

# An Introduction to Deepfake

**Course Title:** Artificial Intelligence (20 14 227)

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September 2020

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## Outline

- Meet Alexander Amini at MIT 6.S191
- What is Deepfake?
- History
- Working Principles
- Getting Started: Notable Tools



MIT 6.S191

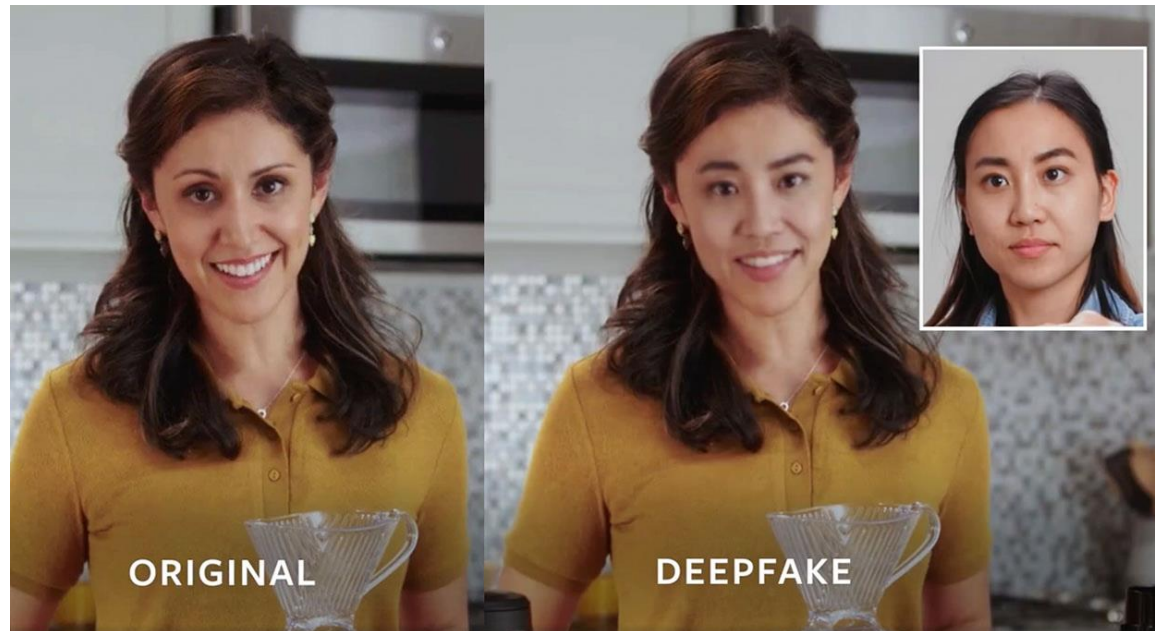
This video is a part of introduction to deep learning course at Massachusetts Institute of Technology (MIT 6.S191), presented by Alexander Amini.  
It has been used here for educational purposes provided to the students of University of Sistan and Baluchestan, Iran.



# What is Deepfake?

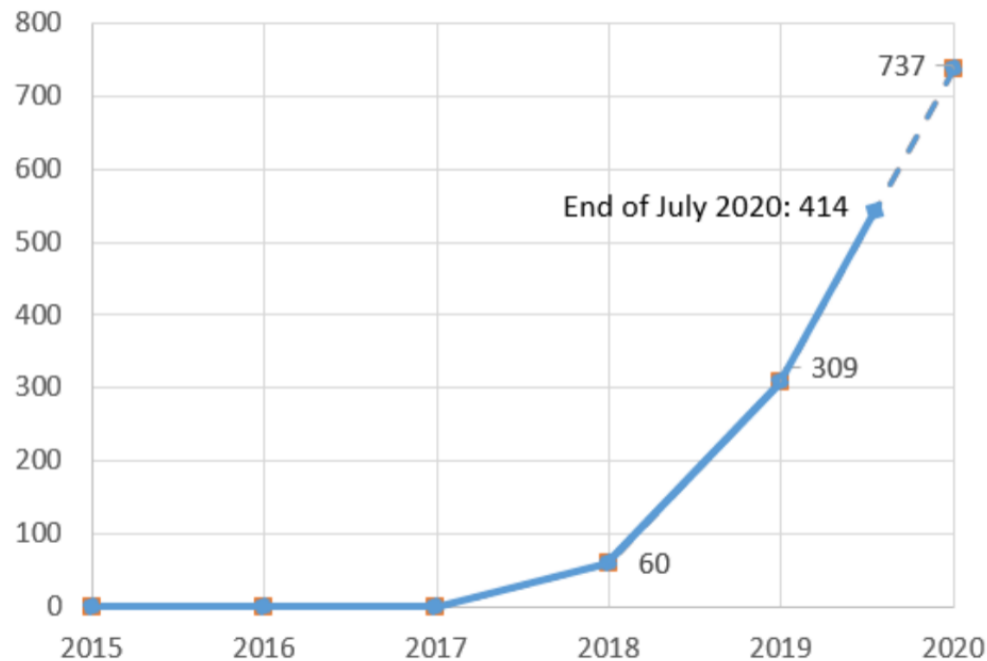
- Stemming from “deep learning” and “fake” (Merriam-Webster)
- Some type of media: Synthetic
- Replacing face of a person with another face in an existing media
- Audios can be deepfaked too

