

DeepRob Discussion 1

1/20/2026



Session Objective

- Gather rough understanding of datasets in ML
- Inspect two datasets
 - Semantic-KITTI
 - PROPS (for project!)
- Describe usage of datasets with regard to ML
- Describe structure and components of datasets

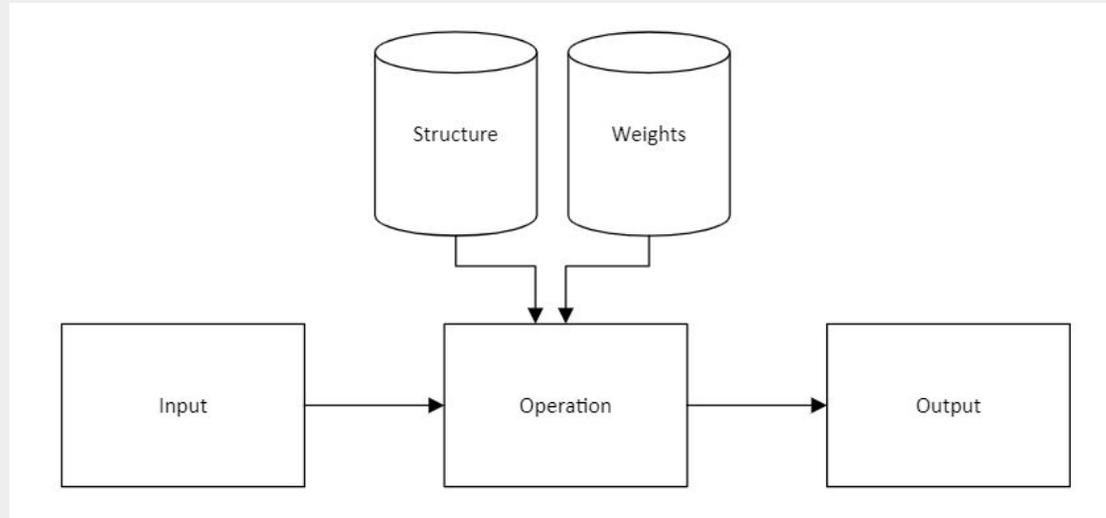


AI/ML Background

Input/Output Formats

- Text
- Numbers
- Images
- Video
- Multi-Modal

All are converted to numbers to feed into model





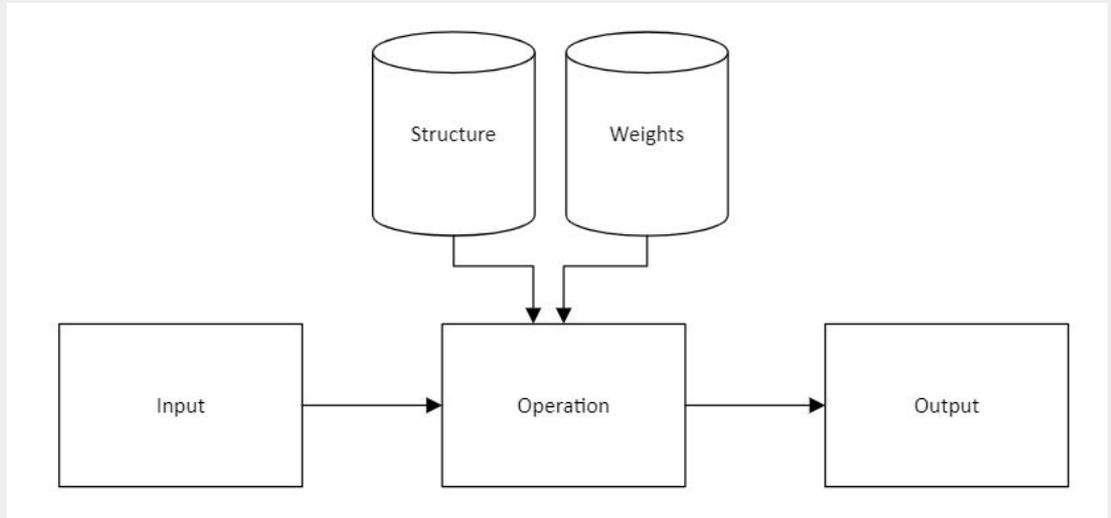
AI/ML Background

ML model is **function!**
(Output = Model(Input))

-> We want to make our function give output we want for specific tasks.
(Function approximator)

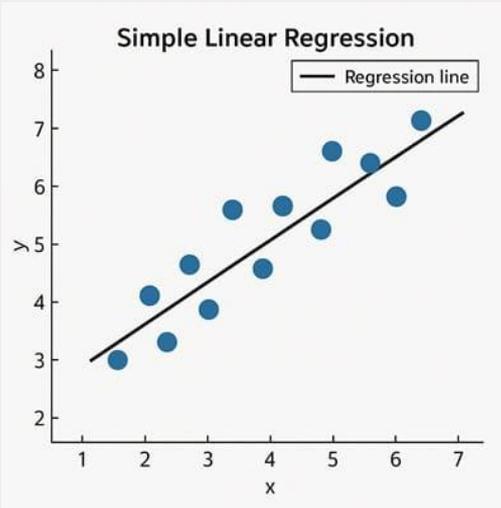
How?

-> Tune function parameter through **training session!**





Quick Example: Linear Regression



We want to make a function approximate specific linear distribution

-> $y = a * x + b$

-> Tuning parameter: a & b

-> **Dataset (Blue points):** $(x_1, y_1), (x_2, y_2), \dots$

-> Find a & b which minimize $\|y_1 - (a * x_1 + b)\|^2 + \dots$ (Training session)



This is why dataset is important!

Give a subset of target function we want to approximate.



What are the components of a dataset?

- Data
 - Multiple Formats (Image, text, number, ...)
- Metadata
 - Subset of the dataset that contains extra information



Chihuahua Dataset

Raw data: Images of chihuahua

Metadata: File format (.png), 640 x 480, made by Jaeho, 07.06.2023, Camera intrinsic matrix ...



What are the components of a dataset?

- Annotations
 - Provides ground truth
 - Can be generated in multiple ways (depending on task!)



Classification

Label: Black Chihuahua

Segmentation

Label: BBox [100, 200, 50, 50]

Chihuahua Dataset



What are the components of a dataset?

- Other considerations
 - How was data collected?
 - Is the data synthetic?
 - Related benchmark algorithm for dataset?



Chihuahua Dataset

These questions are often answered in the paper introducing the dataset!



Demo - Semantic KITTI



**Class Activity - Find a dataset that
matches your interests!**

Post into Piazza

Quick break!