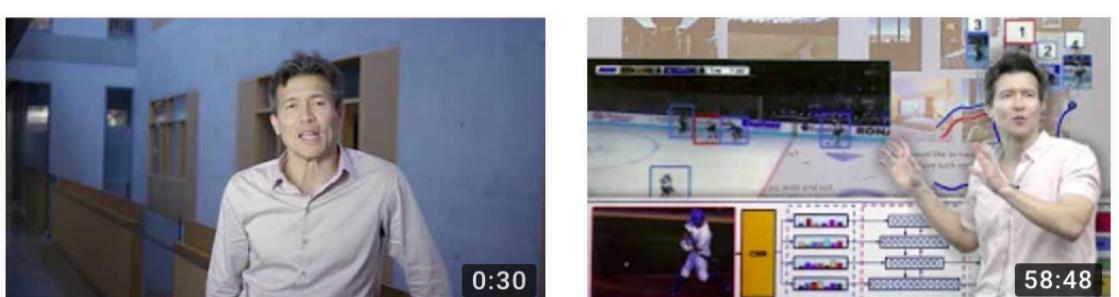


MORE MORI

Face Swap with Limited Data

CMPT 419 | FALL 2018 | Alex Nguyen, Sean Beaudoin, Shuman Peng
Replacing everyone's face with Greg Mori's face in real time using CycleGAN

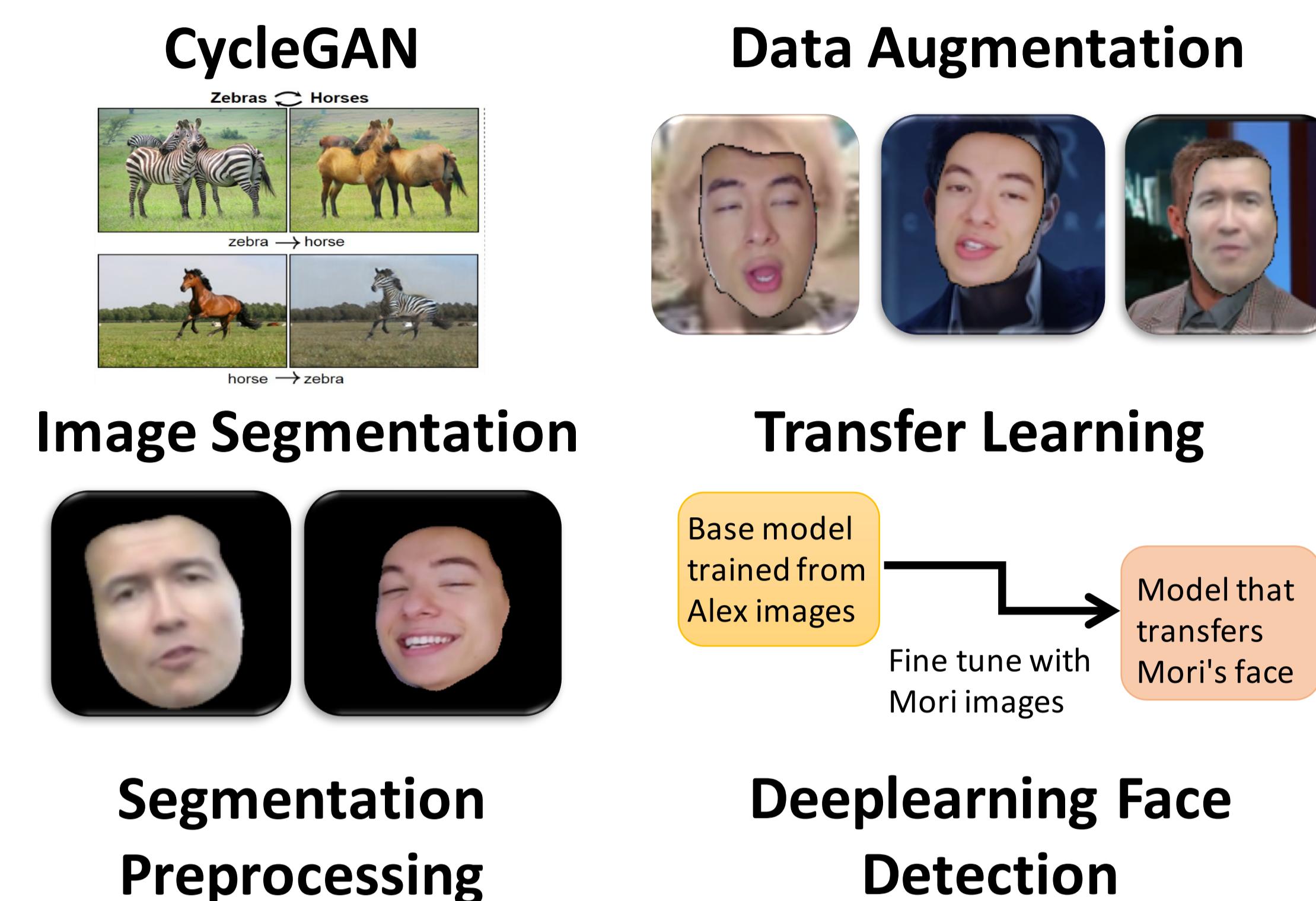
PROBLEM

- Limited diversity with training data (images of Greg Mori)
 
- Run-time constraints on CPU
- Many-to-one transformation (transform everyone to Mori)

Why Data Augmentation?

