Feedback and Discussion:
OpenMFC 2021-2022 Evaluation

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OpenMFC 2020-2021
Video Deepfakes Detection Evaluation Dataset

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- External collaborators :
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Deepfakes Evaluation Dataset: Objective

- Benchmark dataset for evaluation
  - Lab algorithm evaluation vs. in-the-field evaluation (real-world application)
    - Avoid the potential pitfall
    - Reduce the systematic transition difficulties
    - Bridge the gap
  - Continuous year-to-year report

- Adapt to the dynamic evaluation updates:
  - emerging software and tools (GAN, Deepfakes, CGI, etc.)

OpenMFC Deepfakes Discussion Topics

1. Are there any public releasable Deepfaked data?

2. Are there any public releasable real face image/video datasets that you're aware of?

3. What Deepfakes tools/algorithm you know? Which one are you working on?

4. What is the key factors you can think for generating high quality Deepfaked videos?

5. What are the media forensic technologies for deepfake detection as you known?

6. What is the key factors do you think that can affect the media forensic detection technologies significantly?

7. What are the most common artifacts that Deepfake tool can leave behind?

8. What is the minimum amount of videos is expected for deepfake detection training/testing?

Available Deepfakes Tools

Name	Reference	Copyright	Initial Release	Input/output	Required Hardware
First Order Motion Model for Image Animation	arxiv.org/abs/2003.00196	CC BY-NC 4.0	Dec 2019	GIF-video+image/GIF-video	Nvidia GPU - CPU
DeepFaceLab	arxiv.org/abs/2005.05535	GPL-3.0	Jun 2018	Video + video/video	Nvidia GPU - CPU
FakeApp	malavida.com/en/soft-/fakeapp/	"free"	Jan 2018	Video + Video/Video	Nvidia GPU
Deepfakes Faceswap	faceswap.dev	GPL-3.0	Dec 2017	Video + Video – Image/Video	Rec: Nvidia GPU Min: CPU
Celeb-DF	arxiv.org/abs/1909.12962	Not available for public use	Sep 2019	Video + Video/Video	Nvidia GPU
Reface	Reface.app	reface.app/terms/	Feb 2020	Image + Choose a video/video	Android: 5.1 and up IOS: 13 or later
FaceApp	Faceapp.com	www.faceapp.com/terms-en.html	Feb 2017	Image + Image/Image	Android: 5.3 and up IOS: 13 or later

Available GAN Models (1) *

Name	Reference	Copyright	Initial Release	Input/Output	Required Hardware
StyleGan	github.com/NVlabs/stylegan	Nvidia Source Code License	Feb 2019	Image-Image/Image	12GB Nvidia GPU
StyleGan2	github.com/NVlabs/stylegan2	Nvidia Source Code License	Feb 2020	Image-Image/Image	12GB Nvidia GPU
StyleGan3	github.com/NVlabs/stylegan3	Nvidia Source Code License	Oct 2021	Image-Image/Image	12GB Nvidia GPU
Pix2Pix	arxiv.org/abs/1611.07004	github.com/phillipi/pix2pix/blob/master/LICENSE	2016	Image-Image/image Video-image/video	Nvidia GPU
SN-GAN	arxiv.org/abs/1802.05957	IT License	Feb 2018	Image-Image/Image	Nvidia GPU

Available GAN Models (2) *

Name	Reference	Copyright	Initial Release	Input/Output	Required Hardware
MMD-GAN	arxiv.org/abs/1705.08584	BSD-3-Clause	Jan 2018	Image-Image/Image	Nvidia GPU
Glow	arxiv.org/abs/1807.03039	MIT License	Jun 2018	Image-Image/Image	Nvidia GPU
ProGAN	arxiv.org/abs/1710.10196	Attribution-NonCommercial 4.0 International	Oct 2017	Image-Image/Image	Nvidia GPU
PixelCNN	arxiv.org/abs/1606.05328		Nov 2016	Image-Image/Image	Nvidia GPU

Available Datasets (1) *

Name	Reference	Copyright	Initial Release	Size	Description
FFHQ	github.com/NVlabs/ffhq-dataset	CC BY-NC-SA 4.0	Jun 2019	2.56 TB	Human face dataset with over 70,000 high-quality PNG images.
CelebA-HQ	github.com/tkarras/progressive_growing_of_gans	CC BY-NC 4.0	Oct 2017	89 GB	The CelebA-HQ dataset is a high-quality version of CelebA that consists of 30,000 human face images
LSUN	www.yf.io/p/lsun		Jun 2015	21.93 GB	Large-scale Scene Understanding Challenge dataset consists of 10 scene categories and 20 object categories.
ImageNet	image-net.org		2010	150 GB	This dataset spans 1000 object classes and contains 1,281,167 training images, 50,000 validation images and 100,000 test images
CityScapes	cityscapes-dataset.com	www.cityscapes-dataset.com/license/	2016	10.86 GB	large-scale dataset that contains a diverse set of stereo video sequences recorded in street scenes from 50 different cities, with high quality pixel-level annotations of 5 000 frames in addition to a larger set of 20 000 weakly annotated frames.

