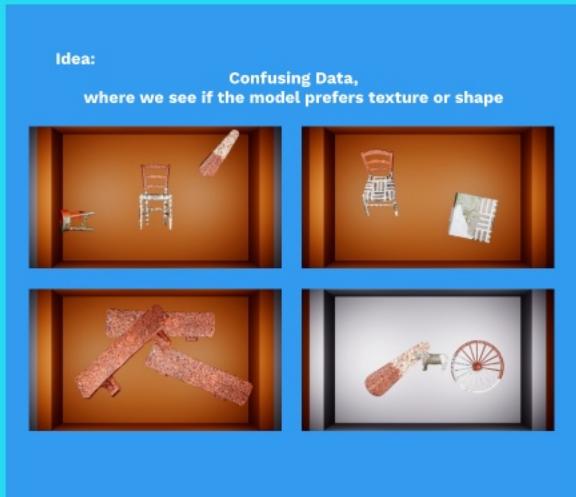
Sim-to-Real Test



- **Known** material + **known** shape  
=> baseline accuracy
- **Novel** material + **known** shape  
=> texture generalization
- **Known** material + **novel** shape  
=> shape generalization
- **Novel** material + **novel** shape  
=> generalization

- **Known** material + **known** shape  
=> baseline accuracy
- **Novel** material + **known** shape  
=> texture generalization
- **Known** material + **novel** shape  
=> shape generalization
- **Novel** material + **novel** shape  
=> generalization

\*In-Distribution



Outlier Data Test

- **Known** material + **known** shape  
=> baseline accuracy
- **Novel** material + **known** shape  
=> texture generalization
- **Known** material + **novel** shape  
=> shape generalization
- **Novel** material + **novel** shape  
=> generalization

\*In-Distribution

Novel vs. Known  
Combinations



Sim-to-Real Test





Self created Real Dataset

- 50-100 Images
- Self-Labeled



Self created Real Dataset

- 50-100 Images
- Self-Labeled

**OCID**  
Object Clutter Indoor Dataset



**OCID**  
Object Clutter Indoor Dataset

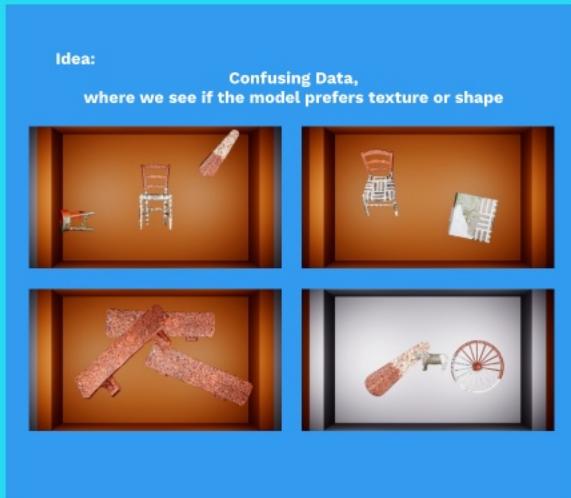


Self created Real Dataset

- 50-100 Images
- Self-Labeled

**WISDOM**-Dataset





Outlier Data Test

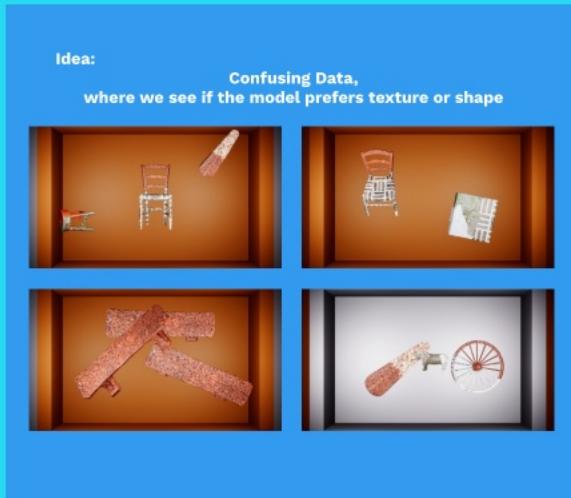
- **Known** material + **known** shape  
=> baseline accuracy
- **Novel** material + **known** shape  
=> texture generalization
- **Known** material + **novel** shape  
=> shape generalization
- **Novel** material + **novel** shape  
=> generalization

