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Document Forgery Detection for Admission Process using CNN Algorithm

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Abstract: ***The recent advancement in technology in the usage of image processing tools and applications has led to increased criminal activities in fraudulent and forging documents and digitally manipulating them. The use of tools like Adobe Photoshop, GNU Gimp to create manipulated fraud documents is a major concern for the government in this digital era. It is extremely crucial to detect image forgery and manipulation done by computer in these documents. This proposed system focusses on the use of image processing techniques and algorithms along with machine learning to detect the forgery and image manipulation done in a admission document which is used for admission in most states.***
A Convolutional Neural Network (CNN) is being adopted to extract the features from the image of the document to analyse it further and classify it. The image of the document extracts features like brightness of pixel and the font format and the resolution of image. These features provide us with details to analyse the similarity between the digital forged images and enable us to develop an algorithm to detect and manipulation in digital images and tampering in documents.

I. INTRODUCTION

India is a developing country and most of the admission and scholarship work is done by scanning and sending picture of the documents while filling a form or applying for jobs, loans, etc. The procedure usually requires the individual to scan or click picture of his/her document and send it to the college or government or individual. The organization once receiving the image verifies the details with the naked eye and just confirms if there is no physical tampering done to the document whose image has been sent, they do not verify whether the image has been digitally manipulated or forged using any digital manipulation tools easily available to the common users on the Internet.

Due to this there is an increase in the field of image forgery and digitally manipulating the document or the image of the document which has been scanned or picture of the document clicked. People are using tools like Photoshop, GNU Gimp to forge and digitally manipulate the document before sending it or uploading it. The forgery or image manipulation that might be done on the document is not visible to the normal naked human eye. This leads to lot of loss of the organization as well as increases the criminal activity.

Hence, it is necessary to detect such fraudulent documents and image forgery in India across the nation while uploading documents via the admission process.

II. LITERATURE REVIEW

A. *Paper 1: Learning Rich Features for Image Manipulation Detection*

1) *Problem Definition:* Detecting whether a given image is manipulated by using faster R-CNN
2) *Survey:* In this paper they have used a two-stream Faster R- CNN network and train it end-to-end to detect the tampered regions given a manipulated image. One of the two streams is an RGB stream whose pur- pose is to extract features from the RGB image input to find tampering artifacts like strong contrast difference, unnatural tampered boundaries, and so on. The other is a noise stream that leverages the noise features extracted from a steganalysis rich model filter layer to discover the noise.

B. *Paper 2: Image Manipulation Detection using Convolutional Neural Network*

1) *Problem Definition:* This paper aims at detecting manipulation in images using Convolutional Neural Networ
2) *Survey:* Digital forensic techniques are needed to detect the tampering and manipulation of images for such illegal purposes . In this paper, we present an image manipulation detection algorithm using deep learning technology. The paper using a CNN model to detect any image manipulation done on the image.

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C. Paper 3: Performance of some image processing algorithms in TensorFlow

1) *Problem Definition:* Image processing algorithm and techniques are used on a large scale everyday in multiple aspects of technology and lifestyle. There are various algorithms with different performance and power required, it is difficult to choose the right algorithm.
2) *Survey:* In this paper various image processing algorithms are compared by testing on TensorFlow with same Hardware being used and the power required and time performance is being plotted and compared anlaysis has been done. All algorithms were tested in TensorFlow, which is a novel framework for deep learning, but also for image processing. Relative speedups compared to CPU were given for all algorithms.

D. Paper 4: Fast 2D and 3D Image Processing with OPENCL

1) *Problem Definition:* Image processing with GPUs requires the use of an API like OpenCL or CUDA. A higher level library that hides these APIs is a better option if the programmer does not need to fine tune or implement his own image processing operations.
2) *Survey:* In this article we describe a library with a code generator that, from a few directives merged in a shader source code, generates a wrapper code with all the OpenCL API calls needed before calling the shader, simplifying, thus, the maintenance of an image processing library. The proposed library performance is better than OpenCV, CImg, ITK libraries for all the tested operators.

III. REQUIREMENT ANALYSIS

A. Scope

Digital document forgery is increasing with increase in technology with tools like Photoshop, GNU Gimp, etc. This project focusses on taking the scanned document and through image processing identifying whether the document is forged or not. Our study does not take into consideration the offline manipulation in image. The project focuses on the document which is being used nationally throughout India on a wide scale with regular usage by many people in their day to day life.

B. Feasibility study

Document Forgery Detection for Admission detects the image in runtime using CNN algorithm The system has a user friendly interface which gives better experience while using the software.

