Towards Real-World Structure-Aware Representation Learning
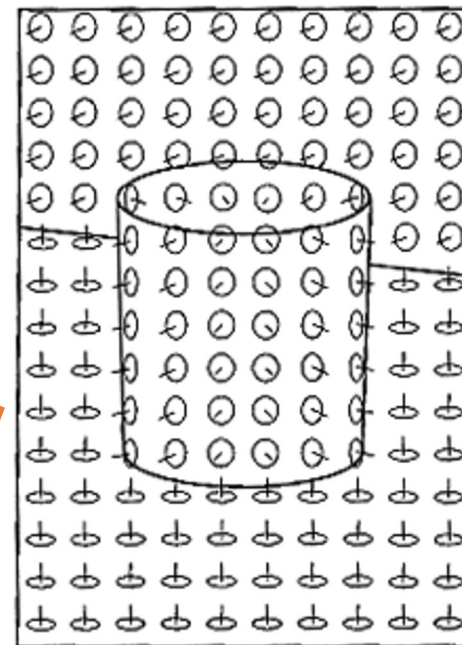
Jiayun (Peter) Wang

UC Berkeley

BAIR

BERKELEY ARTIFICIAL INTELLIGENCE RESEARCH

Berkeley Vision Science

Representation Learning: Bring the Data Structures **Explicit**
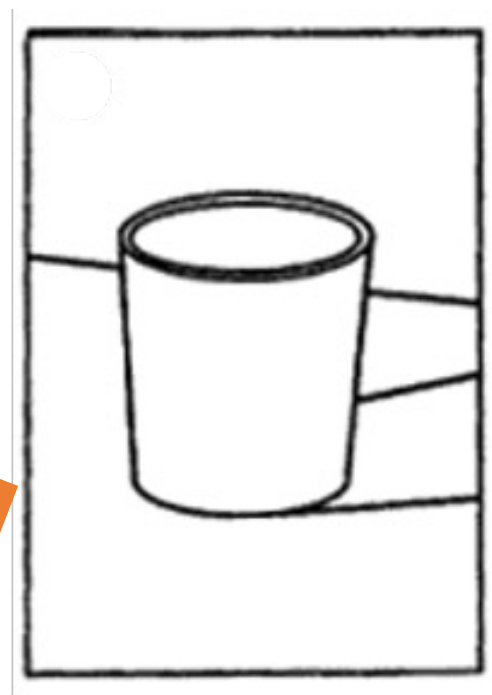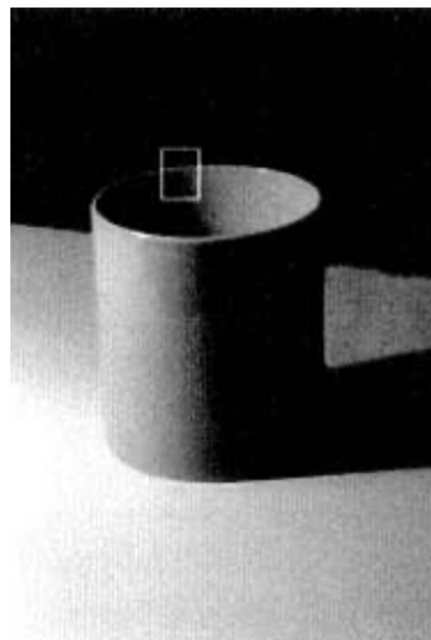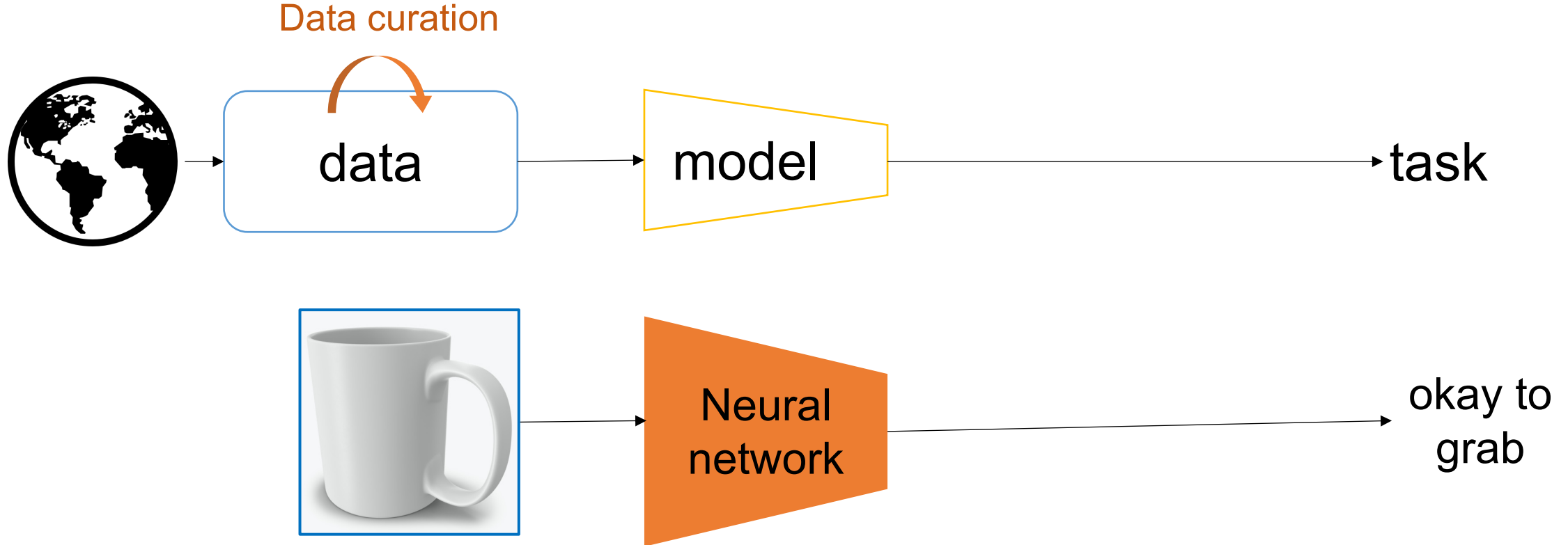

