

Week 2: Summer Internship

31 May 2021- 6 June 2021

Tasks

The main task in this week for extensive reading of research papers to get insights about the techniques.

Another task was to collect datasets for testing the search engines. The engines are provided with deep fake image and it is evaluated on 2 conditions:

- Detection of deep fakes
- Extraction of original image from the deep fake image.

Paper-1

Link: <http://www.ws.binghamton.edu/fridrich/Research/copymove.pdf>

Using some image processing tools, specific areas are detected and other noise is blacked out. Then comparisons are made to detect the forgery/find the original.

Talks about block matching algorithm that compares images in chunks and not as a whole.

Paper-2

Link:

https://www.researchgate.net/publication/264276516_Detection_of_Clones_in_Digital_Images

This paper discusses detection of cloning. Compare small blocks from the image and then compare those blocks in separate threads to get the output.

There were other methods like DCT and PCA that calculated the gray factor of each block to compare the blocks.

Paper-3

Link: <https://ieeexplore.ieee.org/document/8782292>

This paper discusses the efficient methods to detect cloning of an image. It talked about doing this in 3 ways which are as follows:

- Take the image and convert it to grayscale.
- Divide into disjoint blocks and extract the main features.
- Do the matching process (comparison) and detect the duplicates.

Retrieving original from deep fake-1



Tested at:
<https://images.google.com/>



Image size:
167 × 144

No other sizes of this image found.

Possible related search: **suit separate**

<https://www.menswearhouse.com> › Suits › Suit Separates

Suit Separates - Men's Suit Separate Combinations | Men's ...

Shop for men's suit separates including dress slacks, vests & tuxedos. See the latest **suit separate** combinations in the latest styles from Men's Wearhouse.

<https://www.amazon.in> › Dockers-Mens-Suit-Separate-P...

Buy Dockers Men's Suit Separate Pant, Grey Sharkskin, 40x32 ...

Buy Dockers Men's **Suit Separate** Pant, Grey Sharkskin, 40x32 from Casual Trousers at Amazon.in. 30 days free exchange or return.



Visually similar images



Getting original from deep fake image

In the previous image, the most part of the image was taken by the face only that resulted in different results in different search engines (google and pimeyes).

So, I took an image where the face did not take much area and other features of the image (which are crucial for cloning/deep fake detection) get more area.

The results were much better in that case verifying the algorithm described in the research papers.

Retrieving original from deep fake-2



Tested at:
<https://images.google.com/>

Google

Photo...929087.jpg x virat kohli

Pages that include matching images

<https://twitter.com/imvkohli/status...>

Virat Kohli on Twitter: "Quarantine diaries. Un-ironed T-shirt ...

1200 × 900 · 16-Nov-2020 — **Virat Kohli Fans™** @vk_devotee 16 Nov 2020. More.
Copy link to Tweet; Embed Tweet. Replying to @imVkohli. ❤️ 2 replies 0 retweets
7 ...

<https://www.indiatvnews.com/Sports/Cricket...>

'Quarantine diaries': Virat Kohli shares picture from Australia ...

715 × 402 · 17-Nov-2020 — **Virat Kohli** took to Twitter to post a picture of him in quarantine as the Indian cricketers prepare for the upcoming series against Australia.

<https://www.filmfare.com/news/bollywood/throwb...>

Throwback: Virat Kohli is stunned that Katrina Kaif spoke to ...

600 × 450 · 14-Apr-2021 — Indian skipper **Virat Kohli** and actor and producer Anushka Sharma are one of India's most-loved and followed couples. The celebrity couple ...

<https://www.dnaindia.com/Sports/Cricket...>

THIS is how Virat Kohli is spending his quarantine in Australia

640 × 360 · 17-Nov-2020 — The decision of **Virat Kohli** to leave the Australian series has drawn mixed reactions from Indian and foreign audiences. **Virat Kohli's** presence for ...

<https://zeenews.india.com/Cricket...>

Retrieving original from deep fake-3



Tested at:
<https://images.google.com/>

Google

Photo...929376.jpg X effort to level the playing field barron trump will X

<https://www.ndtv.com> > World

Donald Trump Changes Campaign Logo After Being Mocked ...

360 × 222 · 17-Jul-2016 — The campaign of US Republican Presidential nominee Donald Trump unveiled a new logo on Saturday, a day after an original logo was ...

<https://imgflip.com> > ...

It seems Biden is afraid of a real debate. - Imgflip

500 × 955 — It seems Biden is afraid of a real **debate**. | BIDEN WON'T DEBATE. share. 49,236 views · 42 upvotes · Made by Perspicacity 12 months ago in politics · Joe Biden ...

<https://www.ndtv.com> > World

Saddam Hussein Killed Terrorists 'So Good': Donald Trump ...

360 × 222 · 07-Jul-2016 — Donald Trump, who frequently criticizes US foreign policy under President Barack Obama and former Secretary of State Hillary Clinton, ...

<https://www.ndtv.com> > World

Donald Trump's Plans Could Cripple Economy, Says New ...

360 × 222 · 13-Jul-2016 — An analysis by the New York City Council finds that Donald Trump's lightning-rod proposals to deport illegal immigrants and temporarily ban ...

<https://www.ndtv.com> > World

Donald Trump Promises To Herald US Economic Resurgence

360 × 222 · 29-Jun-2016 — Criticising the current US trade policies that has wiped

Getting original from deep fake image

After output of certain search engines on deep fakes, we could see original images as output.

This becomes another parallel work of analysing original image retrieval from deep fakes.

