Steering HoloGAN

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Overview

Motivation:

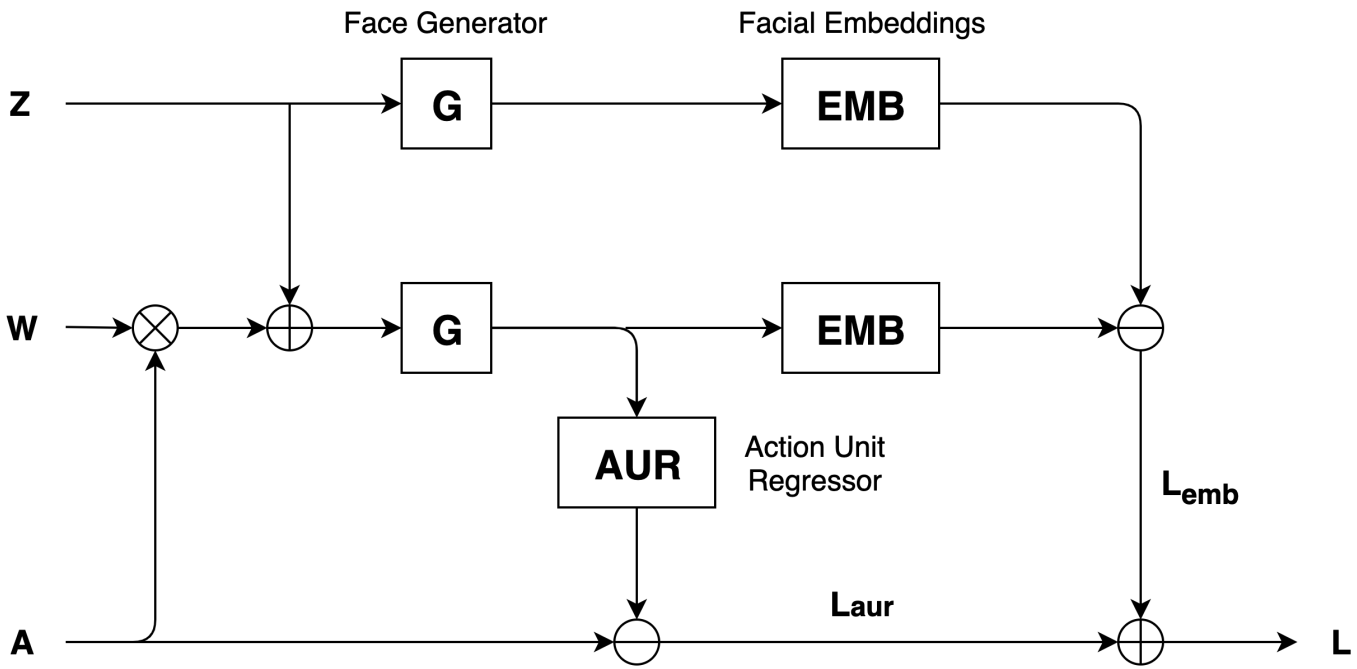
- HoloGAN : Learns 3D Representations
- GAN Steerability : Learns walks in Latent Space
- Can we edit the facial expressions with these concepts?!

GAN Steerability for Editing Facial Expression:

- GAN Steerability paper examines basic camera transformations like zooming, shifting and illumination
- Generated Images can be directly edited to achieve desired transformation while training ;
- Can we do the same in our case?!

Designing Loss Function for Editing Facial Expression.

- Actions Units - To Measure Intensity of Expression
- Facial Embedding - To Preserve Identity



Training & Experiments

- We implemented and trained the HoloGAN on CelebA dataset as per guidelines in original paper;
- We trained the Action Unit Regressor on EmotioNet dataset by fine-tuning the pre-trained ResNet architecture.
- We use pre-trained differential face embedding from CMU Openface;
- Finally, we learn different walks by minimizing our loss function for one action unit and combination of action units.;

