RESULTS

Input:

The input images are selected from CASIA v2.0 (CASIA2) dataset. The dataset contains 12617 images out of which 7492 images are authentic images and 5125 images are forged images. The dataset also contains ground truth for all the forged images.

Fig 1: Authentic image of a zebra

Fig 2: Copy move forgery of Fig1

Fig 3: Authentic image

Fig 4: Spliced forgery of Fig3

JPEG Compression:

Compression can accentuate the differences in error levels between the manipulated and unaltered areas of an image. When an image is compressed, the error levels in the compressed

regions increase, while the unaltered areas remain relatively unchanged. This contrast in error levels can make it easier to identify potential manipulations. They also help to reduce noise. The images are compressed to 90% of the original image.

Fig 5: Compressed image of Fig 1

Fig 6: Compressed image of Fig 2

Fig 7: Compressed image of Fig 3

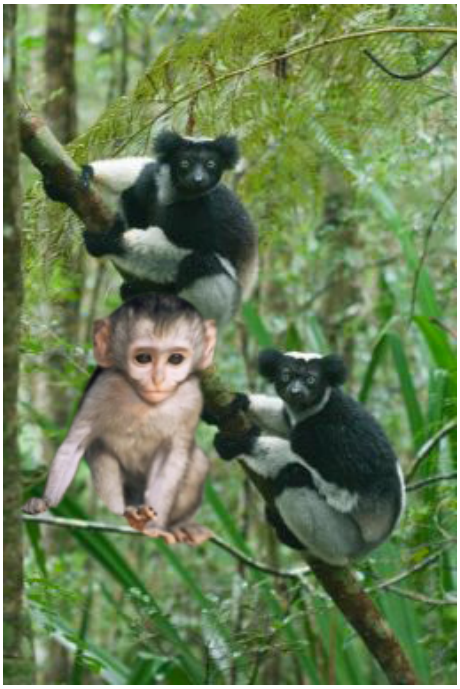

Fig 8: Compressed image of Fig 4

Error Level Analysis (ELA):

Error Level Analysis is a forensic image analysis technique used to identify digital image manipulations. It works by examining the variations in the error levels within an image after it has been compressed and the original image The idea behind ELA is that when an image is modified or manipulated, the error levels in the altered areas are expected to be different from the surrounding unaltered regions. ELA is applied to the images and they are enhanced and sharpened to help in better visualization of errors.