Data augmentation is the main solution to our unique challenge by increasing diversity in our limited dataset and improving runtime.

TOOLS & TECHNIQUES USED

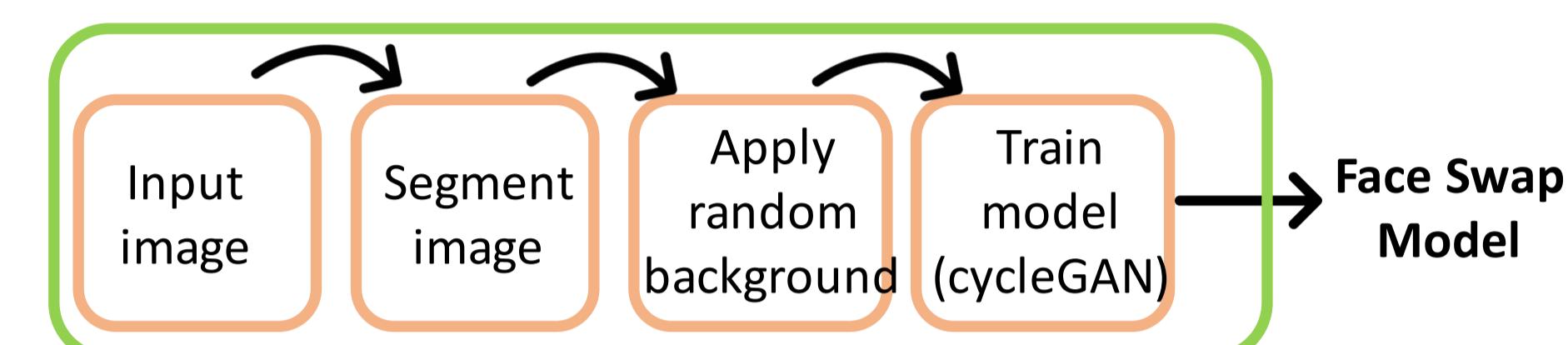


OTHER METHODS

FACE SWAP:

- deepfakes/faceswap
- shaoanlu/faceswap-GAN

OUR PIPELINE



COMPARISON

OUR METHOD:

- Plug & Play: very minimal preprocessing required for evaluation
- Works with data that lack diversity
- Easily generalizes to other objects
- Many-to-one face transformation
- Preprocessing only done during training – faster runtime

OTHER METHODS:

- Requires complicated preprocessing such as segmentation and facial alignment
- Requires diverse data
- Relies on features that do not transfer to other objects
- One-to-one face transformation

BASIC CYCLEGAN

MORI BASE

Method:

- Two datasets: one consists of **unprocessed** images of Ryan Gosling and the other consists of **unprocessed** images of Greg Mori

Training:



Results:



Evaluation:

- Model is overfit during training

ALEX BASE

Method:

- Two datasets: one with unprocessed images of the "World" (collection of different faces that is not Alex) and the other with unprocessed images of Alex
- More diversity in both datasets

Training:



Results:



Evaluation:

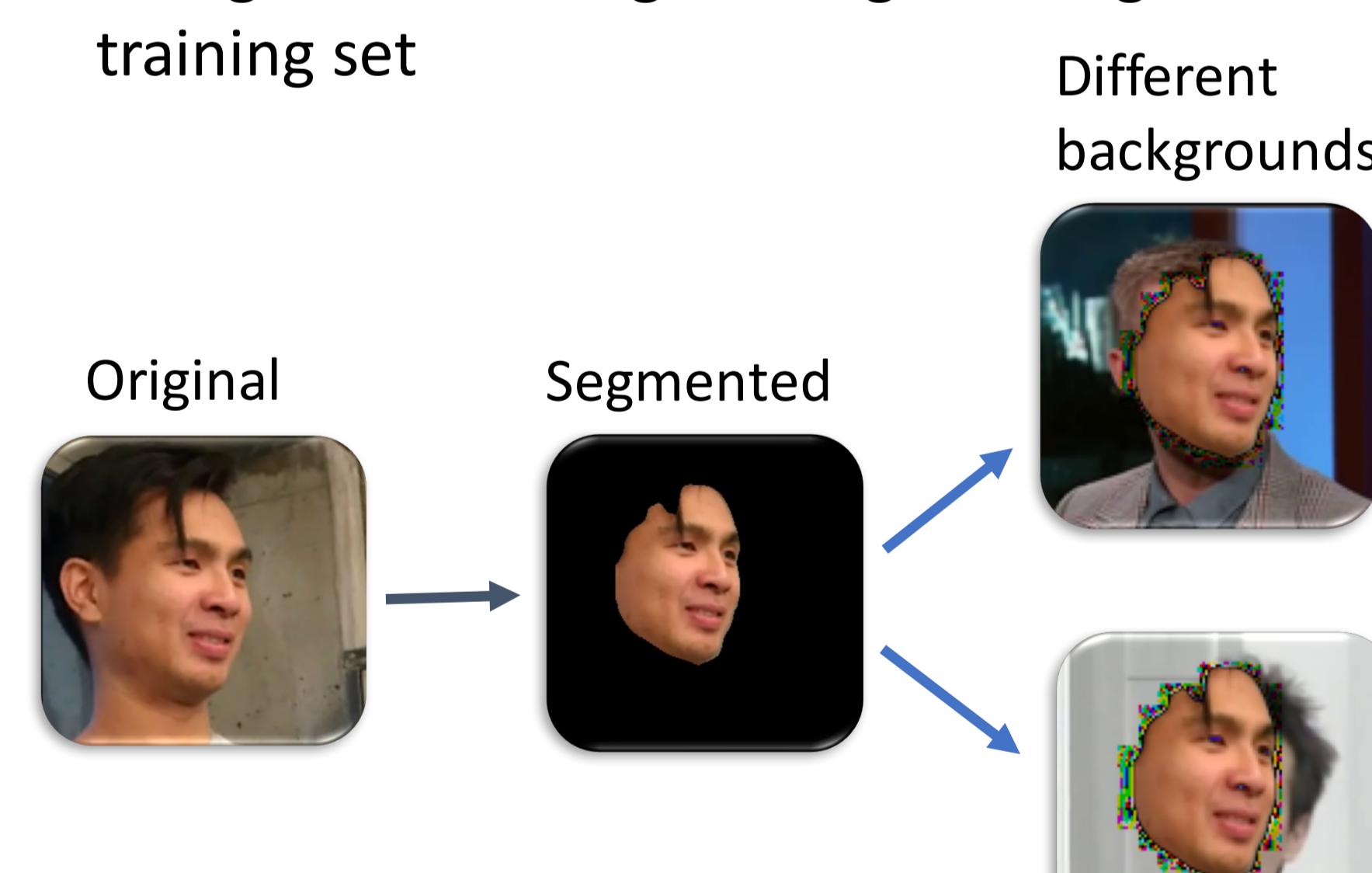
- Better performance than Mori Base

SEGMENTED SWAP

BACKGROUND SWAP

Method:

- Perform image segmentation to extract the face out of an image
- Perform data augmentation by randomly pasting the segmented faces onto different backgrounds during training for images in the training set

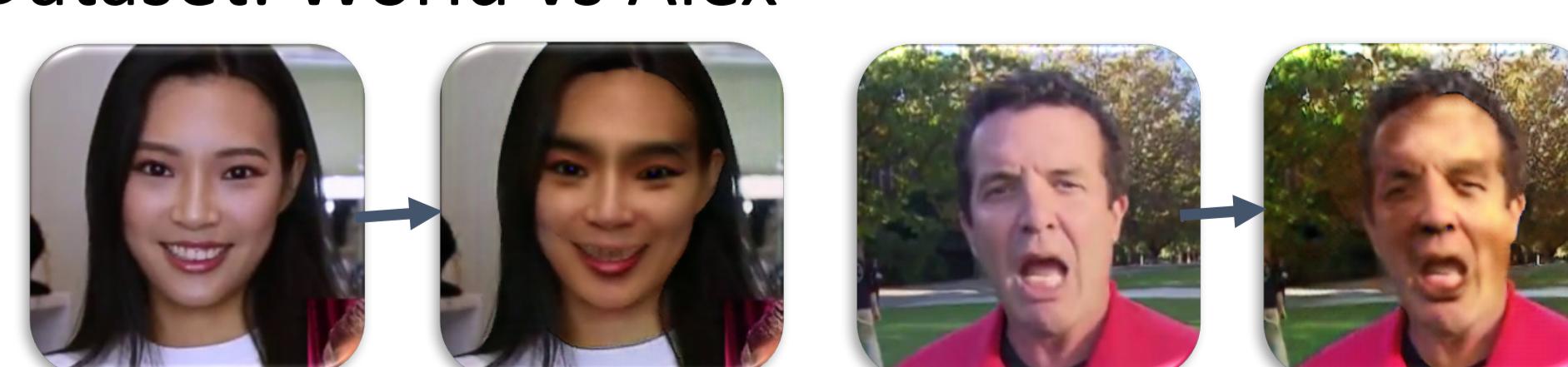


Results:

Dataset: World vs Mori



Dataset: World vs Alex



Evaluation:

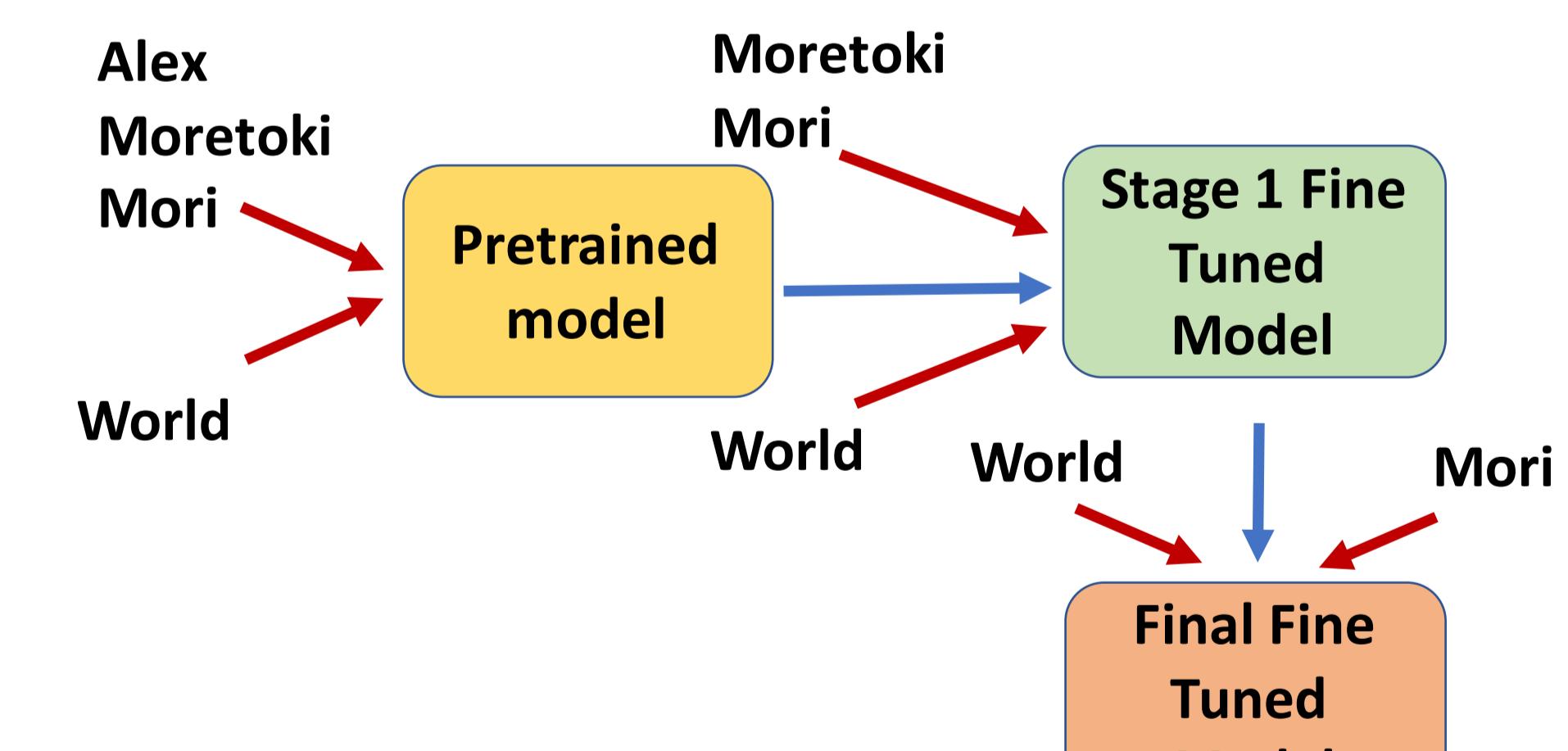
- Model is able to recognize faces and does not learn the background
- Improved performance without compromising runtime (no image preprocessing required during runtime)

TRANSFER LEARNING

TRANSFER LEARNING

Method:

- 3 phase training
- Base:** Pre-train the model using "World" for training set A and using Alex, Moretoki, and Mori as training set B
- Transfer 1:** Tune the pre-trained model by removing Alex from training set B (only keeping Moretoki and Mori)
- Transfer 2:** Further fine tune the model by only keeping Mori in training set B



Results:



Evaluation:

- Best performance out of all the different methods
- Model successfully learns how to transfer Mori features onto a non-Mori face