

# **ICCS482 Deep Learning**

## **Lecture 7: How to get a better network?**

**Sunsern Cheamanunkul, Sep 29, 2020.**

Bayes error ↗ optimal  
error any classifier can achieve  
↳ approx Bayes error ~ ① human performance  
② best record often  $\frac{1}{10}$  error = 90%.

train error  
(1 - accuracy)

dev error

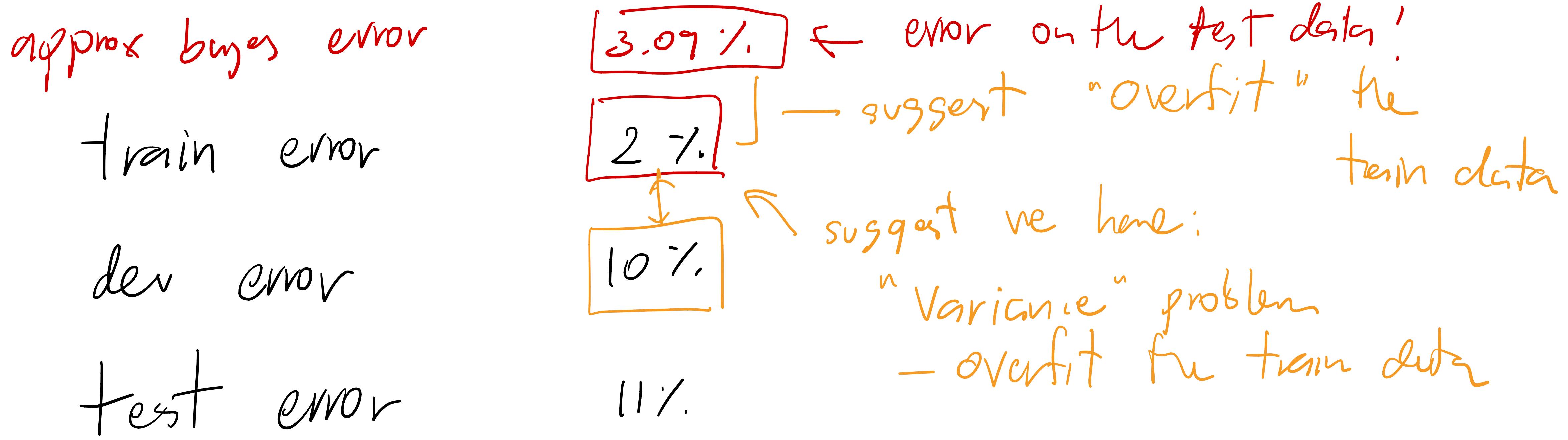
test error 29.7%

random classifier error 90%

real Bayes Error  $\leq$

3.09%

① Try reduce this gap!  
"Bias" problem - underfitting



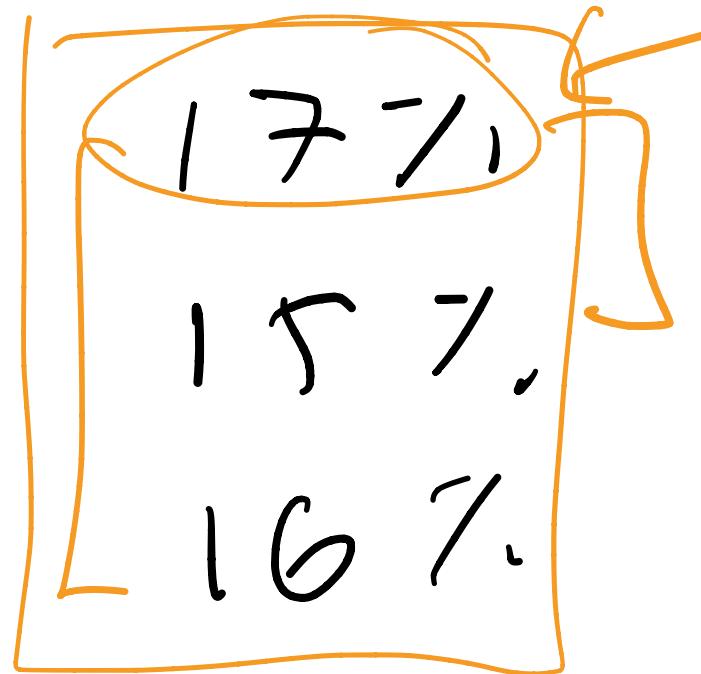

---

After we turn on "regularization"

train error

dev error

test error



too stren regularization?

