

# Characterizing Similarity from Computer-Aided Design (CAD) Assemblies

Ye Wang, Daniele Grandi, Brandon (Shijie) Bian  
Autodesk Research

Aug 13, 2022

# Agenda

1 Problem Statement

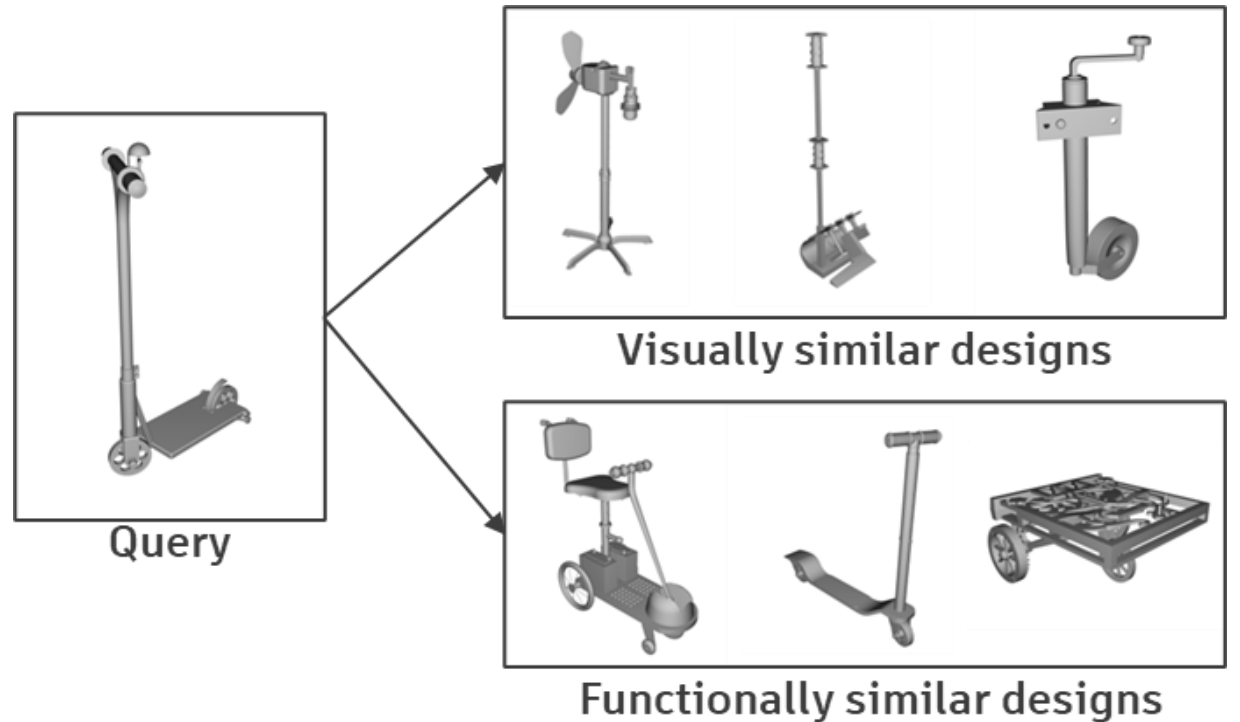
2 Dataset

3 Submission

4 Judgement Criteria

# Problem Statement

- By searching for similar shapes, designers could get inspiration from past examples, and in doing so they might more quickly arrive at novel solutions to design problems.
- You will come up with an open-ended solution for characterizing similarities between designs.



The model of a scooter could be used to find visually similar designs, or search for functionally similar designs.



