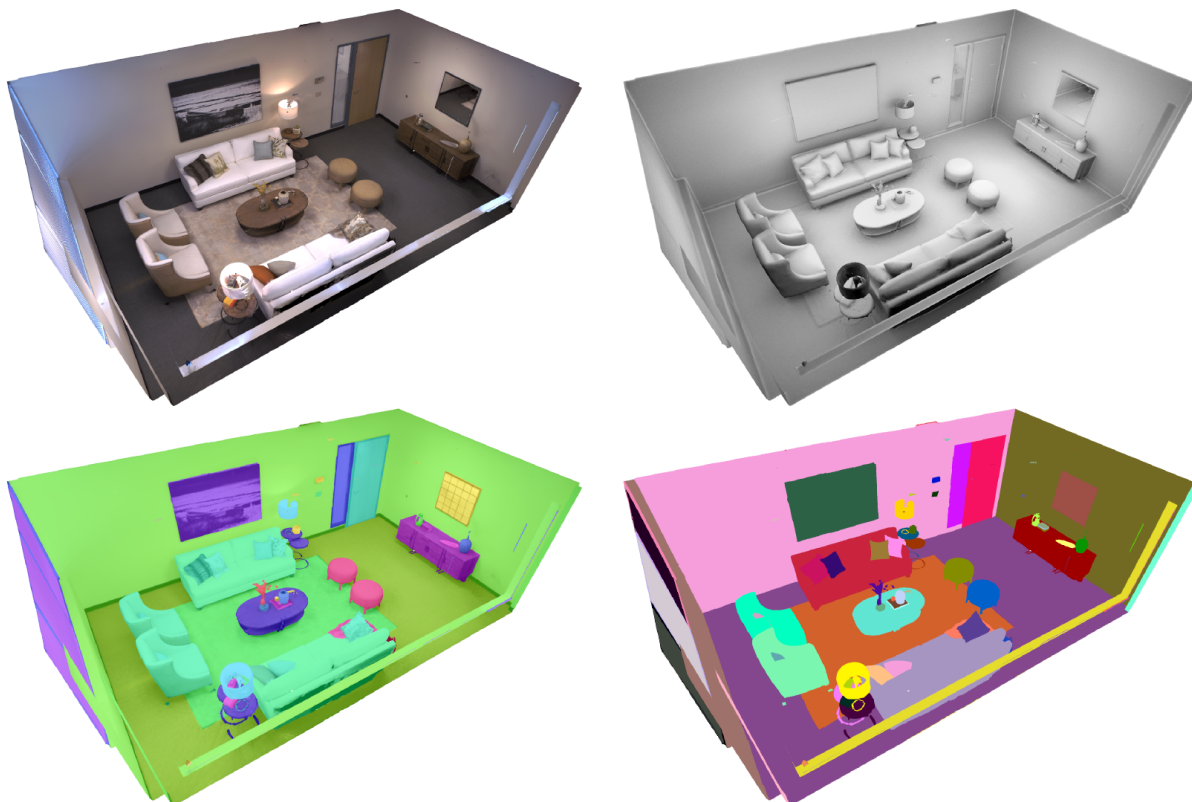

Replica Dataset

The Replica Dataset is a dataset of high quality reconstructions of a variety of indoor spaces. Each reconstruction has clean dense geometry, high resolution and high dynamic range textures, glass and mirror surface information, planar segmentation as well as semantic class and instance segmentation. See the technical report for more details.



The Replica SDK contained in this repository allows visual inspection of the datasets via the ReplicaViewer and gives an example of how to render out images from the scenes headlessly via the ReplicaRenderer.

For machine learning purposes each dataset also contains an export to the format employed by AI Habitat and is therefore usable seamlessly in that framework for AI agent training and other ML tasks.