C. Hardware and Software Requirements

1) *Hardware Requirements:* System: Core i5 and above Ram: 8 GB
2) *Hard Disk:* 10 GB
3) *Monitor:* 15” Color Monitor

D. Software Requirements

Operating System: Windows Family
Python
Keras, TensorFlow

E. Problem Statement

The recent advance in the use of image processing applications has benefitted many areas including the forensic and digital verification techniques in cybercrime detection. At the same time the features of image processing techniques are used for producing digital evidence in criminal activities. Image processing tools have been associated with a variety of crimes, including counterfeiting of currency notes, checks, as well as manipulation of important government documents, wills, financial deeds or educational certificates. The proposed system to provide a solution to this problem. The proposed system focuses on the use of image processing techniques and algorithms along with machine learning to detect the forgery and image manipulation done in a government document which is used nationally on a wide scale.

IV. PROJECT DESIGN

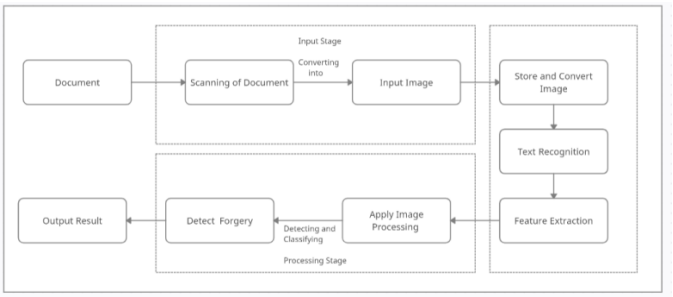

Fig 3.1:Project Design

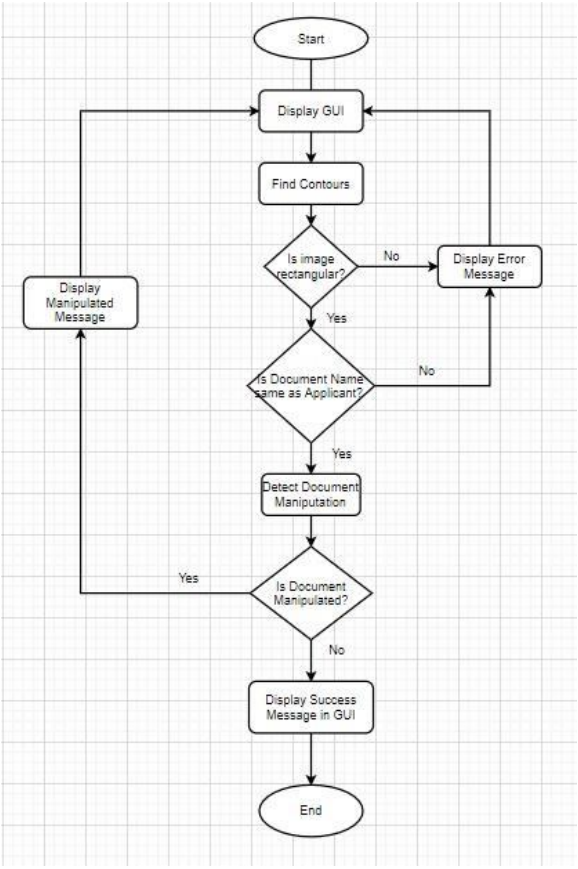

Fig 3.2:Flowchart

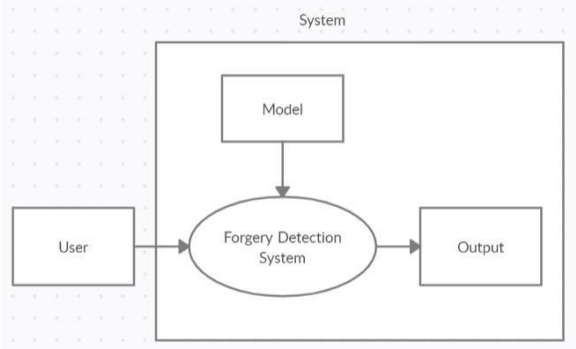

Fig 3.3: DFD Level 0

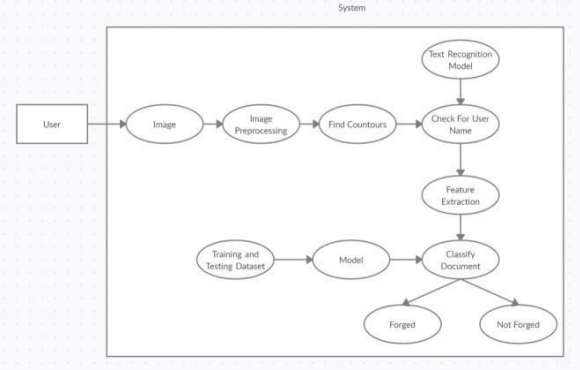

Fig 3.4 :DFD Level 1

V. METHODOLOGY

From the literature survey we have studied and found that there are n number of algorithms that match the requirements of our project. The best suited algorithm for our project that we are going to use is the CNN algorithm. The Convolution model which consists of multiple layers for the purpose of feature extraction from the image. Training data is provided to the model for better prediction of whether the document is forged or not. The classification of document with taking into consideration of various features in the document. The input image is processed, and multiple features are extracted and analyzed. Multiple convolutional layers used to provide better prediction. The testing of the model done using images of document will show its accuracy. Hence, the model classifying the document and the document which has been forged. The processing required in a CNN is much lower as compared to other classification algorithms