# Mismatch Data Distribution

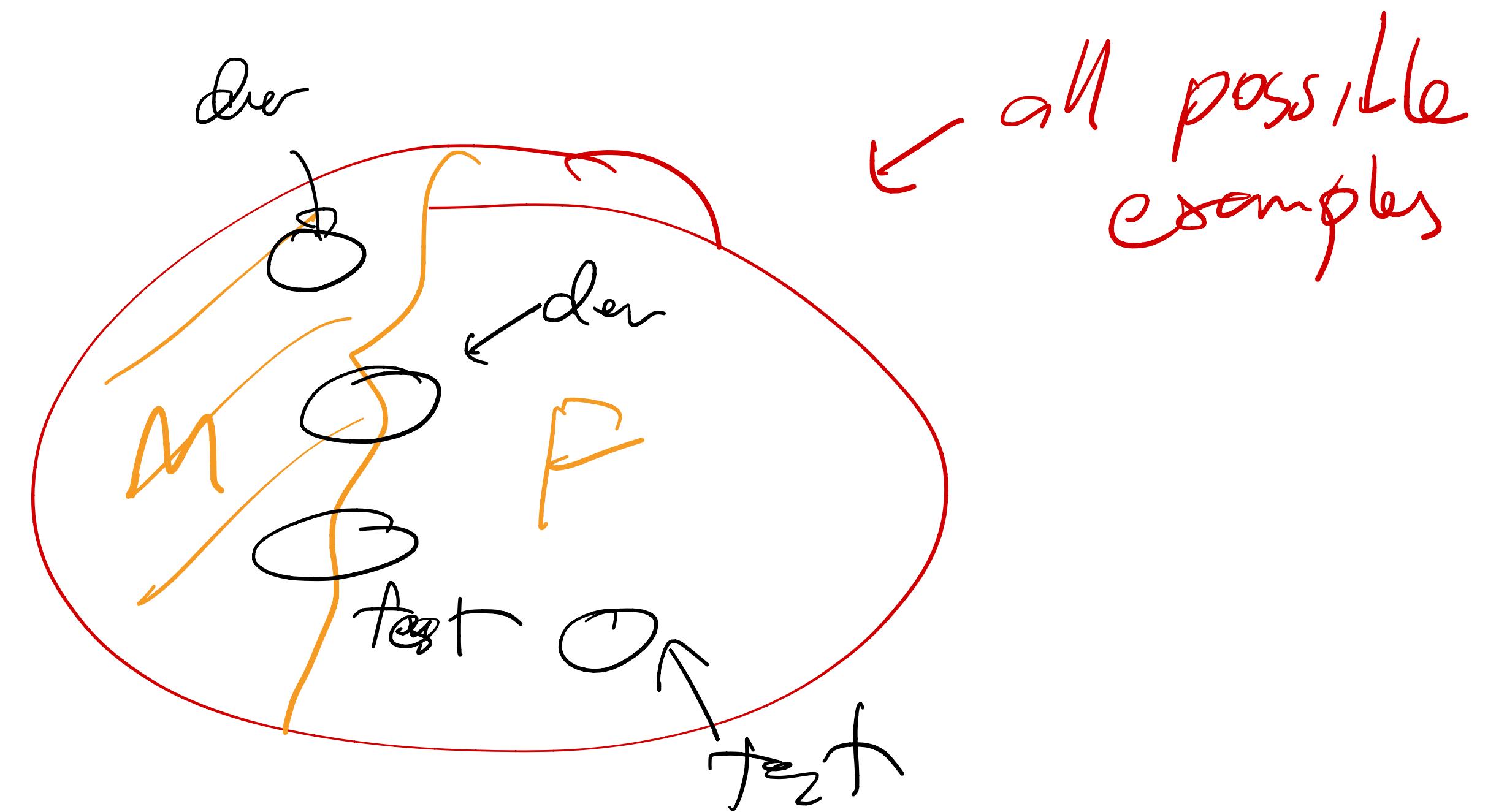


Goal: To do well on Test

- We tuned on Dev set

Problem: if dev and test don't  
come from the same distribution.

So, you need to ensure that  
Dev and Test have the  
same distribution.



If dev & test come from different distributions,

from dev

3%

dev error

3%

test error

10%

data mismatched!