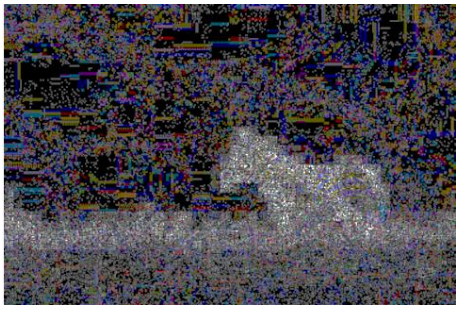

Fig 9: ELA between Fig 1 and Fig 5

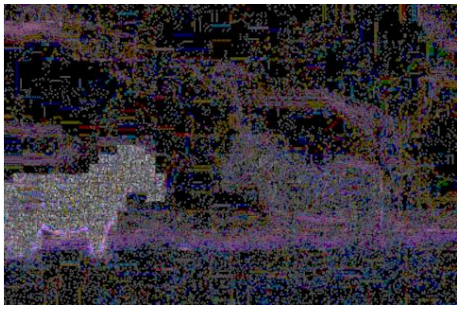

Fig 10: ELA between Fig 2 and Fig 6

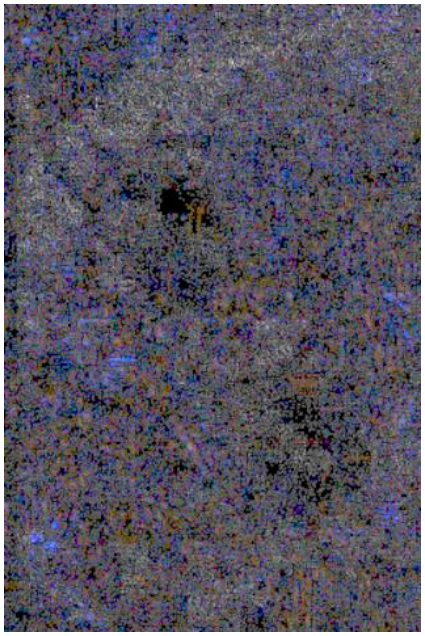

Fig 11: ELA between Fig 3 and Fig 6

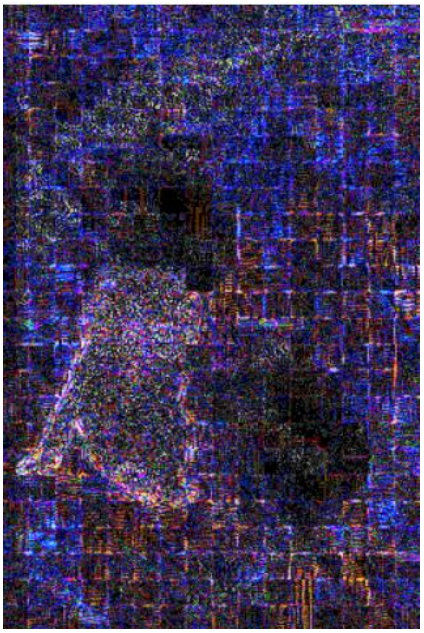

Fig 12: ELA between Fig 4 and Fig 7

CNN model applied to features extracted from ELA:

CNNs are highly effective in tasks like image classification. CNN (Convolutional Neural Network) can be employed to learn the patterns and features indicative of image manipulations. The CNN model is designed with multiple layers and using ReLu activation function. The CNN model is trained using a large dataset containing both authentic and forged images. The model is run for 15 epochs.

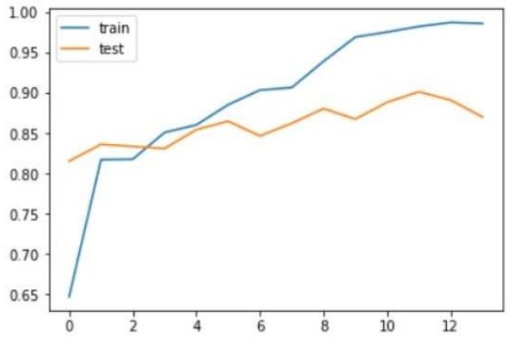

Fig 13: Variation in loss

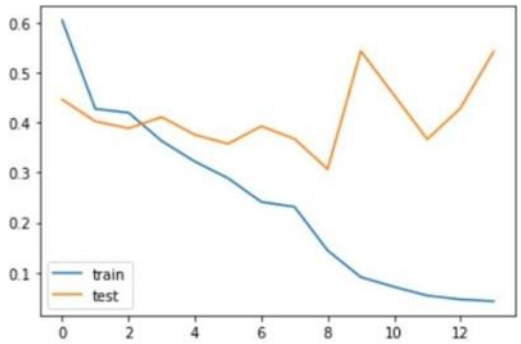

Fig 14: Variation in accuracy

Trained CNN model is used to detect forgery:

The ELA image obtained is resized to 128*128 pixels. The image is flattened and normalized by dividing the values with 255. It is they reshaped into 128*128*3 RGB image and passed into the CNN model. The CNN model gives a list of 2 values. If the first value is grater than the second value, the image is not forged. Else it is considered as forged image.