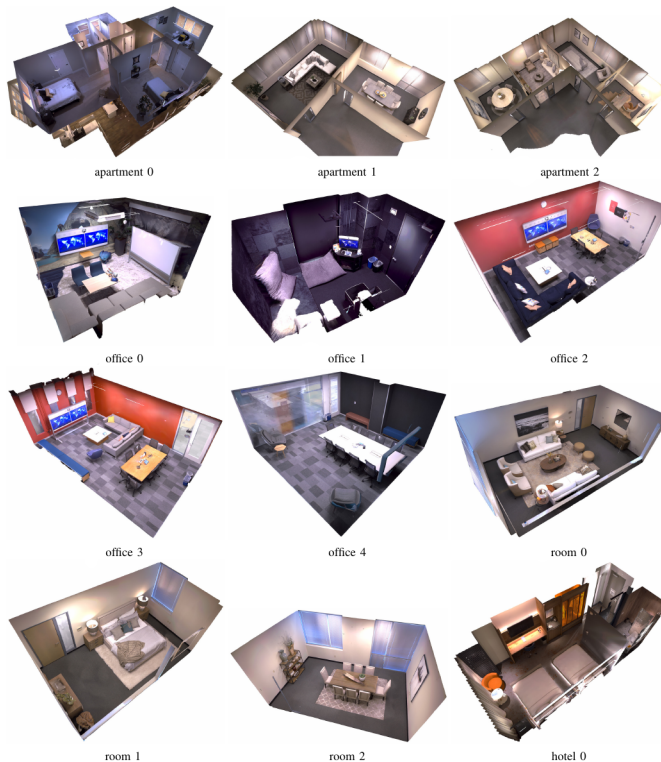
Citing the Replica Dataset

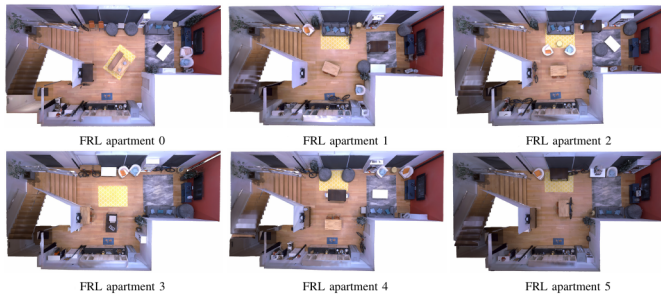
If you use the Replica dataset in your research directly or indirectly via derivative datasets or frameworks, please cite the following technical report:

```
1 @article{replica19arxiv,  
2   title = {The {R}eplica Dataset: A Digital Replica of Indoor Spaces  
3   },  
4   author = {Julian Straub and Thomas Whelan and Lingni Ma and Yufan  
5     Chen and Erik Wijmans and Simon Green and Jakob J. Engel and Raul  
6     Mur-Artal and Carl Ren and Shobhit Verma and Anton Clarkson and  
       Mingfei Yan and Brian Budge and Yajie Yan and Xiaqing Pan and June  
       Yon and Yuyang Zou and Kimberly Leon and Nigel Carter and Jesus  
       Briales and Tyler Gillingham and Elias Mueggler and Luis  
       Pesqueira and Manolis Savva and Dhruv Batra and Hauke M. Strasdat  
       and Renzo De Nardi and Michael Goesele and Steven Lovegrove and  
       Richard Newcombe },  
7   journal = {arXiv preprint arXiv:1906.05797},  
8   year = {2019}  
9 }
```

Replica Dataset

The following 18 scenes are included in this initial release:





Each Replica contains the following assets:

1		
2	glass.sur	
3	habitat	
4	mesh_semantic.ply	
5	mesh_semantic.navmesh	
6	info_semantic.json	
7	mesh_preseg_semantic.ply	
8	mesh_preseg_semantic.navmesh	
9	info_preseg_semantic.json	
10	replica_stage.stage_config.json	
11	sorted_faces.bin	
12	mesh.ply	
13	preseg.bin	
14	preseg.json	
15	semantic.bin	
16	semantic.json	
17	textures	
18	0-color-ptex.hdr	
19	0-color-ptex.w	
20	1-color-ptex.hdr	
21	1-color-ptex.w	
22	...	
23	parameters.json	