**Fig. 1.** A picture showing the use of deepfake in changing a woman’s face





- Everything started with an inappropriate video on Reddit in 2017



**Fig. 2.** Number of papers related to deepfakes in years from 2015 to 2020



## Most Known Implementation: The age of de-aging

- Robert De Niro and Al Pacino de-aged in Martin Scorsese's "The Irishman" using deepfake.



- The main workflow of making a deepfake media consist of three different phases:

**01****Extraction**

Extracting faces from each frame of both videos and creating data for system training.

**02****Training**

The process of teaching the system to recreate new faces.

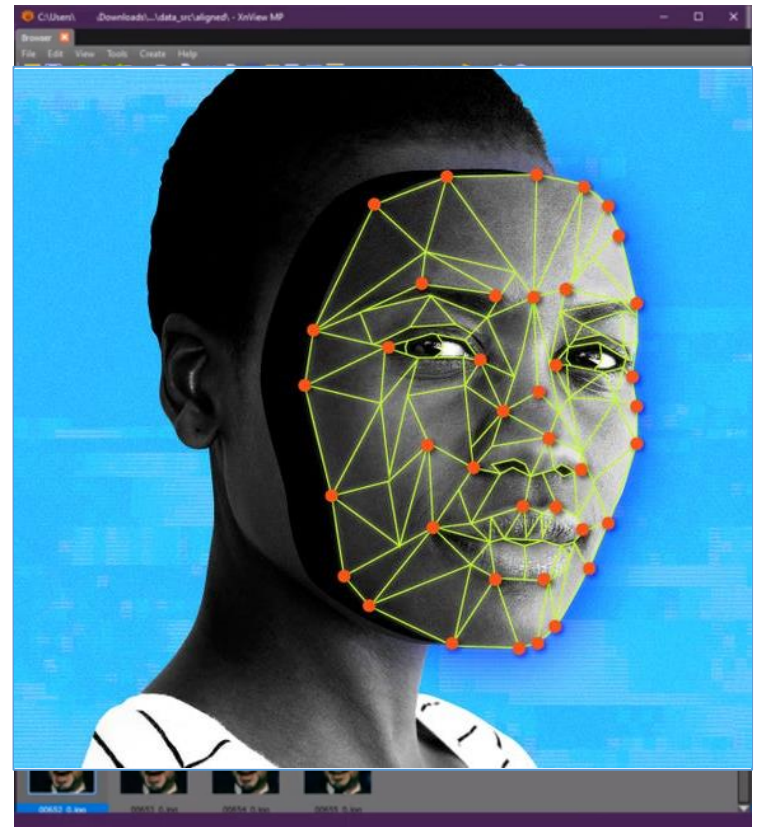
**03****Convert**

Replacing the faces with the masks generated in first step.



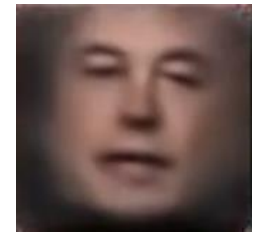
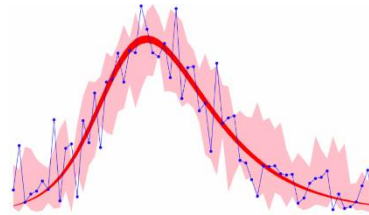
# Phase 1: Extraction

- Extraction performs by the following actions:
  1. Detection
  2. Alignment
  3. Mask generation





