Open Problem: Understanding generative models and invariances

Can we use generative model to create more training data?

- Step 1: Train a GAN (for each class)

- Step 2: Generate images from that GAN (with free labels)

- Step 3: Train a recognition on generated images

real images

generated images

GAN

Recognition

dog? / cat?
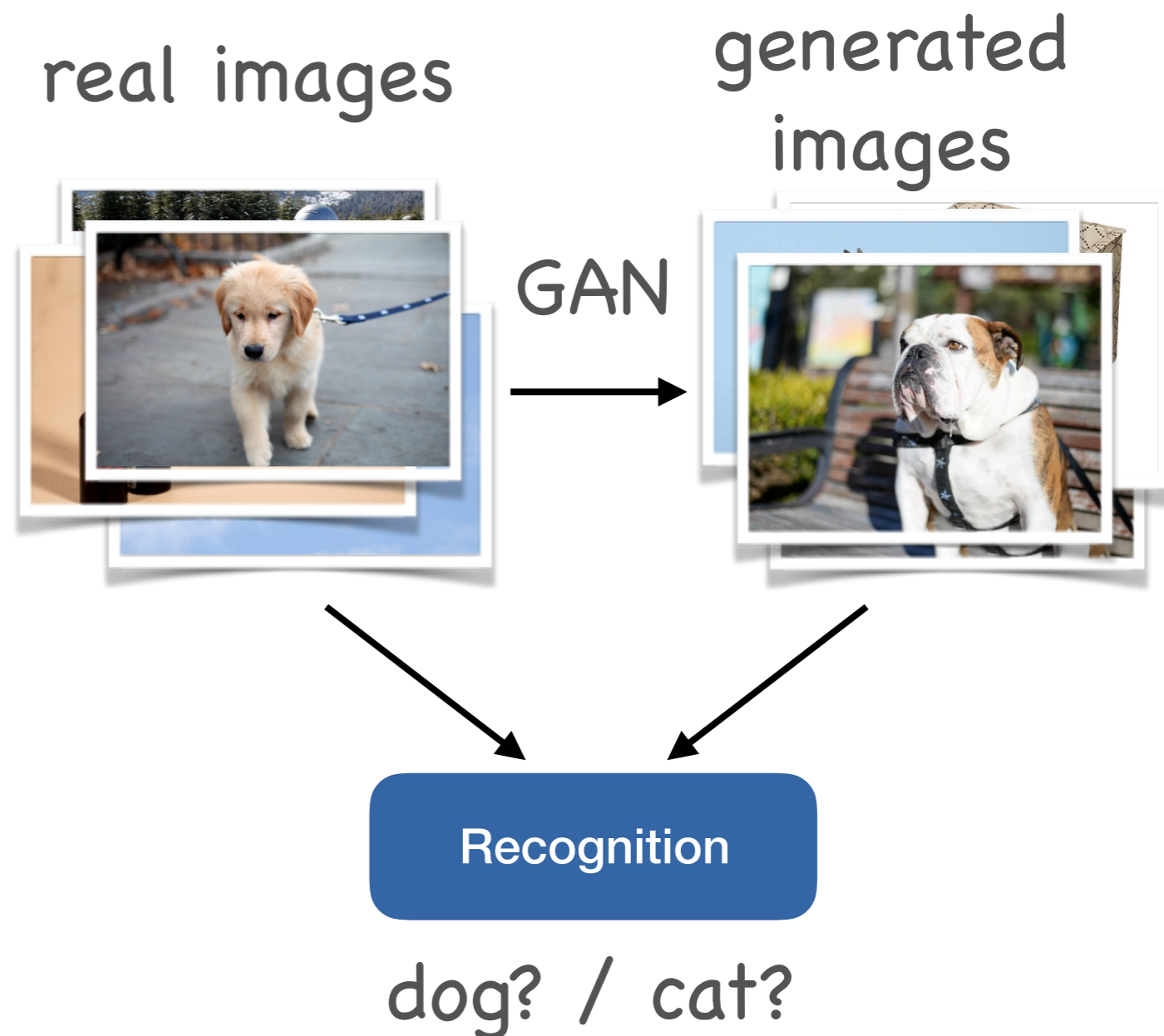
Does this give a better recognition model?