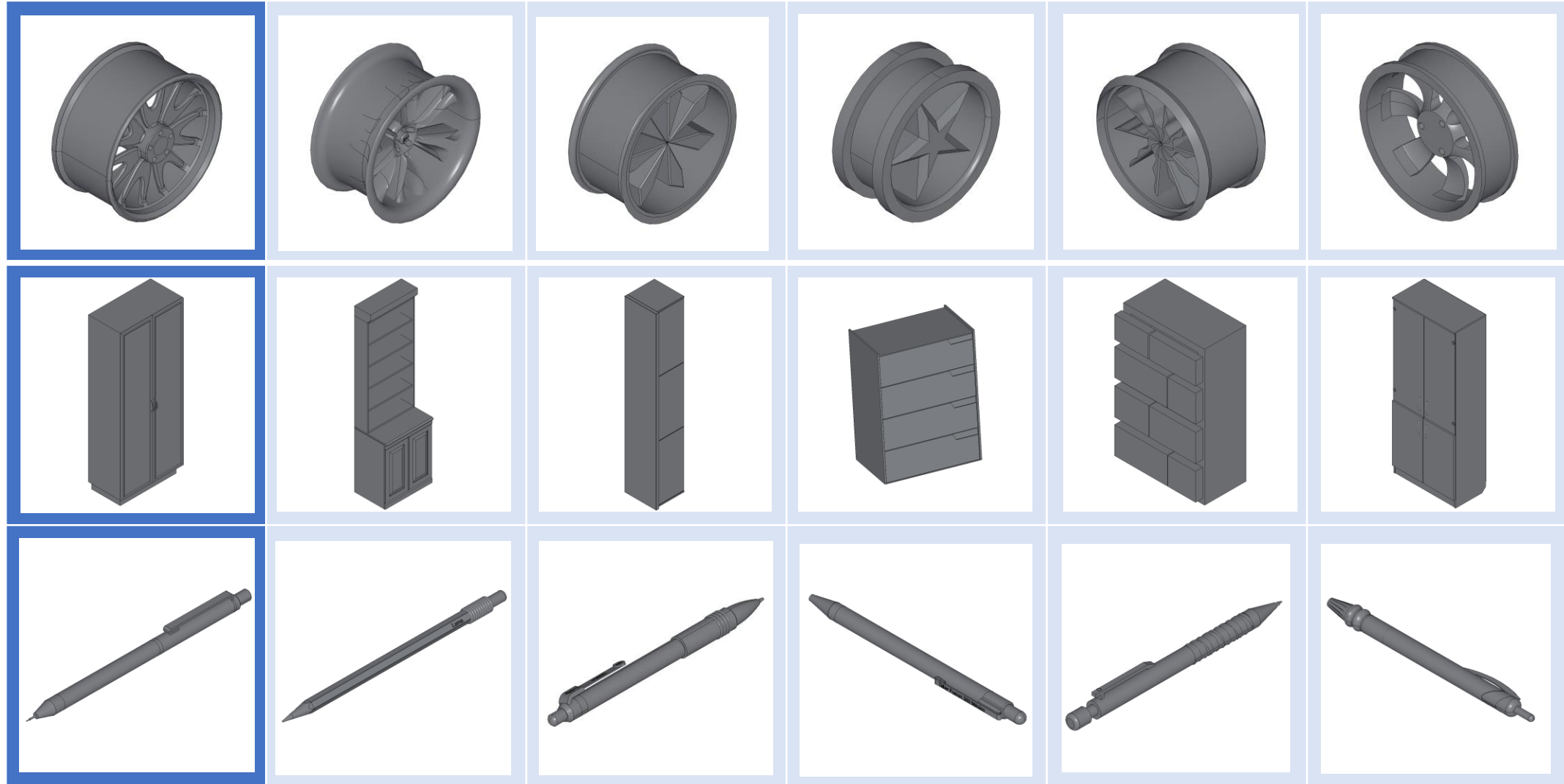


# Dataset

- <https://github.com/AutodeskAILab/IDETC22-Hackathon>
- 8,251 assemblies + 154,468 bodies

File	Feature Properties	Feature Description
assembly.json	Body - Semantic Name	The semantic name of individual bodies, as assigned by the designers
	Body - Material Category	The hierarchical material category of individual bodies
	Body - Physical Properties	The physical properties of individual bodies (e.g., center of mass, area, volume, density, and mass)
	Assembly - Physical Properties	The physical properties of the entire assembly (e.g., center of mass, area, volume, density, and mass). There are also some additional physical properties (e.g., vertex count, edge count, etc.) for the assembly level.
	Assembly - Design	The design information of the entire assembly (e.g., design category, design industries, design type)
	Assembly - Community	The community statistics of the entire assembly as collected on the Fusion 360 Gallery (e.g., the number of views, comments, and likes)
[body_id].jpg	Body - 2D Geometry	A thumbnail image of the body geometry.
[assembly_id].jpg	Assembly - 2D Geometry	A thumbnail image of the assembly geometry.

# Validation Set



# Submission

- Presentation
  - Code (your link to your Github)
  - Explain how you design similarity metrics
  - Explain how you develop your models
- We will release the test set (7 assemblies) in at 3pm. You will report the top 5 similar designs for each assembly. Report your results using our slide template.



# Judgement Criteria

- Similarity (30%) - Teams will present an overview of their definitions of similarity
- Model Development (30%) - Teams will present an overview of their approaches for calculating the similarity metrics.
- Evaluation (30%) – Top 5 similar assemblies on the test set
- Overall Presentation (10%)