AI and Machine learning in a VFX and Animation WorkFlows

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Use Cases for AI and machine learning

Facial swaps

Animation

Smart Rotoscoping

Facial recognition

3D motion tracking

rendering

Photogrammetry(3d mapping)

Material scan processing

Relighting and color grading

Army Generation(weta digital)

Physics sims(water fire smoke)

Asset touch up/removal

Automation and more

Introduction

Today we will discuss 2 specific workflows, the tools used and the ethics in the in the film industry.

Machine learning used in facial swaps

AI in Animation

Facial replacement

80 at the time of release in 2023
Deaged almost 60 years

2016

1977

Facial swaps and deep fakes

What is a deep fake?

-Using performance capture (raw footage) of a person and replacing them with your target actor

Reasons to do so?
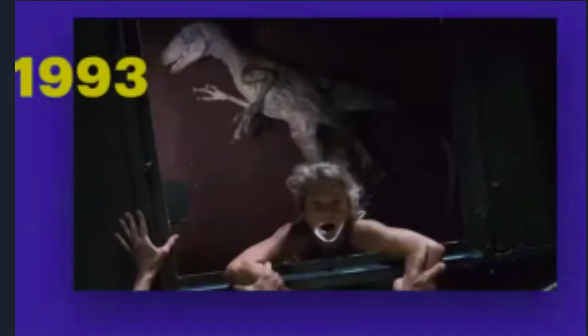
-to re/de-age an actor

-actor has passed

-stunt performer replacement

-protect identities

75 years old at the time of release

First face swap-ILM

How do they do this?

Released 2019 requiring 3 leads to be deaged by 30+ years

Step 1- capture video

Step 2- map and normalize the source face (performance capture)

Step 3 -generate mask by training a model between target face and source face

Step 4 - Map the target mask over the souce faces performance

The Irishman was the first movie to do de aging in camera without a performance capture rig on each actors body and tracking dots on their faces

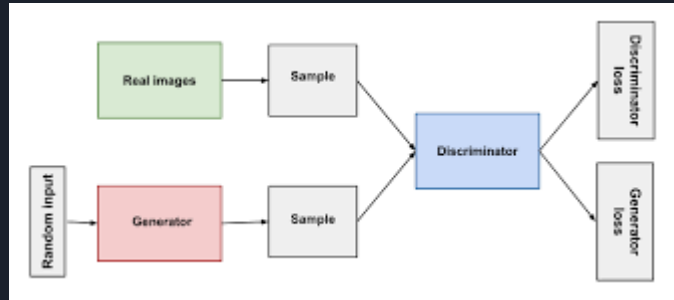Developed a special IR 3 camera rig to capture facial performance

Models to generate the mask

Most popular Generative adversarial networks (GANs) iterative give and take(unsupervised)

Encoder-Decoder method- extensive labeling required on both (unsupervised)

Geometry based methods-3d models- extensive hand animation (supervised)

Tools of the Industry

Weta Digital and Industrial Light and Magic are industry leaders

Unfortunately many tools are proprietary and hard to find

Autodesk Flame

Foundry's Nuke

Unity ArtEngine

Disney's FaceDirector

Massive (crowds)

Unreal Engine 5

Unity Weta tools

Tensorflow(models)

Maya

Houdini

And more

- Created using a series of drawings converted into images
- Colors represent material, AI interprets that into a realistic image
- Each frame was drawn and then cut together, automated through a script
- Time consuming and simplistic, requires human input for every element

- Primarily text inputs, with a variety of key frames
- Some editing to maintain consistency on the beat
- A series of photos spliced together to create video

- Midground of human work, relying primarily on AI generated images
- Human input consists of keyframes and maintaining consistency in art

- Created using a custom AI tool
- A variety of human inputs required, but much simpler than creating by hand
- Modern AI art and video combined, alongside human editing
- Process is secret, but probably a mix of photo and text prompts

AI and Actors

- Disney scans actors, often minor or background actors.
- Apple fills a stadium of people, using only 20 actors
    - Tiling isn't new, but many applications of AI are
- Quality is somewhat poor, but as scans and other techs get better so will quality
- Half of SAG-AFTRA have acted as background characters
- Scanning is difficult and time consuming

Reshooting actors - Without the actors

- From frustrations over Dubbing, Scott Mann created "Vubbing", a process to not only rewrite the actors lines, but also change their lips, making the change in dialogue, or language, more convincing.
- This can be used to not only dub out cussing, but also to change the language of a movie without any awkward lip-syncing issues.
- It can also, potentially, be used to change entire scenes, changing sponsors or other more important things.
- As to the drawbacks, these fakes can be used for a variety of misleading or harmful videos.

SAG-AFTRA's input

- If a digital replica of a background actor is used to portray a principal character, the background actor must be compensated for the days they would have worked in person (plus residuals).
- Additionally, the performer is owed residuals for their digital replica's screen time.
- If the employer wishes to use a performer's digital replica for a project beyond the production the actor was employed for, the employer must obtain separate consent from the performer and describe how the replica will be used in "reasonably specific" terms. That consent carries over after the performer's death "unless explicitly limited otherwise." The performer also would be compensated (including residuals) for material featuring their digital replica.
- The AI section addresses the use of "synthetic performers," or nonreplica digital people who appear on screen instead of human performers. According to the summary, the contract states that companies must notify and plead their case to the union before using a synthetic performer instead of a human performer. These protections do not apply to nonhuman characters.

- Actors must be paid if their duplicates would work more than they did, or if their duplicates have larger roles
- They must also be paid for any screen-time the duplicates have
- Any usage of the actor's likeness, outside of their original contract, must be explained to the actor, and have full consent. This extends beyond death, unless otherwise stated.
- If a film would use replicas, rather than humans, they must explain why they made that choice. Non-human's can be created as they wish.

Conclusion

AI and ML have many use cases in the film industry

AI and ML heavily used where automation is capable.

Studios are fighting against both artists and performers rights to protect their work.

Sources

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