\*In-Distribution

Novel vs. Known Combinations



Sim-to-Real Test

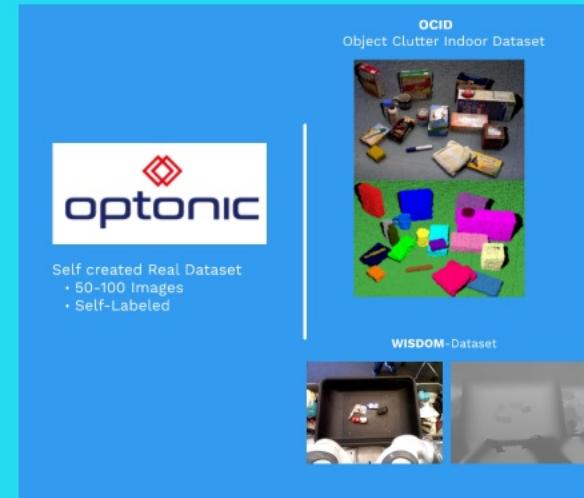


### Outlier Data Test

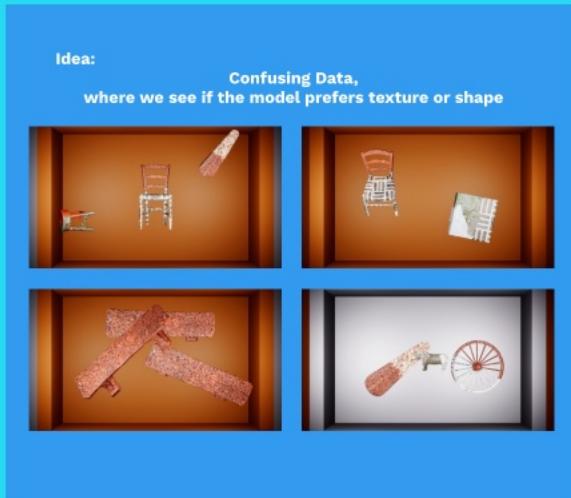
→ **Texture/Shape Bias**

- **Known** material + **known** shape  
=> baseline accuracy
  - **Novel** material + **known** shape  
=> texture generalization
  - **Known** material + **novel** shape  
=> shape generalization
  - **Novel** material + **novel** shape  
=> generalization
- \*In-Distribution

### Novel vs. Known Combinations



### Sim-to-Real Test



### Outlier Data Test

↳ **Texture/Shape Bias**

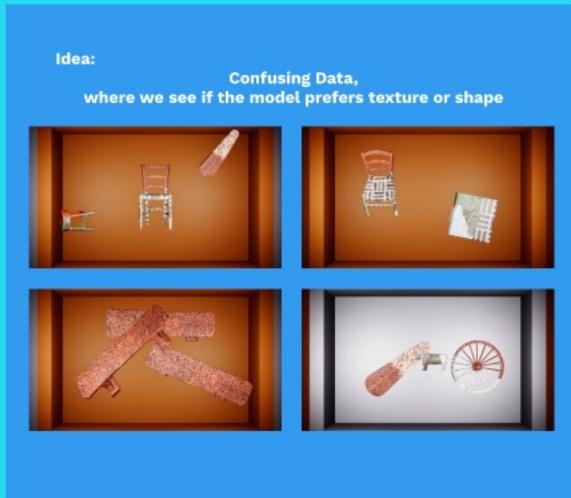
- **Known** material + **known** shape  
=> baseline accuracy
  - **Novel** material + **known** shape  
=> texture generalization
  - **Known** material + **novel** shape  
=> shape generalization
  - **Novel** material + **novel** shape  
=> generalization
- \*In-Distribution

### Novel vs. Known Combinations

↳ **Performance/  
Generalization**



### Sim-to-Real Test



### Outlier Data Test

↳ **Texture/Shape Bias**

- **Known** material + **known** shape  
=> baseline accuracy
  - **Novel** material + **known** shape  
=> texture generalization
  - **Known** material + **novel** shape  
=> shape generalization
  - **Novel** material + **novel** shape  
=> generalization
- \*In-Distribution

### Novel vs. Known Combinations

↳ **Performance/  
Generalization**



### Sim-to-Real Test

↳ **Performance/  
Sim-to-real**