The different files contain the following: - `glass.sur`: parameterization of glass and mirror surfaces. - `mesh.ply`: the quad mesh of the scene with vertex colors. - `preseg.json` and `preseg.bin`: the presegmentation in terms of planes and non-planes of the scene. - `semantic.json` and `semantic.bin`: the semantic segmentation of the scene. - `textures`: the high resolution and high dynamic range textures of the scene. - `habitat/mesh*semantic.ply`: the quad meshes including semantic or presegmentation information for AI Habitat. - `habitat/info*semantic.json`: mapping from instance IDs in the respective `mesh_*.ply` to semantic names. - `habitat/mesh*semantic.navmesh`: navigation grid for AI Habitat. - `habitat/replica_stage.stage_config.json`

: configuration file defining scene level parameters for habitat-sim. - [habitat/sorted_faces.bin](#): binary file containing pre-processed geometry data for habitat-sim Ptex rendering support.

Download on Mac OS and Linux

Make sure [pigz](#), [wget](#), and [unzip](#) are installed:

```
1 # on Mac OS
2 brew install wget pigz unzip
3 # on Ubuntu
4 sudo apt-get install wget pigz unzip
```

To download and decompress the dataset use the [download.sh](#) script:

```
1 ./download.sh /path/to/replica_v1
```

Download on Windows

Execute [win_download.bat](#) to download Replica.

Replica SDK

Setup

After installing the dependencies of Pangolin, the Replica SDK can be compiled using the build script via

```
1 git submodule update --init
2 ./build.sh
```

It requires the dependencies of Pangolin and Eigen to be installed. If you wish to use the headless renderer ensure you have the libegl1-mesa-dev package.

ReplicaViewer

ReplicaViewer is an interactive UI to explore the Replica Dataset.

```
1 ./build/bin/ReplicaViewer mesh.ply /path/to/atlasses [mirrorFile]
```



The exposure value for rendering from the HDR textures can be adjusted on the top left.

ReplicaRenderer

The ReplicaRenderer shows how to render out images from a Replica for a programmatically defined trajectory without UI. This executable can be run headless on a server if so desired.

```
1 ./build/bin/ReplicaRenderer mesh.ply textures glass.sur
```

Replica and AI Habitat

To use Replica within AI Habitat checkout the AI Habitat Sim at <https://github.com/facebookresearch/habitat-sim>. After building the project you can launch the test viewer to verify that everything works:

```
1 ./build/viewer --dataset /PATH/TO/REPLICA/replica.scene_dataset_config.json -- frl_apartment_0
```

Team

Julian Straub, Thomas Whelan, Lingni Ma, Yufan Chen, Erik Wijmans, Simon Green, Jakob J. Engel, Raul Mur-Artal, Carl Ren, Shobhit Verma, Anton Clarkson, Mingfei Yan, Brian Budge, Yajie Yan, Xiaqing Pan, June Yon, Yuyang Zou, Kimberly Leon, Nigel Carter, Jesus Briales, Tyler Gillingham Elias Muegler, Luis Pesqueira, Manolis Savva, Dhruv Batra, Hauke M. Strasdat, Renzo De Nardi, Michael Goesele, Steven Lovegrove, and Richard Newcombe.

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Acknowledgements

The Replica dataset would not have been possible without the hard work and contributions of Matthew Banks, Christopher Dotson, Rashad Barber, Justin Blosch, Ethan Henderson, Kelley Greene, Michael Thot, Matthew Winterscheid, Robert Johnston, Abhijit Kulkarni, Robert Meeker, Jamie Palacios, Tony Phan, Tim Petrvalsky, Sayed Farhad Sadat, Manuel Santana, Suruj Singh, Swati Agrawal, and Hannah Woolums.

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