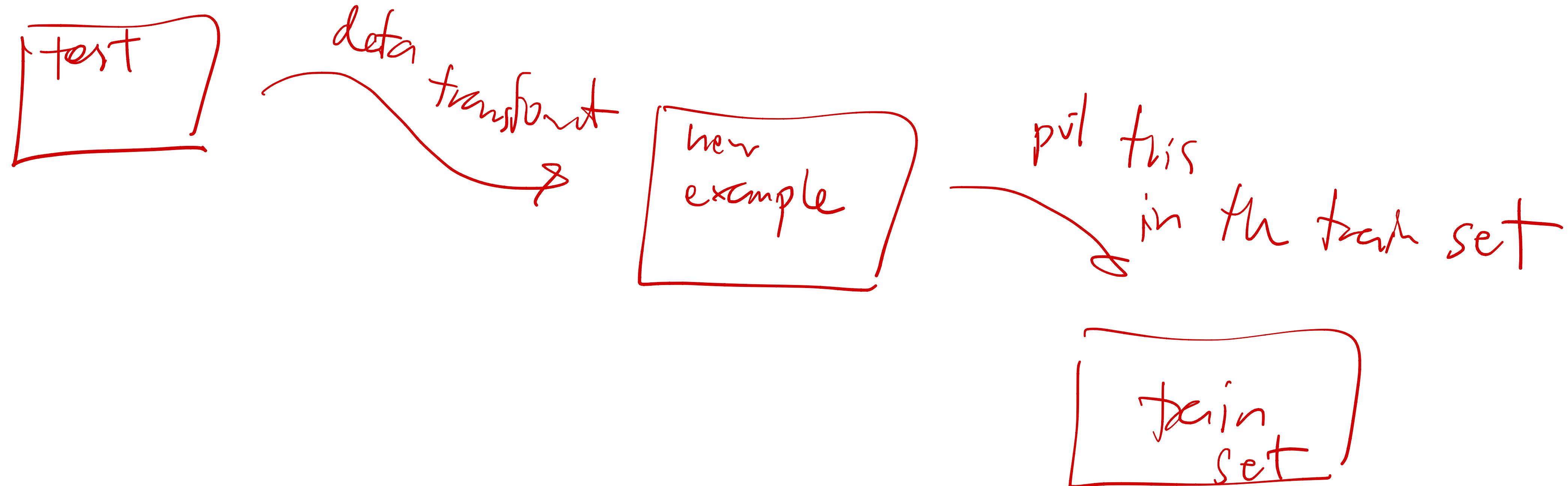
f may be we are  
unlucky

- try increase  
# of examples  
in dev

Another Idea

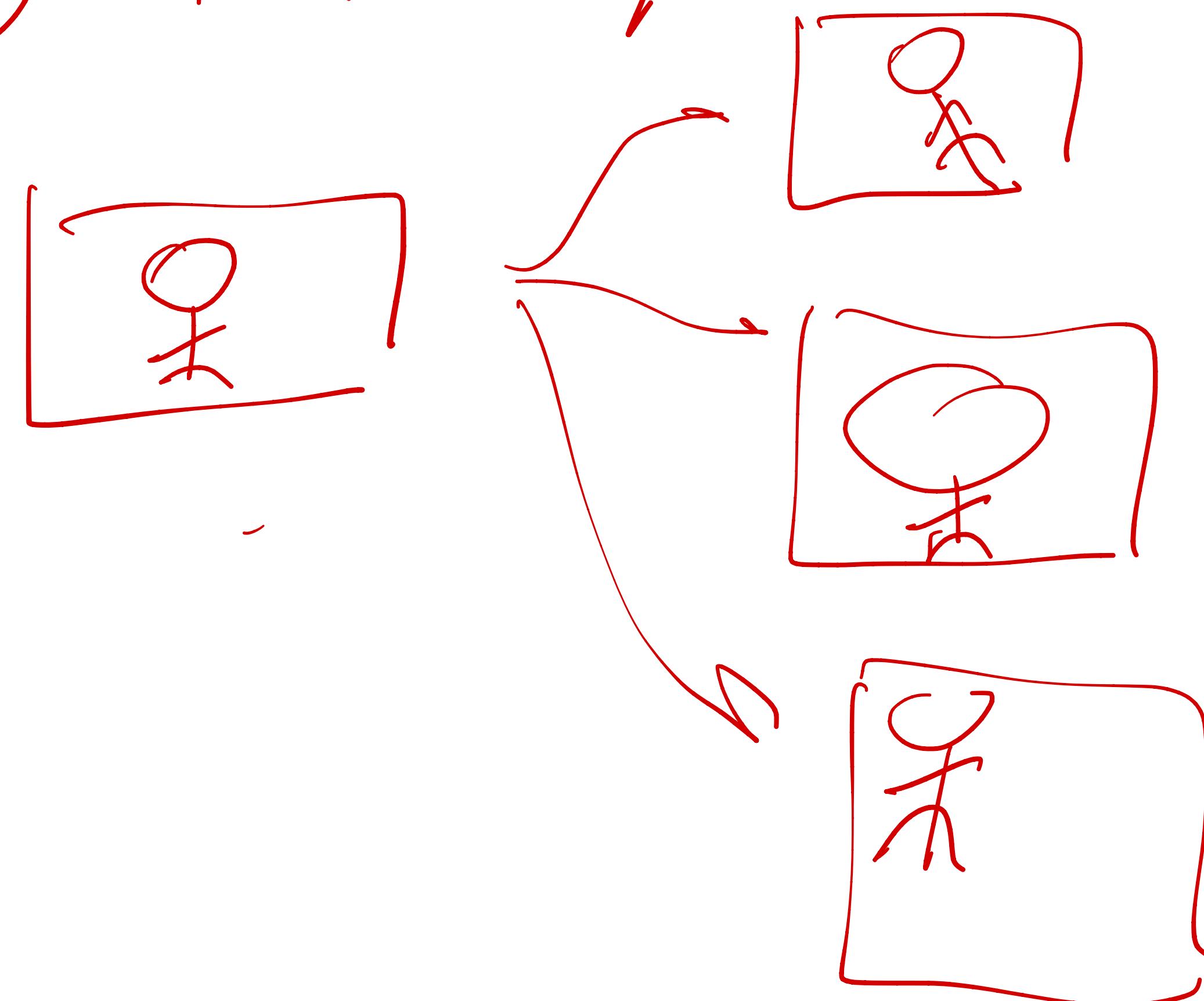
Look at examples in tests and apply

"data synthesis"



What if we don't have enough data?

① Data synthesis .a.k.a. data augmentation



Build simulator

