

Queering StyleGAN, Queering AI

Systems Analysis from the Art Studio

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StyleGAN (+ ecosystem) is flexible enough to support drag queen makeovers out of the box

$\leq 2^\circ$ of separation to homophobic structures

Leverage points afford many paths for change

StyleGAN

- GAN architecture, based on style transfer
- Unsupervisedly learns to separate disentangled high-level attributes
 - 18 levels of increasingly fine features
 - 512 features/level
 - if trained on faces: pose, identity, eyes
- High-quality interpolation
- Highly accessible code (Github), training data (Flickr Faces High Quality), pre-trained model (1 week/8 Volta GPUs)
- Powers thispersondoesnotexist.com

Coarse features from 3 faces,
fine features from 5 other faces:



Flickr Faces High Quality

- 70000 faces from Flickr, permissive licenses, 1024×1024 RGB
- Images aligned and cropped with dlib
- Pruned with "various automatic filters" and then Mechanical Turk, to remove statues, paintings, photos of photos
- Acknowledges bias of photos
 - uploaded to Flickr, permissive licenses, dlib facial detection thinks it is a face
- "contains considerable variation in terms of age, ethnicity and image background"
- "good coverage of accessories such as eyeglasses, sunglasses, hats, etc."

Seven sample images from the dataset:



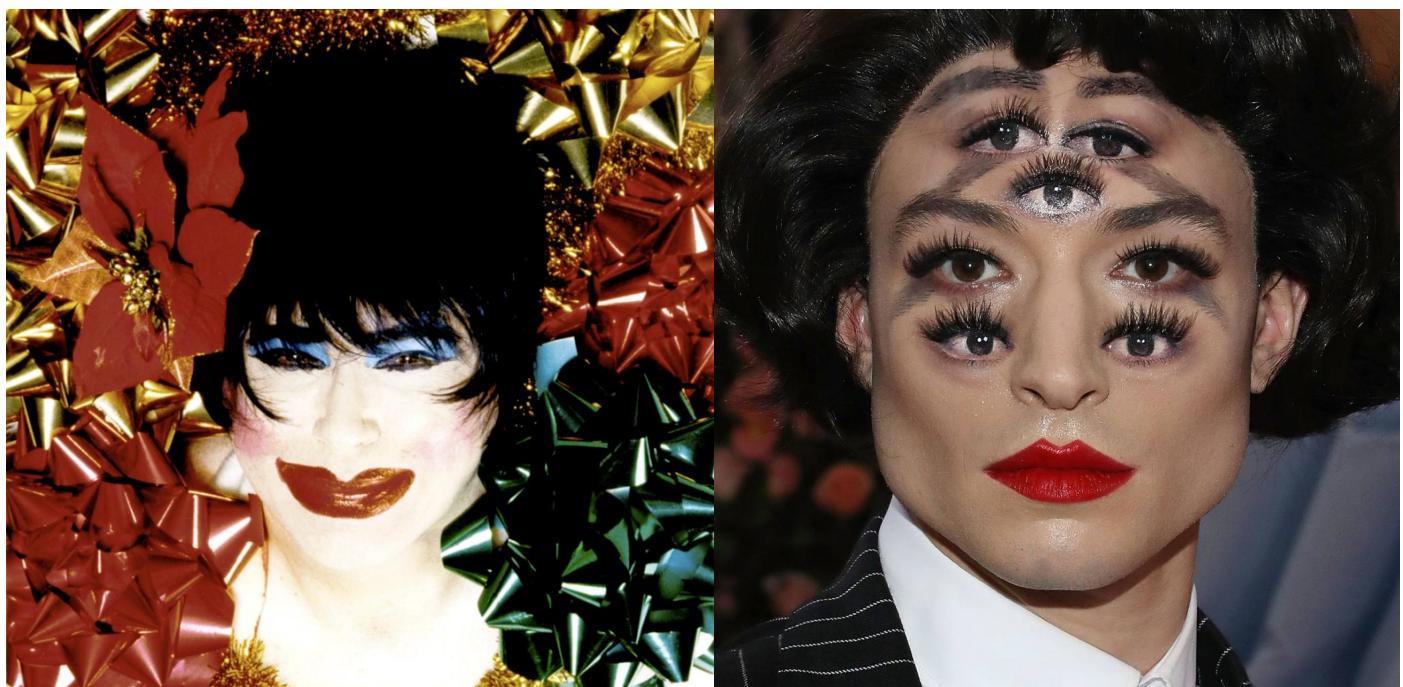
StyleGAN Encoder

- First encoder: github.com/Puzer/stylegan-encoder
 - future work: try others!
- Register/crop faces in input (with dlib)
- Encode reference image and intermediate generated images with pre-trained VGG16, into a high-level feature space
- Loss = difference in VGG16 feature space
- Stochastic Gradient Descent
- Start with all 18x512 features set to 0:
plausible average of 70k faces re: age, background focus/content, skin tone, facial expression, butch/femme presentation, lighting and paint (ambient diffuse, minimal paint; vs face 6 with green paint, underlighting, dark background), number of extra limbs (zero hands in frame):