- Argument in favor

  - More data

  - Less overfitting

  - Better generalization

real images

generated images

GAN

Recognition

dog? / cat?
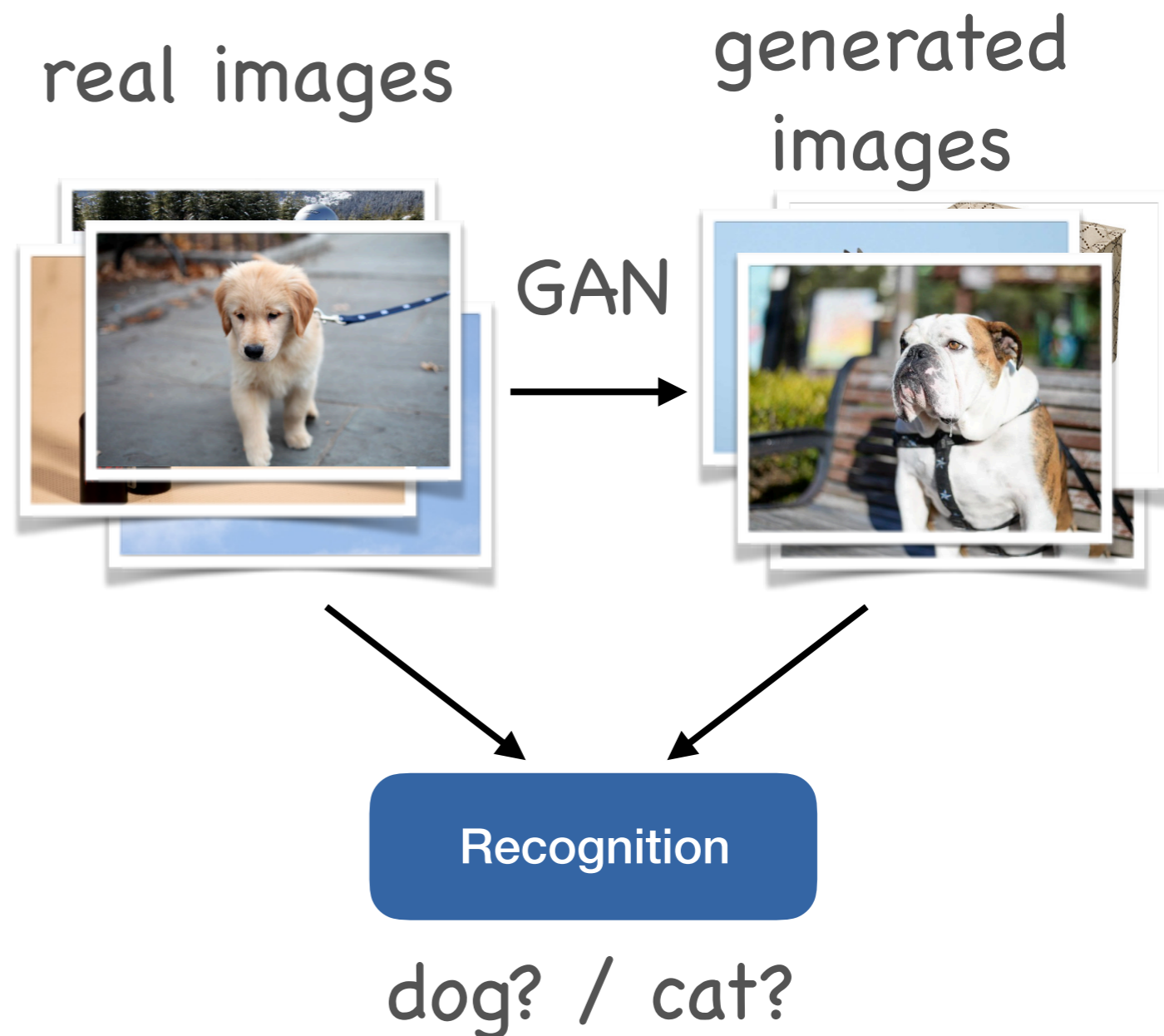
Does this give a better recognition model?

