A Generalized Mesh Prediction Framework for Arbitrary Objects

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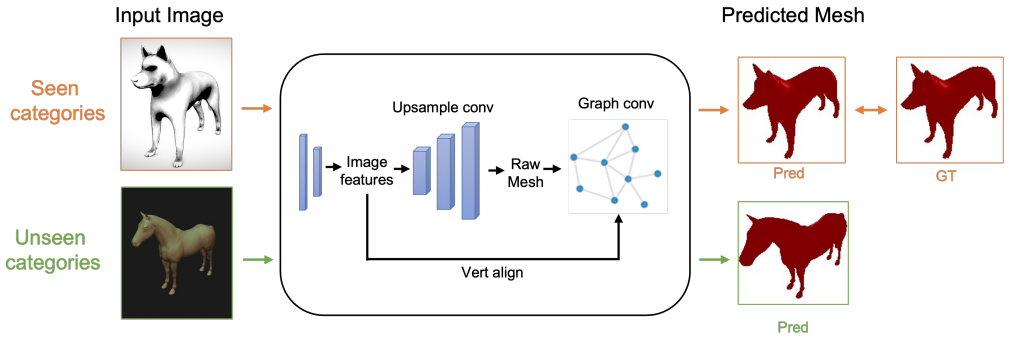
Open Category Mesh Prediction



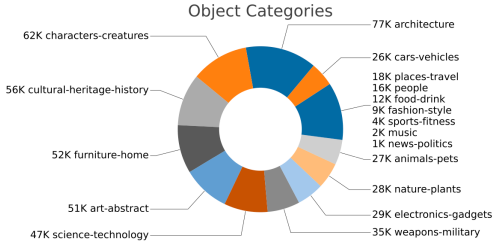
We developed a mesh prediction framework capable of handling open category objects:

- *Input*: a 2D image from either Seen/Unseen categories; *Output*: predicted 3D mesh

Experiment Setup

Dataset: Objaverse

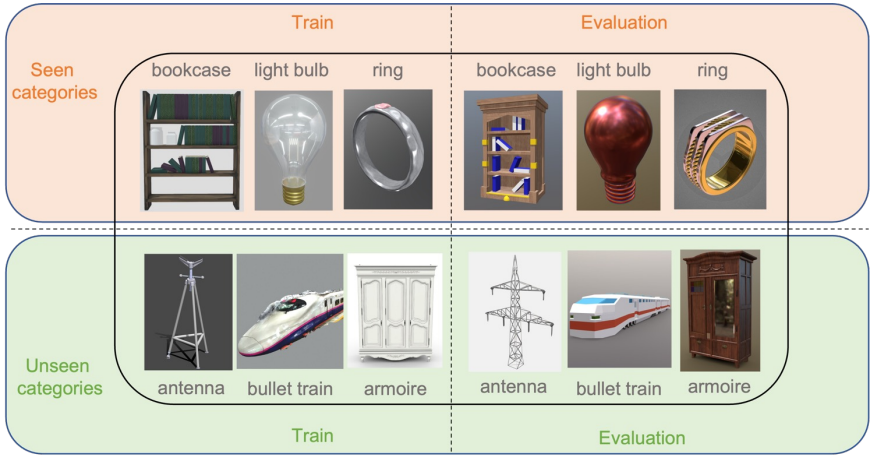
Dataset	# Objects	# Classes
YCB [5]	77	5
BigBIRD [69]	125	–
KIT [35]	219	145
IKEA [43]	219	11
Pix3D [71]	395	9
GSO [19]	1K	17
EGAD [51]	2K	–
PhotoShape [53]	5K	1
ABO [12]	8K	63
3D-Future [22]	10K	34
ShapeNet [7]	51K	55
Objaverse	**818K**	**21K**



Dataset split: randomly choose 15 seen categories and 15 unseen categories

Train: 1) 2D images and 3D annotations of objects in Seen Categories
2) 2D images of objects in Unseen Categories

Evaluation: 1) 2D images of objects in Seen Categories
2) 2D images of objects in Unseen Categories



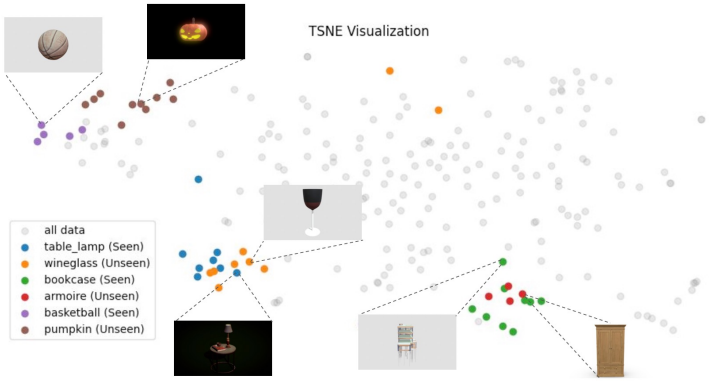
Experiments

Quantitate Result

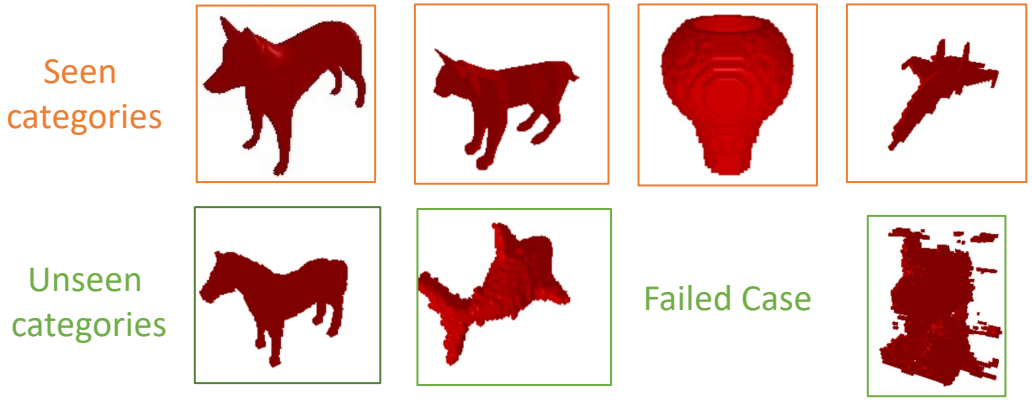
Categories	F1 0.1	F1 0.3	F1 0.5	Chamfer Distance
Seen	85.9427	99.5634	99.9941	0.0102
Unseen	79.1717	99.0235	99.9849	0.0148

Correlation between 2D Representation Space and 3D

We found that objects having similar 3D shapes are close in 2D t-SNE visualization.



Visualization on Validation Set



Models and code are publicly available