Adversarial Gift Bows

- Queer culture includes people of many sizes and many levels of adornment
 - gritty ball culture of *Paris is Burning*
 - slick commercialism of *Drag Race*
- Face registration+cropping is inexact
 - excludes hair, outfits, even people
- Very camp & on-brand Dina Martina press photo: high production values, asymmetric lipstick, underexposed hair, overexposed décolletage, industrial-holiday-cheer gift bows, head-tinsel, dress-tinsel, horror vacui photo composition, large DoF: *does not register as having a face*. Ezra Miller's Met Gala 2019 seven-eyed-face: *registers*.



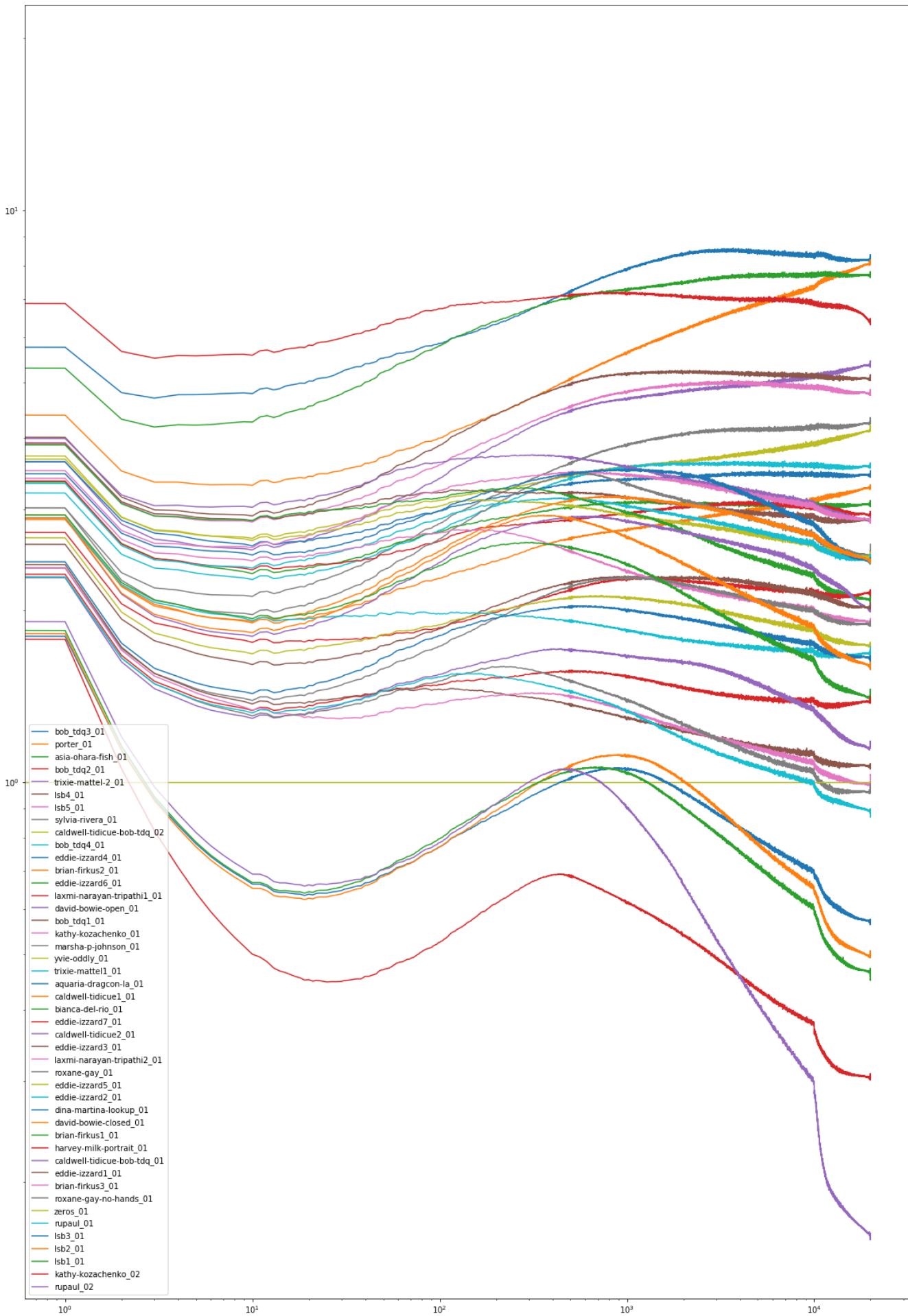
Dataset of queer faces

- For testing, training, calibrations, and more
- github.com/lsb/queer-faces (PRs welcome!)
- Encoded with 10k iterations, vs default 1k

aquaria-dragcon-la asia-ohara-fish bianca-del-rio bob_tdq1 bob_tdq2 bob_tdq3 bob_tdq4 / brian-firkus1 brian-firkus2 brian-firkus3 caldwell-tidicue1 caldwell-tidicue2 caldwell-tidicue-bob-tdq_01 caldwell-tidicue-bob-tdq_02 / david-bowie-closed david-bowie-open dinamartina-lookup eddie-izzard1 eddie-izzard2 eddie-izzard3 eddie-izzard4 / eddie-izzard5 eddie-izzard6 eddie-izzard7 harvey-milk-portrait kathy-kozachenko kathy-kozachenko laxmi-narayan-tripathi1 / laxmi-narayan-tripathi2 lsb1 lsb2 lsb3 lsb4 lsb5 marsha-p-johnson / porter roxane-gay roxane-gay-no-hands rupaul_01 rupaul_02 sylvia-rivera trixie-mattell / trixie-mattel-2 yvie-oddly zeros



$\Delta\text{loss}/\Delta t$, per 0-face loss:

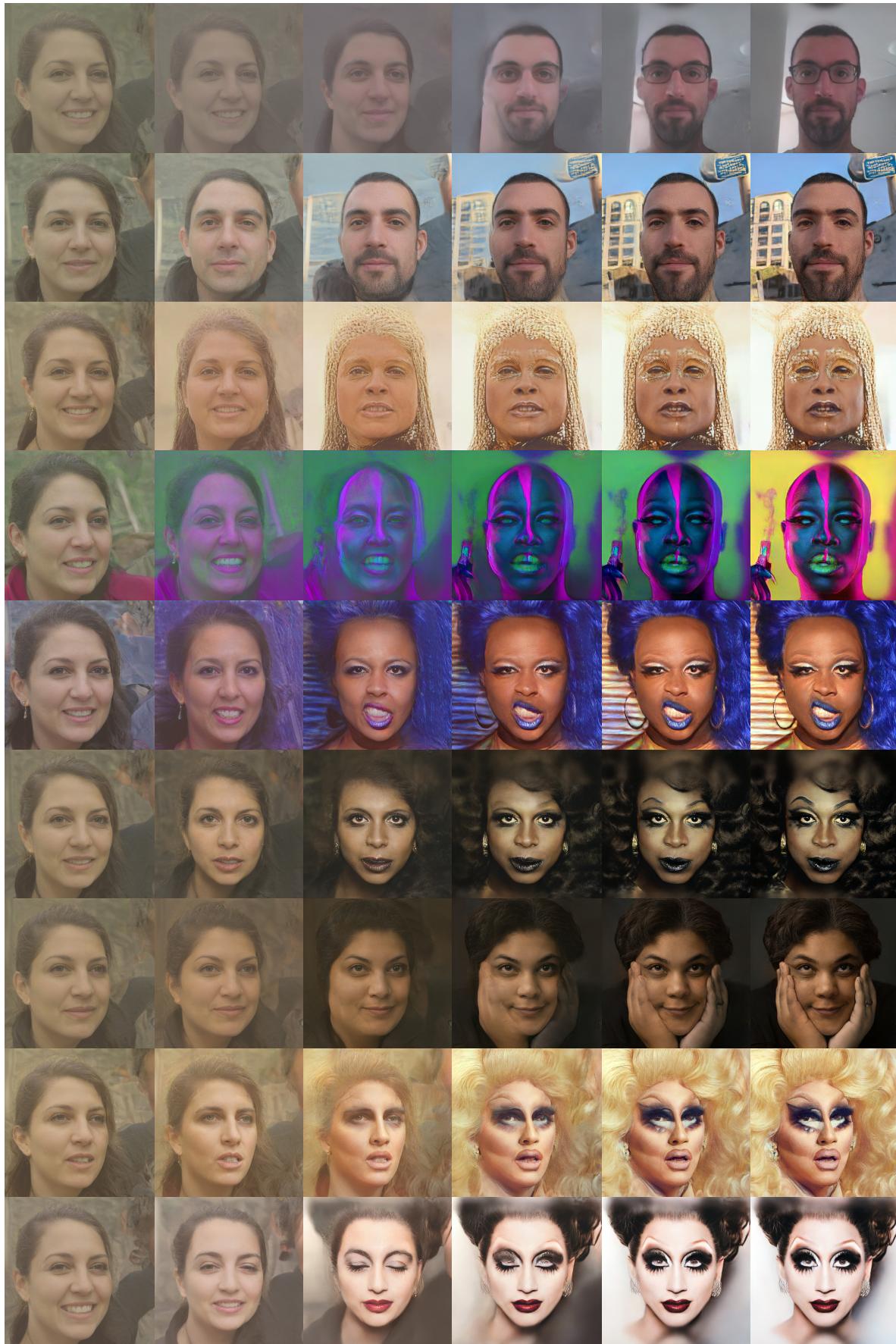


Encoding results

- $\Delta\text{loss} / \Delta t \propto$ conformity to training data
 - useful for self-assessment of genderqueer performance
 - or of gender-normative performance (misusable!)
- FLOPS, non-conformity: expensive
- Lowest 2 losses: false + face registrations
- *lsb1* meant to be more neutral than 2 or 3
- *lsb1, 4, 5* meant to be neutral
 - 4, 5: difficult background