VI. CONCLUSION

In this project the Image processing technique using Convolutional Neural Network (CNN) is used for determining whether the input digital image of the document is forged or not. The algorithm used along with feature extraction techniques will be able to extract the features from the document image. These features are used by the convolutional layers to process the image and give a binary classified output as whether the input image is forged or not. The system will use the features to process and will detect and classify whether the image is forged or not. However, the system cannot detect if there is any tampering done on the physical document which was scanned, or picture clicked and uploaded to the system.

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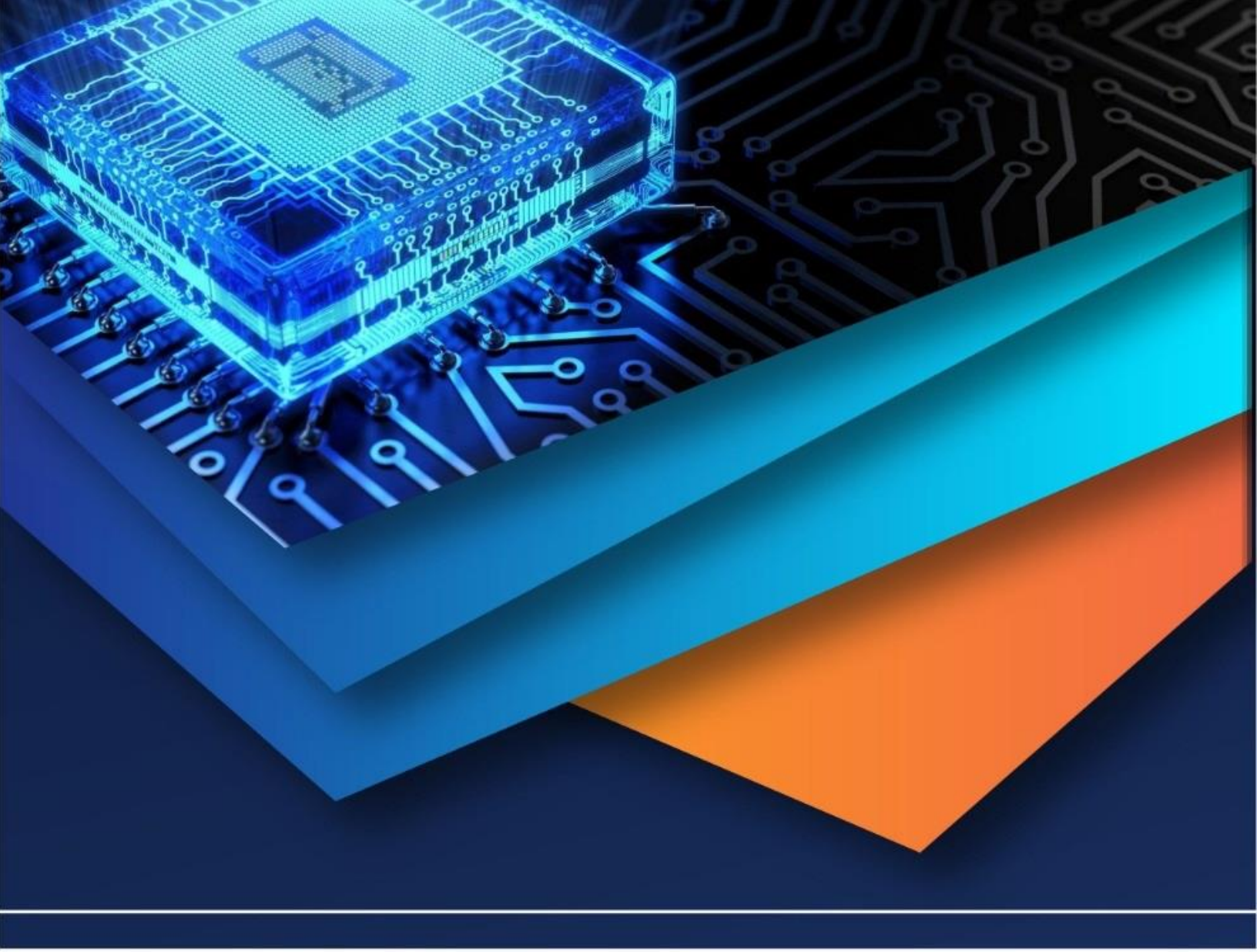

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