

Developing the model.

(1) If i have to reduce the recall value and execution time of my sleep fake image detection i have to focus more on the preprocessing techniques the prioritise on the high frequency features, on region specific analysis and at last selective processing of potential tampering areas.

Potential uses of the techniques that can help the achievement of the reduction in the recall value and execution time -

(1) Discrete Wavelet Transform (DWT) for frequency Analysis :-

- DWT is known to focus on high-frequency components for detecting anomalies.

It have two sub-bands High Low and High High. can be reduced the amount of data that needs to be processed.

(2) facial region segmentation and analysis:-

- Instead of processing whole face it focuses on segmenting specific facial regions such as the eyes, nose and mouth, to help in focusing on the most critical areas.

- Can reduce the processing time by limiting the area of interest, but still capturing the key features that are crucial for distinguishing.

(3.) Error level Analysis (ELA):-

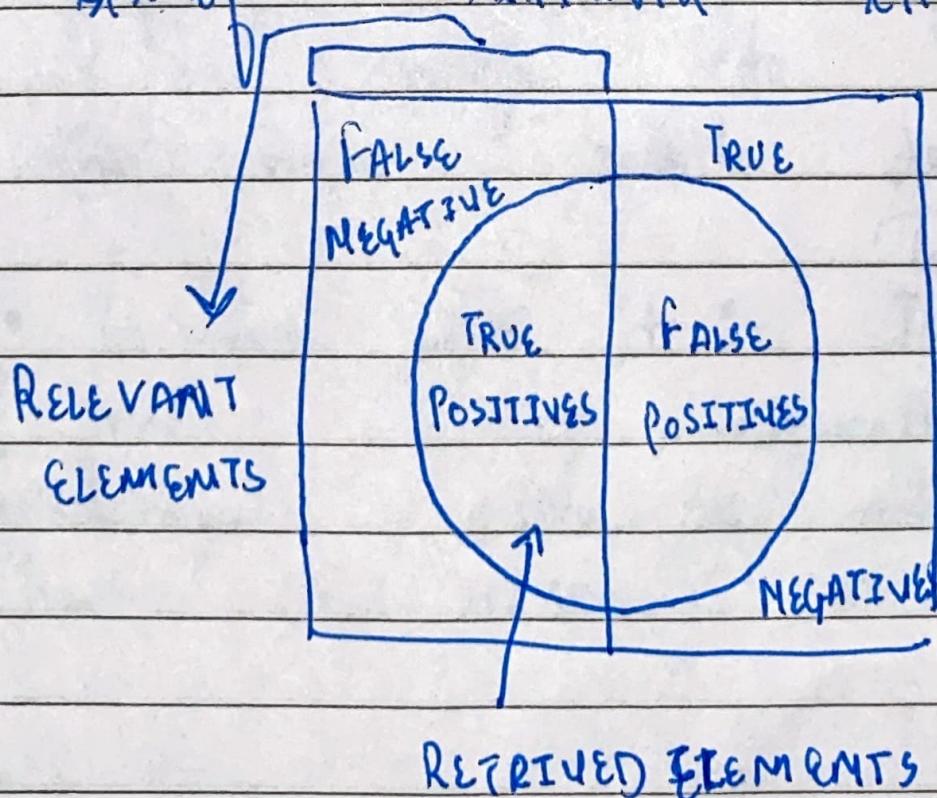
- ELA is used to detect compression artifacts in images to help in the indication of manipulation.
- ELA's application as a preprocessing step can filter out areas of the images that have higher probability of unaltered and focus on potentially manipulated areas.

* What is recall in machine learning.

→ Recall means when retrieving how many relevant items are retrieved.

which includes true positives and false negatives.

If we see it as a whole set of retrieved items :-



Recall is also named as sensitivity which further means the fraction of relevant retained elements by the all retained elements.

* WHAT KIND OF THING I CAN FURTHER WORK ON TO FURTHER IMPROVE THE RECALL VALUE.

1. Use of advance augmentation techniques.

→ What has been done up until now.

Basic augmentation like rotation, flipping or scaling might not be enough to find

the more subtle deepfakes/joiner.

To deal with it :- To introduce more advance augmentation techniques such as which i have to research on.

(2)

Techniques to enhance this
Artifacts.

* What has been done up until now +

Standard preprocessing techniques.

To deal with it \Rightarrow To improve the anomalies detection we

should introduce more advanced techniques in the preprocessing such as that i have to research on it more.

(3) feature Scaling and Normalizing.

* What have been done up until now +

Inconsistent scaling and too much standard normalization.

To deal with it \Rightarrow for all features

(Z-Score normalization)
(Min-Max Scaling)

We have to implement a consistent scaling that should be appropriate. which can lead the model to focus on subtle differences rather than being biased on the larger values.

4. Multi Level analysis.

→ what have been done up until now.

Standard preprocessing might not be able to capture the "dopfake" artifacts or features that occurs at different resolutions.

- To deal with it → Can try training the model on images of different resolutions, to capture each and every feature.

(Morphological Transformations)

(5.) Combining Different Processing steps.

→ What has been done up until now. →

Most of the researchers used one of a few processing steps in this pipeline.

To deal with it → We can try combining multiple pre-processing steps in the pipeline such as what we have talked upon earlier.

(6.) Imbalanced datasets:-

↑ This problem ←

Imbalanced dataset can negatively affect recall by favouring the majority data over the minority.

(SMOTE)

(Adaptive Resampling)

- To deal with it →

Apply various techniques to balance the dataset.

(7.) Synthetic data augmentation

- The problem ←

Examples of real-world
deep fake images might
not be fully representative.

- To deal with it →

We can try augmentation on
the training data to generate
synthetic data.