Features apart from faces play vital role in such cases. This is partly because faces are swapped and thus that region has a lot of “noise”. Apart from it, during comparison of blocks of images other than the face, that would match with the image on the bottom.

Certain search engines that are not meant for detecting deep fakes were able to give output of original image especially if it was from **some famous event**.

Kaggle deep fake result -1



Tested at:
<https://images.google.com/>

A screenshot of a Google Images search for the term "lady". The search bar at the top shows "lady" and a thumbnail of "image2.jpeg". Below the search bar, the results are displayed on a dark background. The first result is a small thumbnail of a woman's face, with the text "Image size: 1024 x 1024" and "No other sizes of this image found." below it. To the right of the thumbnail, the word "Lady" is displayed in a large font, followed by a small icon of a person. Below this, a definition of the word "lady" is provided: "The word lady is a term of respect for a girl or woman, the equivalent of gentleman. Once used to describe only women of a high social class or status, the female equivalent of lord, now it may refer to any adult woman. Informal use of this word is sometimes euphemistic or, in American slang, condescending. Wikipedia". Below the definition, there is a section titled "People also search for" with four icons labeled "Knight", "Gentleman", "Viscount", and "Goddess". At the bottom of the page, there is a section titled "Visually similar images" showing a grid of 16 small images of various women's faces. The search results also include a link to a YouTube video titled "Lady - Kenny Rogers - YouTube" with a description: "11-Jan-2008 — lady kenny rogers If you enjoyed my channel and decide to tip in crypto. I thank you for your support. Bitcoin wallet: ...".

Kaggle deep fake result -2



Tested at:
<https://images.google.com/>

The screenshot shows a Google Images search interface. At the top, the Google logo is on the left, and search filters (All, Images, Maps, Shopping, More) and settings (Settings, Tools) are on the right. The search bar contains the text 'boy'. Below the search bar, it says 'About 2 results (0.66 seconds)'. The first result is a small thumbnail of a young boy, with 'image size: 1024 x 1024' and 'No other sizes of this image found.' below it. To the right of the thumbnail is a definition box for 'Boy' with a small image of a boy and text: 'A boy is a young male human. The term is usually used for a child or an adolescent. When a male human reaches adulthood, he is described as a man. Wikipedia'. Below the first result, there are two links to YouTube videos: 'Charlie Puth - BOY [Official Audio] - YouTube' and 'TREASURE - 'BOY' MV - YouTube'. At the bottom, there is a section titled 'Visually similar images' showing a grid of 12 small images of various young boys.

Getting original from kaggle deep fakes

The search results of deep fakes of kaggle were not giving original images as output.

They were giving general output as searches corresponding to “boy”, “lady” etc.

Possible reason could be that the large part of image was taken by faces and no other feature to compare with, unlike the example of Virat Kohli's image.

Facts on profile cloning (non technical)

- Facebook alone removed over **580 million profiles** in the first quarter of 2018 alone while Twitter removed **70 million accounts** from May to June of 2018.
- **Profile photo and location** are the most important information that is checked by any user for checking the originality of any profile.
- The main problem with deep fakes is that it can preserve the pose, facial expressions and lighting of the photographs.
- They also **reduce the quality** a bit to make some of the current deep fake detection algorithms give false negatives.

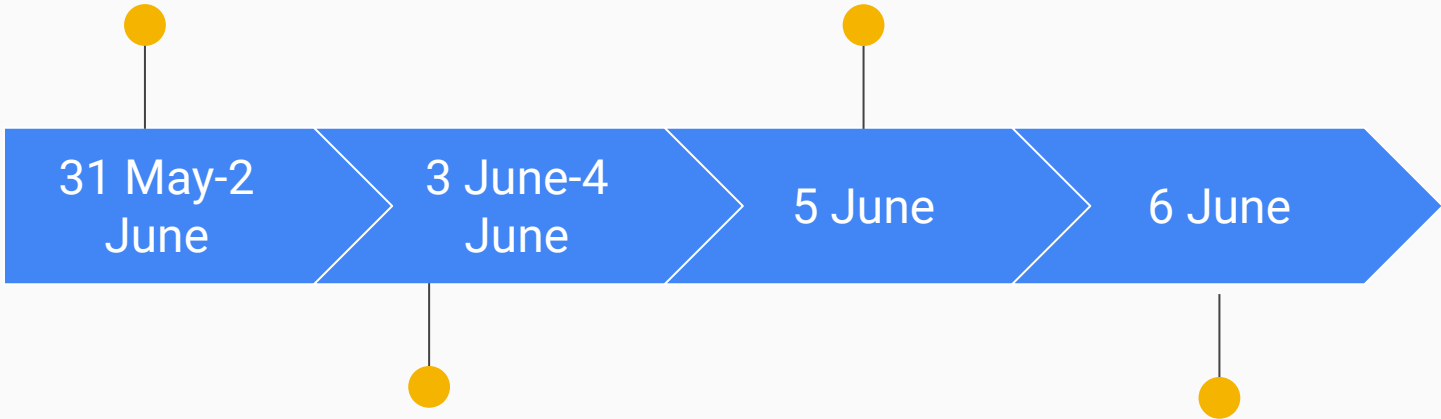
Datasets

Dataset 1: http://www.diid.unipa.it/cvip/?page_id=48

Dataset 2: <https://www.kaggle.com/tunguz/1-million-fake-faces>

Reading research
papers

Testing the search
engine against various
inputs.



Collecting data sets
and more reading
(post meeting)

Report + summarizing