### Introduction

Our rendering engine has 3 stages:
1. (a)->(b) Point cloud rendering: project points to new view
2. (b)->(c) View selection: adaptively select view to retrieve points from; Interpolation: rendered points to image
3. (c)->(d) Neural network: fill holes and fix geometry issues

### Gibson Environment

3. View synthesis: Neural Network filter and Goggle mechanism (Method Section) 4. ROS integration & Gym integration

We gratefully acknowledge the support of Facebook, Toyota (1186781-31-UDARO), ONR

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### Experimental Results

**Dataset comparison**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Others</th>
<th>STANCE</th>
<th>Matterport3D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Spaces</td>
<td>372</td>
<td>498</td>
<td>0</td>
</tr>
<tr>
<td>Total Coverage m²</td>
<td>2114</td>
<td>5.694</td>
<td>46.6K</td>
</tr>
<tr>
<td>SSA</td>
<td>1.38</td>
<td>0.74</td>
<td>0.92</td>
</tr>
<tr>
<td>Nav. Complexity</td>
<td>5.98</td>
<td>2.29</td>
<td>7.80</td>
</tr>
<tr>
<td>Real-World Error Err</td>
<td>0.925</td>
<td>2.887</td>
<td>2.113</td>
</tr>
</tbody>
</table>

**View Synthesis**

**Qualitative Results**

**Transferring to Real World Results**

<table>
<thead>
<tr>
<th>Task</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual obstacle avoidance</td>
<td><img src="https://github.com/StanfordVL/GibsonEnv" alt="Image" /></td>
</tr>
<tr>
<td>Distant navigation</td>
<td><img src="https://github.com/StanfordVL/GibsonEnv" alt="Image" /></td>
</tr>
</tbody>
</table>

**Example tasks in Gibson**

- Distant Visual Navigation
- Stair Climb:
  - Action: `f(\theta)`: NN rendering \(I_v\): real images through goggle
  - \(f_x\): point cloud rendering \(f_{v}\): real images output rendering

**Conclusions and Limitations**

We propose Gibson Environment for developing real world perception for active agents.

**Limitations (future work):**
- Dynamic contents
- Manipulation

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Source code https://github.com/StanfordVL/GibsonEnv
Download Gibson dataset: http://gibsonenv.stanford.edu
Browser dataset online: http://gibsonenv.stanford.edu/database/