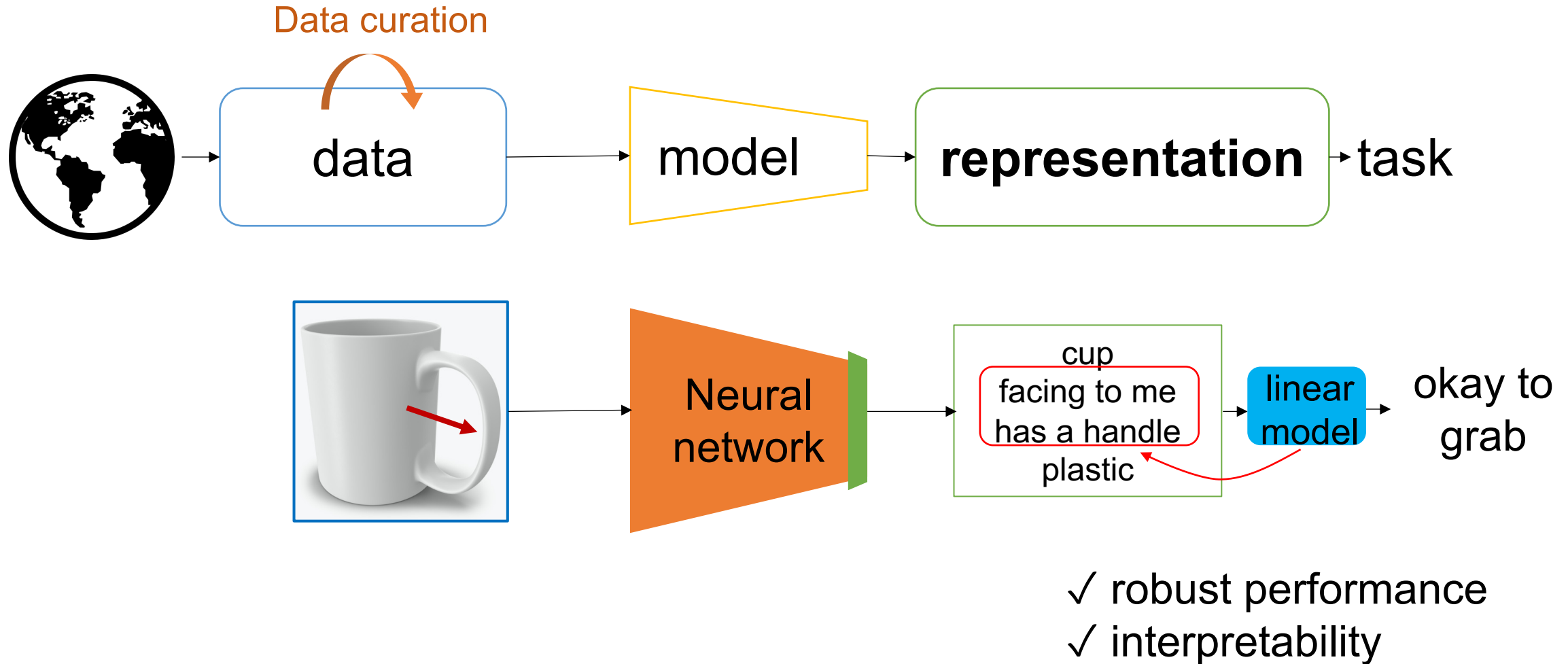edges

geometry and organization
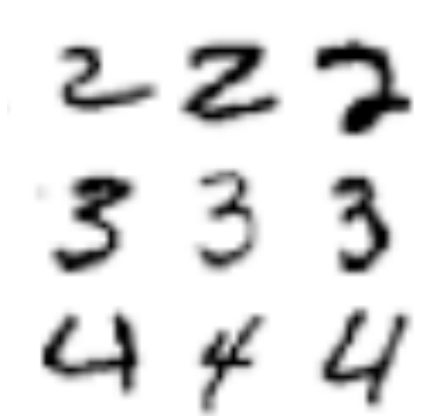
Cup
Grab for water

Why important?

End-to-End Learning Pipeline

Representation Learning Pipeline

Representation Learning: Curated vs Real-World Data

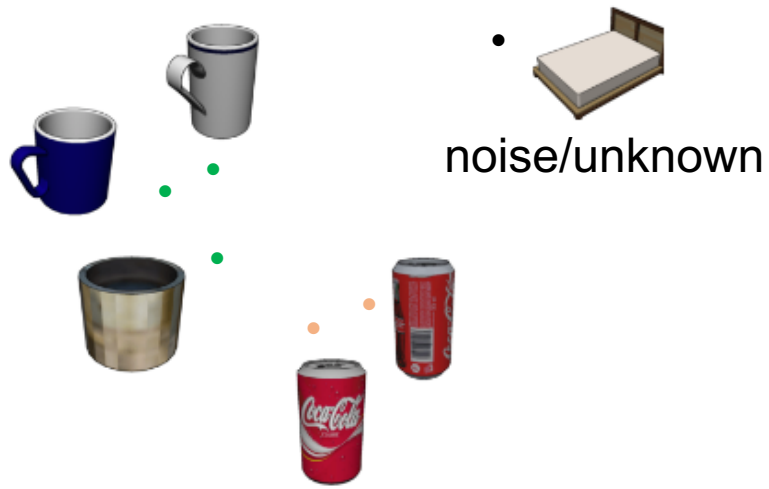|	**curated data**	**real-world data**
labels	full	no or very few
distribution	balanced	imbalanced
noise/ unknown classes	none	a lot
complexity	low	high
interpretability	not needed	important