Available Datasets (2)*

Name	Reference	Copyright	Initial Release	Size	Description
COCO-stuff	github.com/nighttrome/cocostuff	COCO images: Flickr Terms of use COCO annotations: Creative Commons Attribution 4.0 License COCO-Stuff annotations & code: Creative Commons Attribution 4.0 License	Mar 2018	18 GB	COCO-Stuff augments all 164K images of the popular COCO dataset with pixel-level stuff annotations
ADK20k	sceneparsing.csail.mit.edu/	BSD 3-Clause License	2016	1.14 GB	Images of daily scenes.
AFHQ v2	github.com/clovaai/stargan-v2	Attribution-NonCommercial 4.0 International	2021	6.48 GB	High resolution images of animal faces
VGGFace2	github.com/ox-vgg/vgg_face2		2018	40.25 GB	dataset contains 3.31 million images of 9131 subjects, with an average of 362.6 images for each subject

FaceForensics++[1]

Deepfake video dataset containing 1,000 videos with sources and target ground truth

Videos created using:

- Face2Face and NeuralTextures for facial reenactment
- Deepfakes and FaceSwap for the face swap process

[1] https://arxiv.org/abs/1901.08971

DeepFake Detection Challenge Dataset[1]

Facebook's commissioned dataset containing over 100,000 videos with 3,426 subject, resulting in over 25 TB of raw data.

- Average of 14.4 videos per person with most videos being shot in 1080p
- Realistic and nonrealistic examples included to represent most possibilities
- Videos generated using different methods for more variation

Methods used:

- NeuralTalkingHeads
- DFAE model
- FaceSwap
- FSGAN
- StyleGAN
- Manual Retouching

Celeb-DF[1]

A Deepfake dataset with the goal of having higher quality examples of Deepfaked media, containing 5,369 examples of Deepfaked videos.

- 5,369 videos corresponding to over 2 million frames

- Sourced from publicly available Youtube videos of interviews with celebrities.

- Proven to be a more challenging dataset compared to FaceForensics++

- Higher resolution on the Deepfaked faces using encoder and decoders with more layers and increased dimensions

Deepfakes Tool Study

Media manipulation tools that are being tested or are planned to be tested:

DeepFaceLab
FaceApp (mobile application)
Reface (mobile application)
First Order Motion Model for Image Animation
Deepfakes FaceSwap
DeepSwap
FakeApp

DeepFaceLab[1]

DeepFaceLab is one of the first publicly available and Open Source Deepfake tools and ever since its release on Github on 2018, it has been seeing constant updates and tweaks to its code and algorithm.

- Available on MacOS, Windows, and Linux
- Relatively easy to use software for cropping, aligning, and swapping the faces automatically.
- The color correction is done manually by the user, can be done either by hand in a video editing software or using the provided tools.
- Input is two videos, one source and the other destination, with the output being one video.
- The first video created by a fresh model took about 16 hours to look natural

[1]https://github.com/iperov/DeepFaceLab, https://arxiv.org/abs/2005.05535

DeepFaceLab Example

- Video created on a model that is trained for about 24 hours, and took about 4 hours to get to this place.

Deepfake FaceSwap[1]

FaceSwap is also a publicly available and Open Source Deepfake tool with a relatively large community forum and number of tutorials.

- GUI application for ease of use
- The code can also be downloaded and used because of the Open Source nature of the project
- Input can be an image + video or video + video, with the image being source and video the destination.
- Everything is done automatically by the software, no manual retouching needed
- Needs the most amount of time out of all the other tools, with the recommended minimum time being 48 hours of training and the recommended time being one week of training

[1] https://www.faceswap.dev

Reface[1]

Similar to FaceApp, Reface is also a mobile application available on Android and IOS which allows for simple Deepfake videos with specific clips of movies or music videos.

- Available on both Android on IOS free of charge with watermark, and a subscription to remove the watermark
  - Input is only one picture
  - User can choose one of the specific clips available in the app for the faceswap
- Generates the results within minutes, if not seconds. The generated videos are usually fairly impressive

[1] https://reface.app/

Questions?

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Thank You!