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SMART HEALTHCARE FORGERY DETECTION USING DEEP LEARNING

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ABSTRACT

The invention of new communication technologies, new features and facilities are provided in a smart healthcare framework. The features and facilities aim to provide a easy-to-use, accurate, and real-time healthcare service to clients. As health is a sensitive issue, it should be taken care of with utmost security and caution. In this way, the system works seamlessly and in real time. The bandwidth requirement of the proposed system is also reasonable. A new image forgery detection method based on deep learning technique, which utilizes a convolutional neural network (CNN). A image forgery detection method find the fraud medical images using the Convolutional neural network.

1. INTRODUCTION

Forgery delection is the detect the photos of the among thousand files of a computer. The term of forgery detection is to derived from the deep learning techniques. Digital image forgery or we can say that tampering of digital images have become one of the major problems. There are many ways through which the image can be modified. The main objective of proposed forgery detection is to improve high comparison of medical images. For getting these we proposed method of forgery detection using convolutional neural network. In the healthcare domain, image forgery can be serious. If a mammogram is hacked, and the intruder uses the copy-move forgery to enlarge the area of cancer, the diagnosis will be wrong, and the patient will be in life-threatening trouble. If there is an image forgery detection system in a healthcare framework, it can detect the forgery before starting the diagnostic process. In the case of a forgery, the system can ask for another sam- ple from the patient. The intrusive method (e.g., embedding a watermark in the medical image) of forgery detection is not suitable in a cloud-based smart healthcare framework mainly because of two reasons: • Embedding a watermark needs extra infor- mation for transmission, which may require extra bandwidth and cause a delay in the transmission. • Embedding a

watermark may decrease the visual quality of the image, which in turn affects the diagnostic process.

2. MACHINE LEARNING Machine learning is an application of artificial intelligence (AI) that provides systems the capability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. Machine learning is to build algorithms that can receive input data and use statistical analysis to predict an output while updating output as new data becomes available.

2.1 Supervised Learning Supervised Learning in the context of artificial intelligence and machine learning is a type of system in which both input and desired output data are provided. Input and Output data are provided. Input and output data are labelled for classification to provide a learning basis for future data processing. There are two types. Regression : A regression problem is when the output variable is a real or continuous value, such as “salary” or “weight. Classification: A classification problem is when the output variable is a category, such as “red” or “blue” or “disease” and “no disease”. A classification model attempts to draw some conclusion from observed values. Given one or more inputs a classification model will try to predict the value of one or more outcomes.

2.2 Unsupervised Learning Unsupervised learning is the training of machine learning using information that is neither classified nor labeled and allowing the algorithm to act on that information without guidance. There are two types of unsupervised learning. Clustering: A clustering problem is where you want to discover the inherent groupings in the data, such as grouping customers by purchasing behavior. Association: An association rule learning problem is where you want to discover rules that describe large portions of your data, such as people that buy X also tend to buy Y.

3. DEEP LEARNING Deep Learning is a class of machine learning techniques which consists of multiple layers of information processing stages in hierarchical architectures. It can be used for unsupervised learning, pattern analysis and classification [2]. The main characteristic of deep learning is to compute hierarchical features of the observational data where higher level factors are defined from lower levels [3]. Deep learning is a subfield of machine learning concerned with algorithms inspired by the structure and function of the brain called artificial neural network. Deep learning is also known as deep structured learning or hierarchical learning. Most deep learning methods use neural network architectures, which is why deep learning models are often referred to as deep neural networks.

3.1. Convolutional Neural Network Convolutional Neural Networks(CNN) is a type of deep neural network architecture designed for specific tasks like image classification. CNNs have wide applications in image and video recognition, recommender systems and natural language processing. convolutional neural networks are proposed to reduced the number of parameters and adapt the network architecture specifically to vision tasks.[6] In a regular Neural Network there are three types of layers: Input Layers: It’s the layer in which we give input to our model. The number of neurons in this layer is equal to total number of features in our data (number of pixels incase of an image). Hidden Layer: The input from Input layer is then feed into the hidden layer. There can be many hidden layers depending upon our model and data size. Each hidden layers can have different numbers of neurons which are generally greater than the number of features. Output Layer: The output from the hidden layer is then fed into a logistic function like sigmoid or surtax which converts the output of each class into probability score of each class.

4. IMAGE FORGERY DETECTION Forgery detection is the system defined for the medical images. Digital image forgery does not differ very much in nature compared to conventional image forgery. Instead of using photograph, digital image forgery deals with

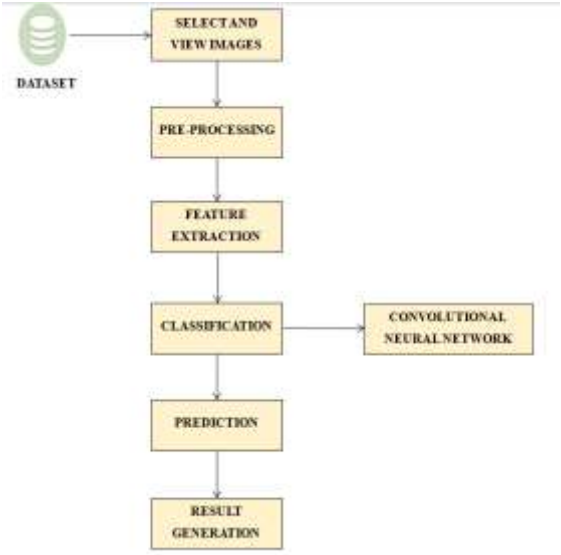
digital image. There are many cases of digital image forgery. There have been different techniques utilized for forging an image.

