# **Software stack**



### **Development**

- Python
- conda and virtual environments
- preferably docker with ubuntu

### **Neural** nets

- preferably PyTorch
- Tensorflow

### Libraries for 3D data

- Kaolin <a href="https://kaolin.readthedocs.io/en/latest/">https://kaolin.readthedocs.io/en/latest/</a>
- PyTorch3D <a href="https://pytorch3d.org/">https://pytorch3d.org/</a>
- PyTorch Geometric <a href="https://pytorch-geometric.readthedocs.io/">https://pytorch-geometric.readthedocs.io/</a>
- PyMesh <a href="https://pymesh.readthedocs.io/">https://pymesh.readthedocs.io/</a>

### Visualisation

- In python <a href="https://plotly.com/">https://plotly.com/</a>
- MeshLab https://www.meshlab.net/
- Blender https://www.blender.org/

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# First technical steps

# **Software Innovation Center**

## Set-up

 Configure environment, install libraries and dependencies (preferably HPC and locally)

### Read and standardize models

- Class for reading mesh data
- Method for standardization (model scaling)
- Method for sanity checks (i.e. broken faces, vertices, normal, waterproof the 3D model)
- Orientation of the model (longest axis along "Z")

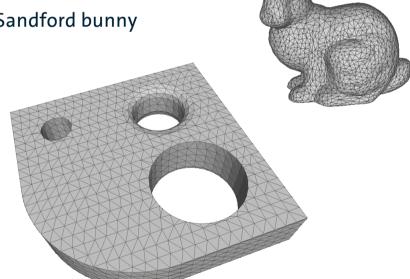
### 3D model manipulation

- Method for voxelization with adjustable resolution
- Method for making cylinder-like holes with certain diameter and location and orientation of the long axis
- Method for making cylinder-like holes with random diameter and location and orientation of the long axis

# **Example models**

Vertical hole





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