Below are some experimental Results

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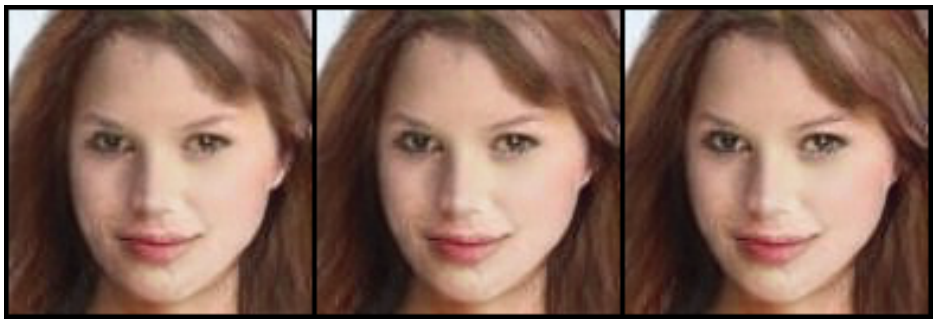

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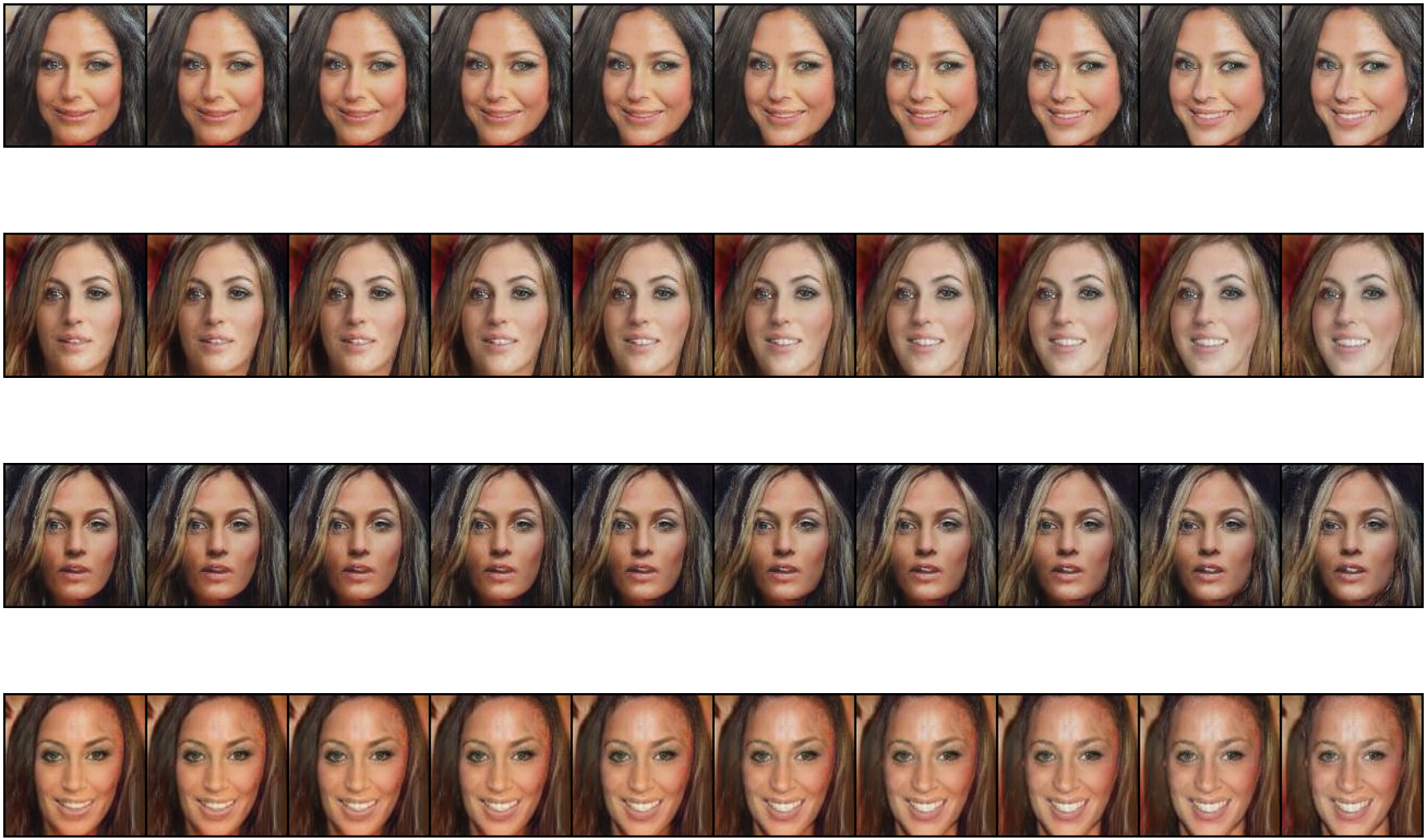