- Argument against

  - Final training pipeline does not see more data

real images

generated images

GAN

Recognition

dog? / cat?
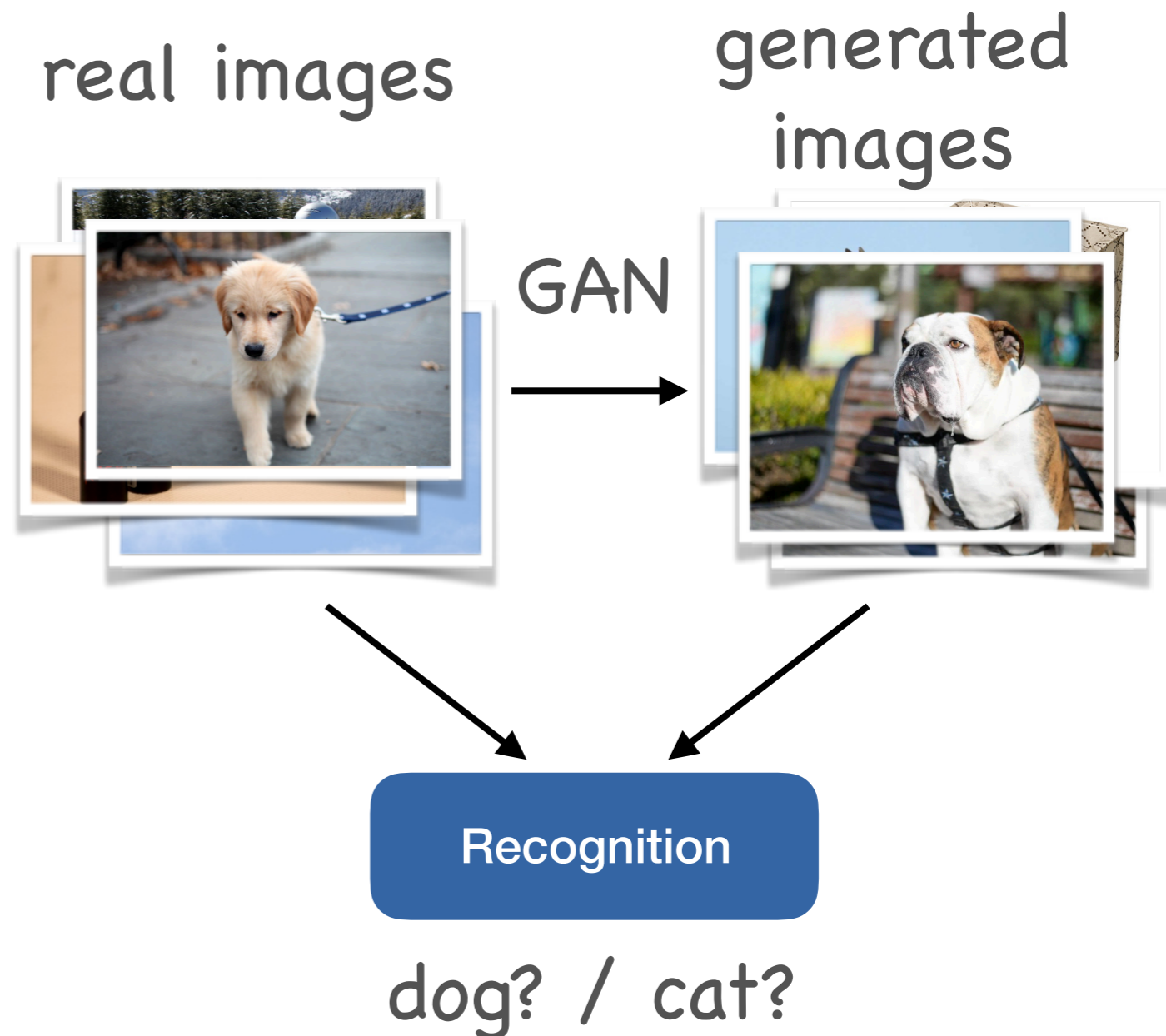
S

- Counter argument
  - Maybe GAN generalizes better?
- Counter counter argument
  - Why?!

real images

GAN

generated images

Recognition

dog? / cat?