Structure-Aware Representation Learning for Real-World Applications
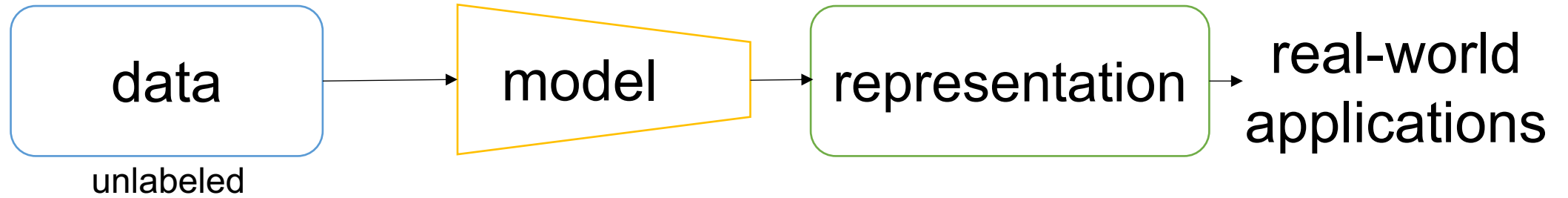
data
unlabeled

model

representation

real-world applications

noise/unknown
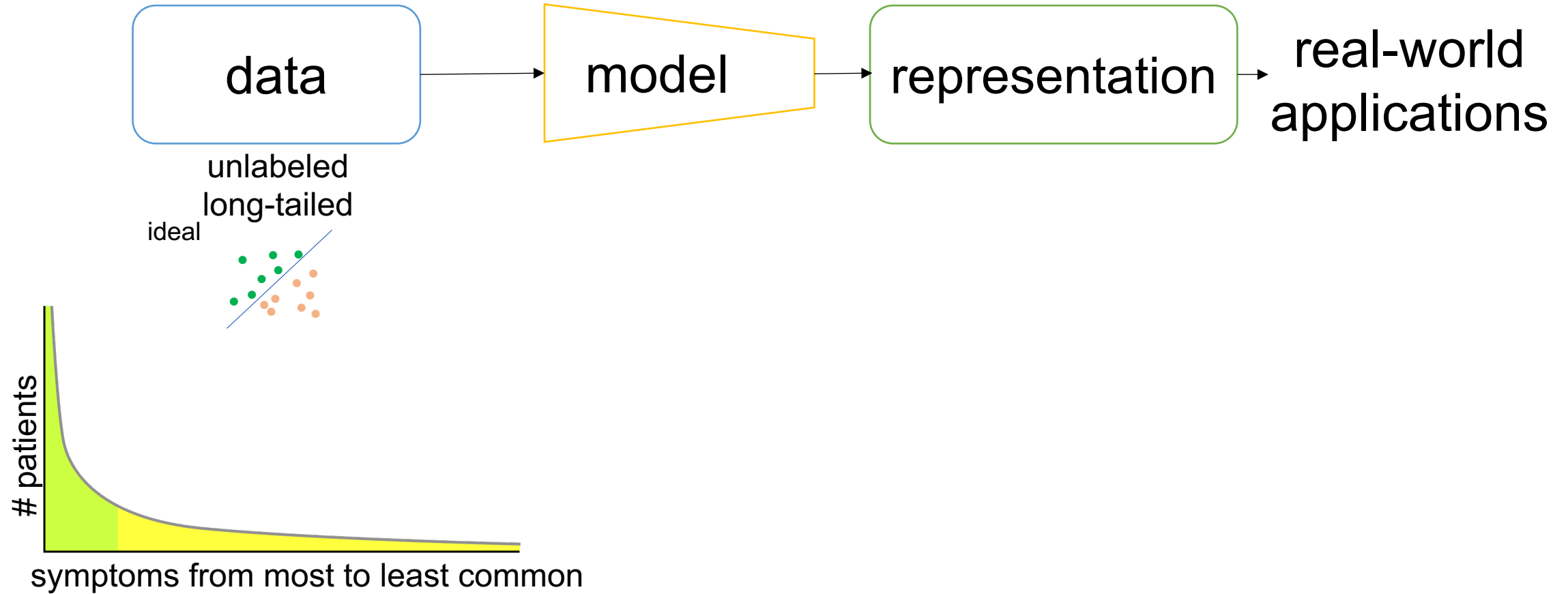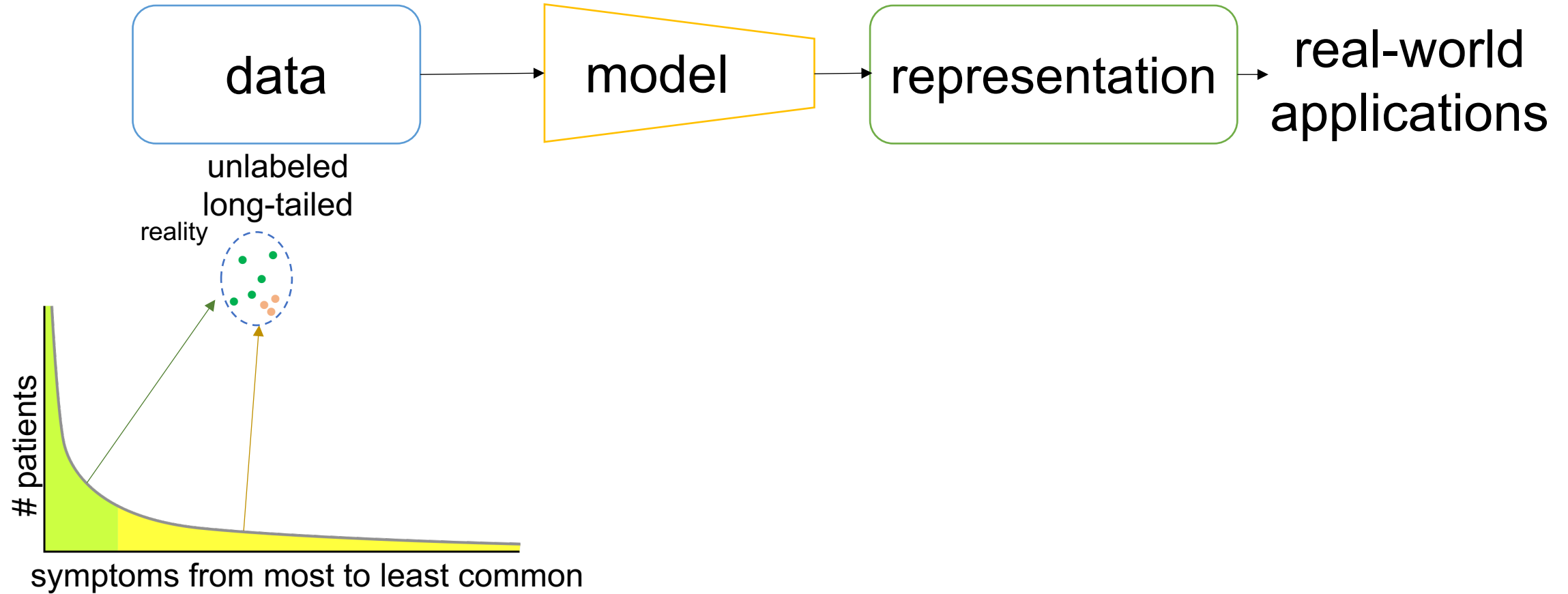