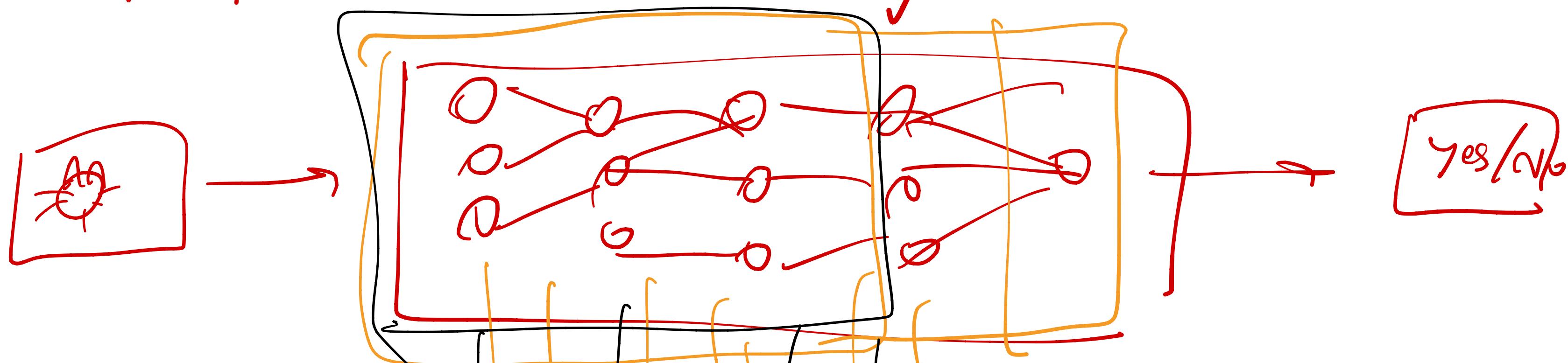
use output from  
sim as training  
examples

\* this introduces  
bias in the training  
data.

2

## Transfer Learning

1,000,000  
image

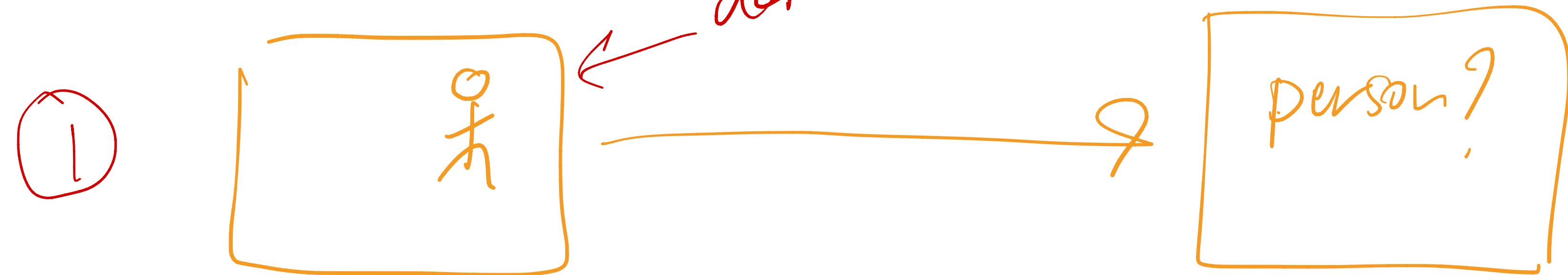


dog  
10,000  
image

specialization

### ③ Leverage domain knowledge

e.g. Face Recognition



end-to-end  
approach