TYPES OF DIGITAL IMAGE FORGERY

Detection:[12] Digital Signature is one among the active method used for detecting image forgery or tampering. Demonstrating the authenticity of digital document using a sort of mathematical scheme is called as digital signature.[12] Digital Watermarking is also used for image forgery detection several watermarking techniques have been proposed.[12] Copy-Move Forgery In copy-move forgery (or cloning), some part of the picture of any size and shape is copied and pasted to another area in the same picture to shroud some important data as demonstrated .[12] Image Forgery using Splicing Image splicing uses cut-and-paste systems from one or more images to create another fake image. When splicing is performed precisely, the borders between the spliced regions can visually be imperceptible. Splicing, however, disturbs the high order Fourier statistics.[12] Image Resampling To make an astounding forged image, some selected regions have to undergo geometric transformations like rotation, scaling, stretching, skewing, flipping and so forth. The interpolation step plays a important role in the resampling process and introduces non-negligible statistical changes.[13]

5. RELATED WORK: Framework For Image Forgery Detection And Classification Using Machine Learning [14] In this , lays a foundation on investigation of digitally manipulated documents and provides a solution to distinguish original document from a digitally morphed document. A Graphical User Interface (GUI) was created for detection of digitally tampered images. A Greedy Deep Learning Method for Medical Disease Analysis[15] In this paper using the Greedy weighted dictionary learning for mobile multimedia for medical disease analysis. The help of mobile multimedia technology, we timely follow-up observation to patients and exchange the collected information into data information. A Deep Learning Approach to Detection of Splicing and Copy-Move Forgeries in Images [16] In this paper, we present a new image forgery detection method based on deep learning technique, which utilizes a convolutional neural network (CNN) to automatically learn hierarchical representations from the input RGB color images. The proposed CNN is specifically designed for image splicing and copy-move detection applications. A Deep Learning Architecture for Classifying Medical Images of Anatomy Object[17] Deep learning architectures particularly Convolutional Neural Network (CNN) have shown an intrinsic ability to automatically extract the high level representations from big data. Medical Image Forgery Detection for Smart Healthcare[18] In this paper ,a new medical image forgery detection system for the healthcare framework to verify that images related to health- care images not changed. The system was tested using three different databases, two having natural images and one having mammograms.

SYSTEM ARCHITECTURE



IMPLEMENTATIONS

Modules

- Image Selection and Loading
- Image Preprocessing
- Feature extraction
- Classification
- Prediction
- Result Generation

Modules Description

IMAGE SELECTION AND LOADING

- The data selection is the process of selecting the data for **Fake images and Original images** dataset.
- The dataset which contains the information about correct person images or fake person images.

IMAGE PREPROCESSING

- Image Data pre-processing is the process of getting rescale data from the dataset.
  - Resize image dataset
  - Getting data
- Resize image dataset: Rescale the grey scale chest fake images and original images.
- Getting data: That categorical data is defined as variables with a finite set of rescaled values. That most deep learning algorithms require array input and output variables.

SPLITTING DATASET INTO TRAIN AND TEST DATA

- Data splitting is the act of partitioning available data into two portions, usually for cross-validator purposes.
- One Portion of the data is used to develop a predictive model and the other to evaluate the model's performance.
- Separating data into training and testing sets is an important part of evaluating data mining models.
- Typically, when you separate a data set into a training set and testing set, most of the data is used for training, and a smaller portion of the data is used for testing.

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IMAGE SEGMENTATION

In digital image processing and computer vision, image segmentation is the process of partitioning a digital image into multiple image segments, also known as image regions or image objects (sets of pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.[1][2] Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics. The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image (see edge detection). Each of the pixels in a region are similar with respect to some characteristic or computed property[3] , such as color, intensity, or texture. Adjacent regions are significantly different color respect to the same characteristic(s).[1] When applied to a stack of images, typical in medical imaging, the resulting contours after image segmentation can be used to create 3D reconstructions with the help of interpolation algorithms like marching cubes

APPLICATIONS

Some of the practical applications of image segmentation are:

- Content-based image retrieval[5]
- Machine vision
- Medical imaging,[6][7] including volume rendered images from computed tomography and magnetic resonance imaging.
- Locate tumors and other pathologies[8][9]
- Measure tissue volumes[10][11]
- Diagnosis, study of anatomical structure[12]
- Surgery planning
- Virtual surgery simulation
- Intra-surgery navigation
- Object detection[13]
- Pedestrian detection
- Face detection
- Brake light detection
- Locate objects in satellite images (roads, forests, crops, etc.)
- Recognition Tasks
- Face recognition
- Fingerprint recognition
- Iris recognition
- Traffic control systems
- Video surveillance
- Video object co-segmentation and action localization[14][15]

Several general-purpose algorithms and techniques have been developed for image segmentation. To be useful, these techniques must typically be combined with a domain's specific knowledge in order to effectively solve the domain's segmentation problems.

CONCLUSIONS The area of medical image forgery detection needs more attention to gain the trust of patients and to avoid their embarrassment. We can take advantage of these technologies to make the healthcare system real time and secure. The goal of this project is to patients medical image fraud images are detected and improve accuracy.

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