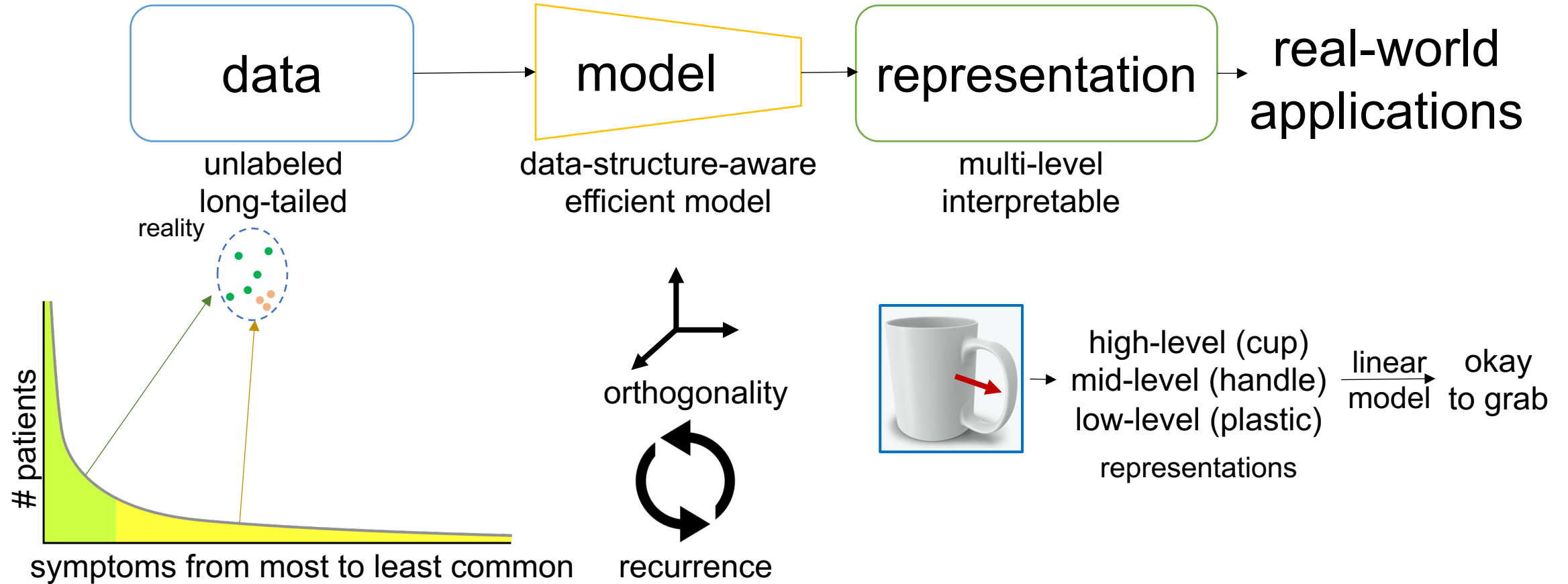# Structure-Aware Representation Learning for Real-World Applications