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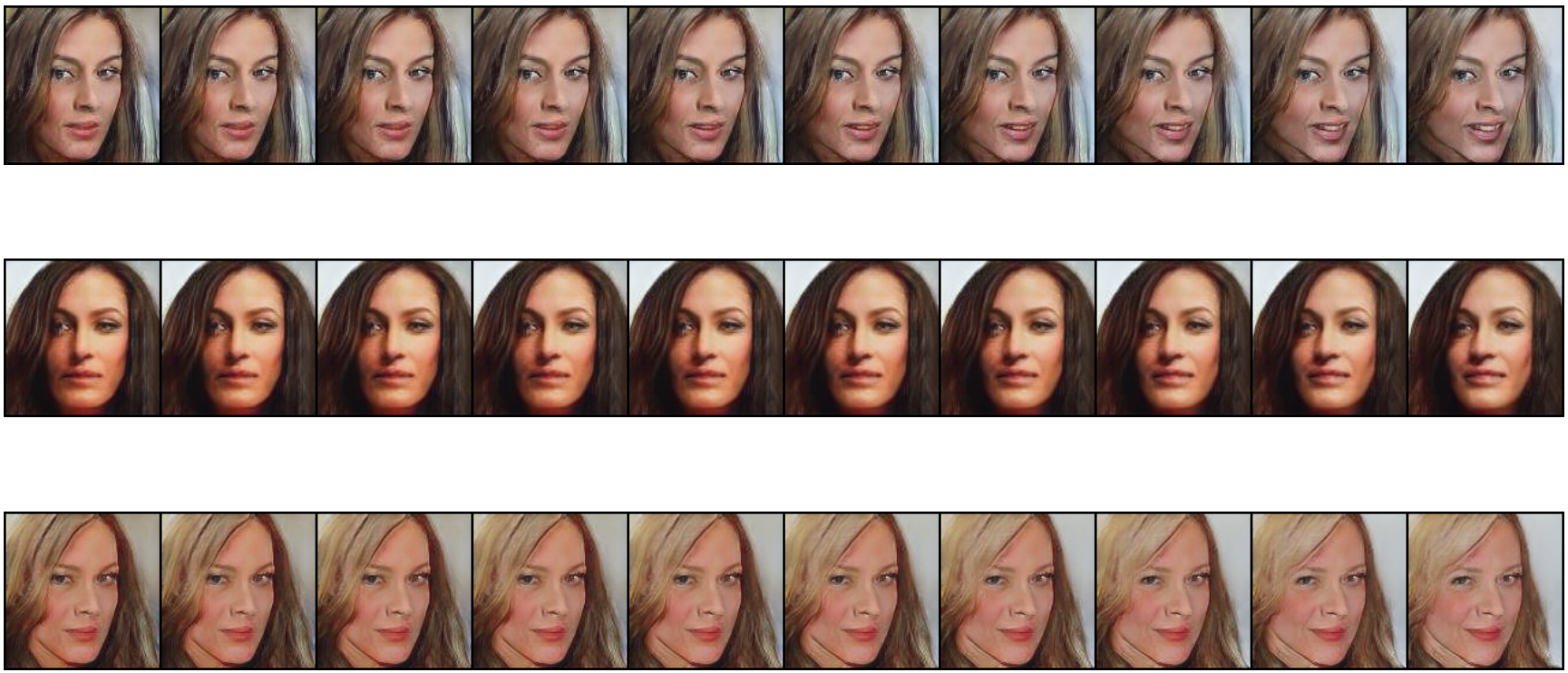

What are some things that one should take care while expression editing?

- Tune the weightage given to Embedding Loss and Action Unit Regression Loss.
- Training data should contain the wide variety of expressions, especially the desired ones.
- Tune Learning Rate wisely!
- Some combination of action units may or may not work depending upon the intensities of those action units in the training images.

Takeaways: More variety, More expressions!

- We design a generic method to edit facial expressions that can work with any type of GAN.
- The training data with wide variety of expressions can help to edit more facial expressions.
- Intensities out of 0 to 1 range can also give variations in expressions.

References

- HoloGAN Paper: https://arxiv.org/abs/1904.01326
- On GAN Steerability Paper: https://arxiv.org/abs/1907.07171
- https://github.com/thunguyenphuoc/HoloGAN
- http://mmlab.ie.cuhk.edu.hk/projects/CelebA.html

Thank You!

Q & A