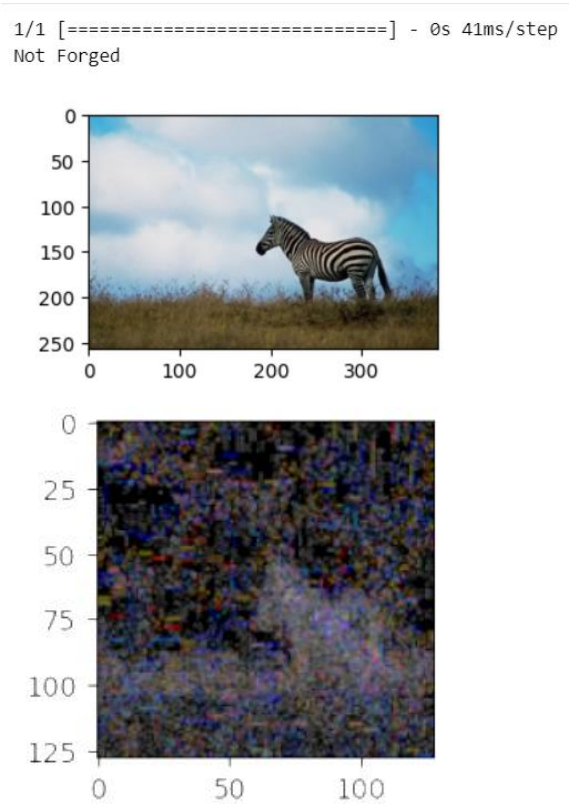

Fig 15: Output for Fig 1

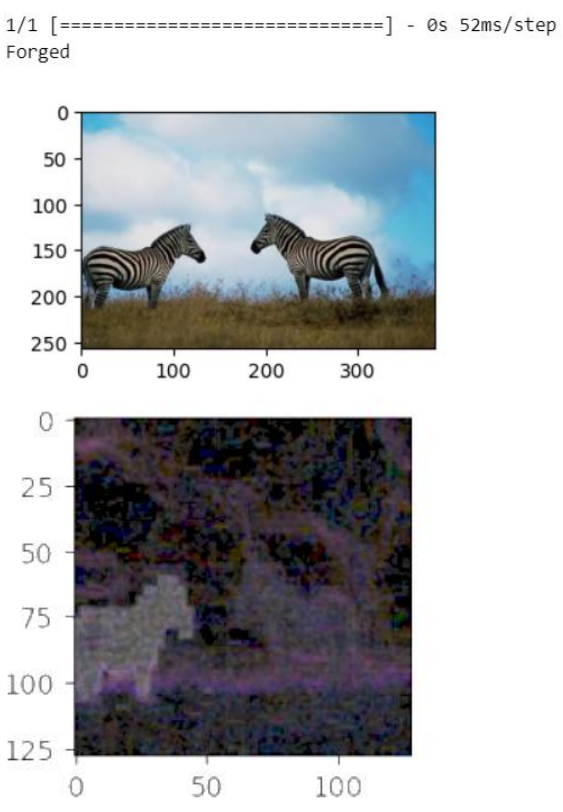

Fig 16: Output for Fig 2

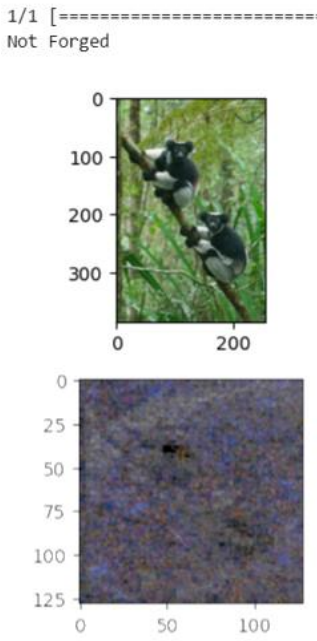

Fig 17: Output for Fig 3

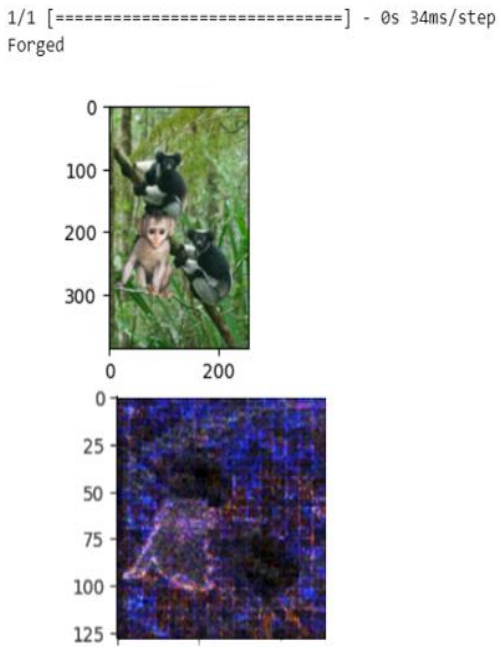

Fig 18: Output for Fig 4