- Tough to model Billy Porter's Sun God look, and Bob the Drag Queen's blue wig / hoop earrings / snarl
- Hands on a face can come from the background, and not any humanoid body part: see *roxane-gay_01*
- The smoking water pistol in *bob-tdq2_01* seems to take the place of an earring

Selected encodings

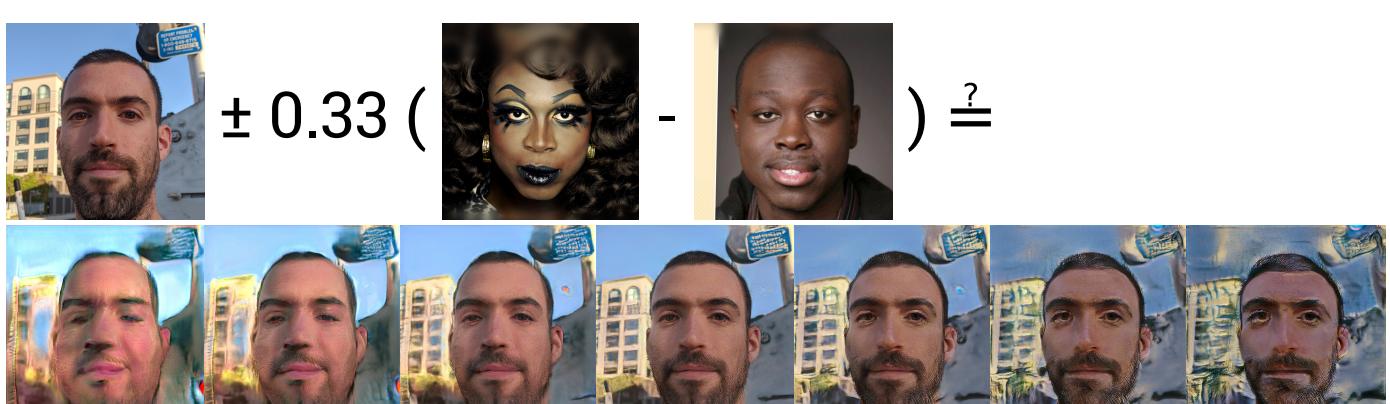
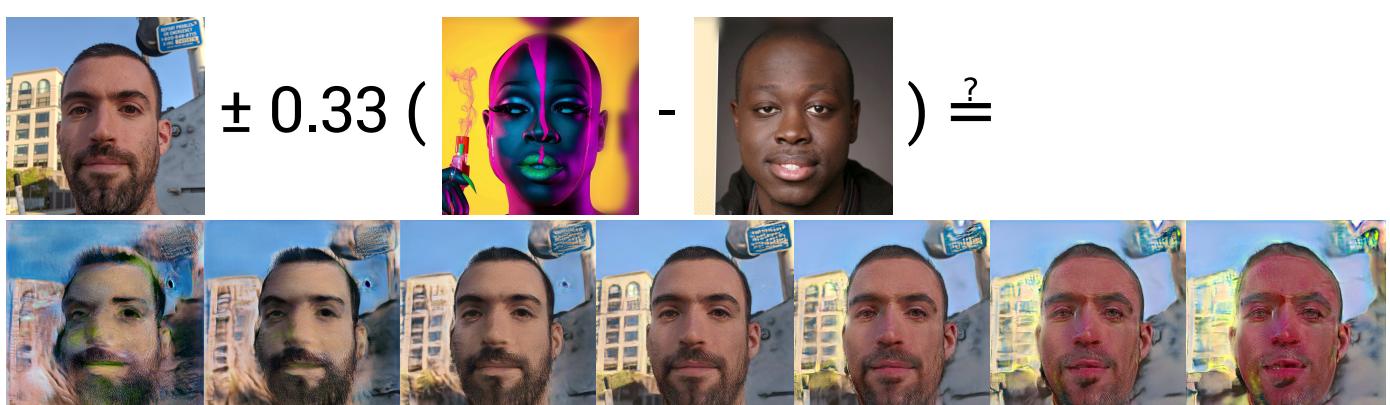
e -speedup shows morphing, source/dest:



