

# Densify Point Clouds Sprint 3

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# Sprint 3 Tasks

- Continue researching papers and finding a paper that we can feasibly reproduce
  - Find frameworks that we can utilize from these papers
- Keep working on testing out our development software
  - Test advanced tutorials on torch-3d
  - Install pytorch 3d and PCL locally
  - Install open3d and test tutorials
- Start working on theoretical ML module in pytorch 3d



# Accomplishments

- Our Team found an interesting paper that implemented their own deep learning model to classify sparse point clouds into denser objects.
- The paper also had the framework they developed under github called PointSDF



# Research Finding - PointSDF

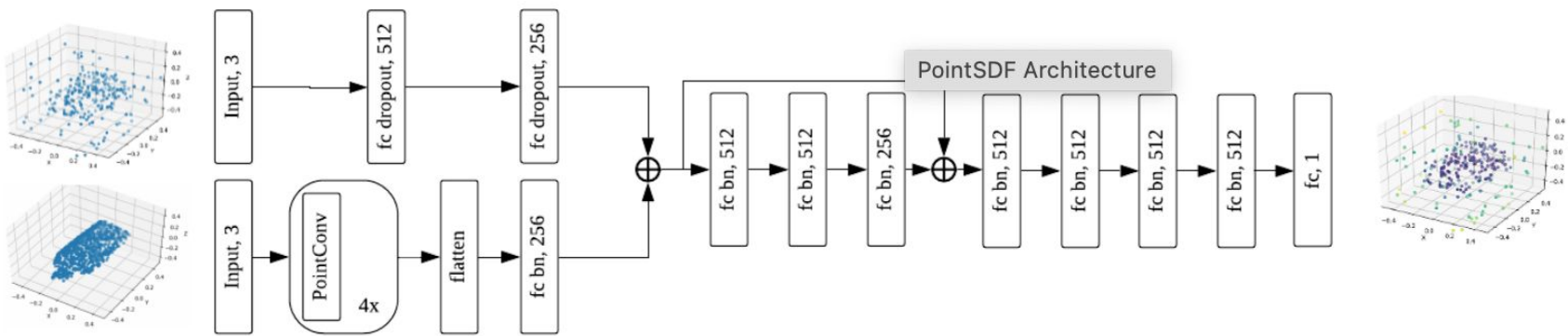
- **PointSDF - Signed Distance Function**

- Directly regresses signed distance functions from point clouds
- Providing geometrically rich input and output

- **Distance Prediction**

- Implicitly encode geometry by introducing the point cloud embedding from PointSDF

3D Object Reconstruction



# Research Finding

- **Supapixel Method**
  - Only performs a decent result under certain environmental conditions
  - Cannot present all the possible variations in an image, may deliver wrong/missing spots
- **Markov Random Field(MRF)**
  - Pixelwise optimization
  - Pair up the neighbor points/pixels to compute a certain 3D surface
- **Semantic Labeling**
  - Mapping elements on the image such as color and texture to a 3D plane normal
- **Multiple Segmentation Method**
  - Obtaining a higher accuracy by analyze the advantages of each single elements

# Set Backs

- We had serious trouble trying to install torch-3d and pytorch 3d using the SCC
  - Our team worked in tandem with IT but we didn't have much luck getting these libraries to function as intended
    - The closest we got was getting pytorch 3d to use CPU
- We also had trouble installing pytorch 3d locally
  - I tried to install Pytorch 3d locally on Linux but it didn't work out due to graphic driver issues
    - Im currently in the process of installing pytorch 3d using a conda environment



# Sprint 4 Tasks

- Install PointSDF locally and test their framework
  - Have a demo showcasing the PointSDF framework
- Continue Paper Research
  - Diagram a model for our ideas on how to optimize the frameworks ML component
- Continue trying to get pytorch 3d working
  - Work with Osama to check if the SCC has correctly installed the software and test example
  - Continue trying to install locally
  - (Reach goal) Have a demo showcasing pytorch 3d