Structure-Aware Representation Learning for Real-World Applications

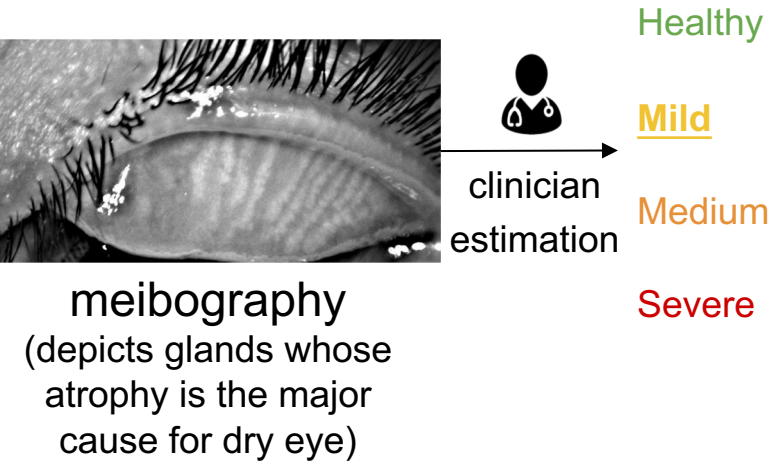# Structure-Aware Representation Learning for Real-World Applications

Applications to Medical Data

Existing method

meibography
(depicts glands whose
atrophy is the major
cause for dry eye)

clinician
estimation

Healthy

Mild

Medium

Severe

Ours

meibography

gland segmentation

atrophy
segmentation

gland
morphology

demographics

symptoms

clinical
signs

diagnoses

interpretable
relationships

new findings