Vector-space manipulations

- StyleGAN advertises high-quality interpolation: ✓
- Puzer/stylegan-encoder: 3 directions
 - "age" (youth)
 - "gender" (butchness)
 - "smile"
- Performer in drag / out of drag?
 - makeup tutorials are big business!
 - many drag queens teach, encourage this
- requires realistic encodings
- requires continuity through latent space
- +makeover direction implies -makeover!
 - negative direction less intuitive
- The first two Trixie makeovers lose the crisp lines, most of the jewelry, keep the yellow, red, brown palette (which inverts to a purple-green sci-fi chic: silvery spotlight and chartreuse accents, or C3PO-zinc-knockoff robot fantasy)
- The last two Bob makeovers are less obvious, less of an entire reworking of the face as with Trixie

\pm makeovers



Large-scale impact

- Significant effort (curating datasets, actually running the SGD, tweaking hyperparameters, renaming homophobically inaccurate `±gender.npy`, et cetera)
- ImageNet uses WordNet 3.0 synsets, and Wordnet is widely noticed to include racist, sexist, ableist, and homophobic slurs
- MBROLA has had only "male" or "female" voices for twenty years, as does Google Cloud TTS's 180 voices
 - California state id more gender-diverse!
- Increased rate of research in AI
 - homophobia whack-a-mole ineffective
 - analyze the field as a system

Caveat: municipalities in which people perform AI are not uniformly stable/supportive, radically opened borders are valuable and out-of-scope

Meadows' 12 Leverage Points

12. Constants, parameters (taxes/subsidies)

Tweak hyperparameters

11. Buffer sizes

Re-build StyleGAN facial models, stylegan-encoder notebooks with more inclusive training data

10. Structure of material stocks/flows

(transport network, pop age distribution)

Use diverse datasets, hire diverse ppl

9. Delay per rate of change

Run continuous integration benchmarks of queer testing data to assess inclusion

8. Slow - feedback loops

File PRs to add inclusion

7. Slow + feedback loops

File PRs to fix bugs and add features in inclusive projects, but not to the exclusion or abandonment of other projects

6. Structure of information flow

Raise awareness of issues of inclusion

Meadows' 12 Leverage Points

5. System rules (incentives, punishments)

Invite people with expertise in AI and queer issues into a workshop tied to a prestigious AI conference, amplify voices

4. Evolve/self-organize system structure

Establish a culture of open data, reproducible results, oversight

3. Goal of the system

Change the goal of AI to be more inclusive and ethical

2. Mindset/paradigm of the system

Repeatedly challenge anomalies/failures of foundational assumptions (*neural processing? with widespread use of human benchmarks? are humans the best yardstick?*)

1. Power to transcend paradigms

Teach people to code, lower cost of compute, help decentralize advancement of queer liberation

Current leverage points

11. github.com/lmb/stylegan-encoder
7. `trixie-mattel.npy`, `bob-tdq.npy`
6. (see earlier slides)
5. (shout out to the organizers of this event)
4. Embodied in StyleGAN's widely available dataset and prebuilt models and paper and code, and StyleGAN Encoder's inclusion of Jupyter notebook and scripts
3. Ethics pledges
1. Rise of AI courses, decrease of cost of compute, rise of Jupyter/Colab to expand availability of GPU-powered work environments

leebuterman.com/queering-ai

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