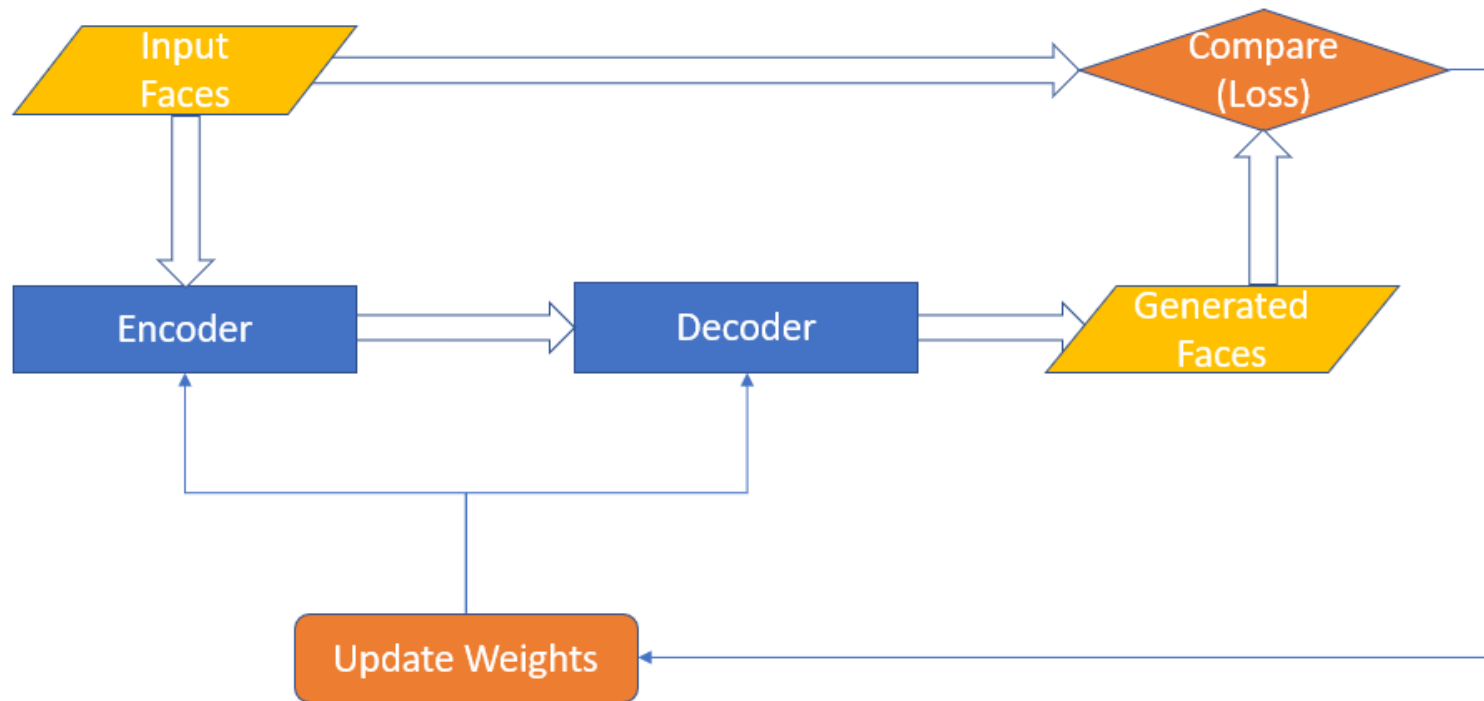
- In this phase the machine starts to find the best algorithm for face reconstruction.





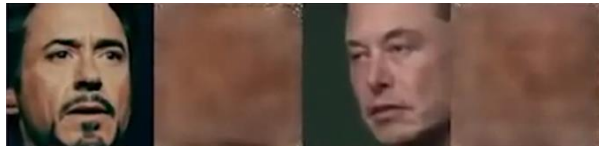
## Phase 2: Training (cont.)

- How the machine knows the algorithm works well?





# Phase 2: Training (cont.)



```
[s]:save [b]:backup [enter]:exit  
[p]:update [space]:next preview [l]:change history range  
Preview: "Quick96" [1/2]  
  
Iter: 1
```



```
[s]:save [b]:backup [enter]:exit  
[p]:update [space]:next preview [l]:change history range  
Preview: "Quick96" [1/2]  
  
Iter: 232
```



```
[s]:save [b]:backup [enter]:exit  
[p]:update [space]:next preview [l]:change history range  
Preview: "Quick96" [1/2]  
  
Iter: 945
```



```
[s]:save [b]:backup [enter]:exit  
[p]:update [space]:next preview [l]:change history range  
Preview: "Quick96" [1/2]  
  
Iter: 97159
```



## Phase 3: Convert

- Machine uses the model to generate faces to overlay destination video frames.
- You can modify picture settings like contrast and blur for a better result.
- Now merge the new frames and export the destination video.

Scan the QR-Code for desired tool to start making your first deepfake video!

### 1. DeepFaceLab 2.0

Available on GitHub

No need of installation, works only with Windows



<https://www.youtube.com/watch?v=ISM-9RBk3HQ>

### 2. Faceswap

Free software

Runs on Windows, Mac OS, and Linux



<https://faceswap.dev/>



# References

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- [2] From Zero to Deepfake. (2020). Retrieved 27 September 2020, from <https://medium.com/@jsoverson/from-zero-to-deepfake-310551e59aa3>
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*Any Question?!*





*Thanks for your kind attention!*

