“ DIGITAL WATERMARKING AND CAPTION GENERATOR ”

A Project Report Submitted in the partial fulfillment of requirement of the Degree of

Bachelor of Engineering

In

Computer Technology

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur

Under the guidance of

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DEPARTMENT OF COMPUTER

PRIYADARSHINI COLLEGE OF ENGINEERING, NAGPUR-440019

2022-2023

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DECLARATION

We, the undersigned, declare that the project entitled **"Digital Watermarking And Caption Generator",** being submitted in partial fulfillment for the award of Degree in Computer Technology, affiliated to RASHTRASANT TUKDOJI MAHARAJ NAGPUR UNIVERSITY, is the work carried out by us.

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ABSTARCT

Data integrity and source origin authentication are essential topics for real-time multimedia systems. But the traditional methods are not very applicable to overcome the distortion introduced in multimedia data transportation. In this project some security mechanics are proposed, which rely on authentication rather than on encryption methods. The highly asymmetric architectures found in ubiquitous computing applications are exploited to provide a protection of the transmitted multimedia data by means of well-known digital watermarking techniques. Images represent the memories of vision that significantly affect the human encephalon, allowing us to remember specific details about a location, a particular person, or an object we instantly record. A detailed description of each image is required to get a clear idea of what the picture actually consists of because some of the images cannot be recognized.

Deep learning and machine vision are used to comprehend the context of a picture and add the appropriate captions to it. It entails categorizing a photograph with English keywords using datasets made accessible during model training. Using the imagenet dataset, the CNN classifier Xception also is trained. Xception handles the retrieval of image features. These extracted characteristics will change the LSTM model to produce the caption for the image. When using machine learning-based methodologies, applications that automatically attempt to present captions or descriptions regarding pictorial and clip frames have a lot of potential.

The caption of both images and videos is regarded as a clever issue in imaging science. General-purpose robot vision systems, automatically developing captions for pictures and videos for people with varying degrees of visual impairment, and many other application fields are among the application fields. Each of these application groups can greatly benefit from numerous additional task-concrete applications.

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CHAPTER 1
INTRODUCTION

1. Introduction

1.1 General

Science and business have both benefited greatly from image analysis, and this trend will continue. It has been used in a variety of contexts, including scene interpretation and perception of sights, to mention a few. A large number of researchers depended on imaging methods that worked well on rigid components in controlled environments using specialized equipment before the introduction of deep learning. Convolutional neural networks powered by deep learning have recently had a beneficial and significant impact on picture captioning, enabling significantly more versatility. In this article, we discuss new developments in the field of deep learning-based image and video labeling. Convolutional neural networks powered by deep learning have recently had a significant and beneficial impact on the field of picture captioning, offering significantly more freedom. In relation to the topic of deep learning, we have chosen to highlight current developments in the area of image and video annotation in this essay.

1.2 Introduction To Digital Watermarking

A digital watermark is a kind of marker covertly embedded in a noise-tolerant signal such as audio, video or image data. It is typically used to identify ownership of the copyright of such signal. "Watermarking" is the process of hiding digital information in a carrier signal; the hidden information should, but does not need to, contain a relation to the carrier signal. Digital watermarks may be used to verify the authenticity or integrity of the carrier signal or to show the identity of its owners. It is prominently used for tracing copyright infringements and for banknote authentication. Like traditional physical watermarks, digital watermarks are often only perceptible under certain conditions, e.g. after using some algorithm. [1] If a digital watermark distorts the carrier signal in a way that it becomes easily perceivable, it may be considered less effective depending on its purpose.[1] Traditional watermarks may be applied to visible media (like images or video), whereas in digital watermarking, the signal may be audio, pictures, video, texts or 3D models. A signal may carry several different watermarks at the same time. Unlike metadata that is added to the carrier signal, a digital watermark does not change the size of the carrier signal. The needed properties of a digital watermark depend on the use case in which it is applied. For marking media files with copyright information, a digital watermark has to be rather robust against modifications that can be applied to the carrier signal. Instead, if integrity has to be ensured, a fragile watermark would be applied. Both steganography and digital watermarking employ steganography techniques to embed data covertly in noisy signals. While steganography aims for imperceptibility to human senses, digital watermarking tries to control the robustness as top priority. Since a digital copy of data is the same as the original, digital watermarking is a passive protection tool. It just marks data, but does not degrade it or control access to the data. One application of digital watermarking is source tracking. A watermark is embedded into a 3 digital signal at each point of distribution. If a copy of the work is found later, then the watermark may be retrieved from the copy and the source of the distribution is known. This technique reportedly has been used to detect the source of illegally copied movies

1.3 Introduction To Caption Generator

Automatically describing the content of images using natural language is a fundamental and challenging task. With the advancement in computing power along with the availability of huge datasets, building models that can generate captions [2] for an image has become possible. On the other hand, humans are able to easily describe the environments they are in. Given a picture, it’s natural for a person to explain an immense amount of details about this image with a fast glance. Although great development has been made in computer vision, tasks such as recognizing an object, action classification, image classification, attribute classification and scene recognition are possible but it is a relatively new task to let a computer describe an image that is forwarded to it in the form of a human-like sentence. For this goal of image captioning, based on semantics of images should be captured here and expressed in the desired form of natural languages. It has a great impact in the real world, for instance by helping visually impaired people better understand the content of images on the web. So, to make our image caption generator model, we will be merging CNN-RNN architectures. Feature extraction from images is done using CNN. We have used the pretrained model Exception. The information received from CNN is then used by LSTM for generating a description of the image. However, sentences that are generated using these approaches are usually generic descriptions of the visual content and background information is ignored. Such generic descriptions do not satisfy in emergent situations as they, essentially replicate the information present in the images and detailed descriptions regarding events and entities present in the images are not provided, which is imperative to understanding emergent situations.

CHAPTER 2
LITERATURE REVIEW

2. Literature Review

A. Verma, H. Saxena, et al [3], This research undertakes the task of caption development with an LSTM and RNN based establishes an approach that relies on the same to produce effective and relevant captions by correctly training the dataset. Our model was effectively trained using the Flicker8k dataset. The model's precision is evaluated using standard evaluation measures.

V. Agrawal, S. Dhekane, et al [4], Using a variety of techniques, involving DL, CV, and NLP, among others, the task is to produce concise captions. The system that produces the captions in this research makes use of an encoder as well as a decoder, along with an attention technique. It uses an RNN called GRU to supply the proper caption after first extracting the characteristics of the photograph using a CNN with prior training called Inception V3. The proposed model generates captions using a well-positioned attention algorithm. The MS-COCO dataset is used to train the algorithm. The results show that the model is capable of producing text and fairly understanding images.

C. Amritkar and V. Jabade et al [5], The model of regenerating neurons is created. It is reliant on computer imagery and machine translation. This method results in organic phrases that ultimately describe the image. RNN and CNN are additional elements of this strategy. The RNN is used to create sentences, while the CNN algorithm is employed to extract characteristics from images. When provided an input image, the simulation has been trained to generate titles that almost verbatim describe the image. On different datasets, the model's accuracy as well as its fluency or comprehension of the language it picks up from its visual representations are evaluated.

E. Mulyanto et al [6], This study is crucial because there isn't an Indonesian corpus for picture captioning. This research will contrast the experimental results in the FEEH-ID dataset with datasets in English, Chinese, and Japanese using the CNN and LSTM models. The performance of the suggested model in the test set indicates promise with scores of 60.0, down for BLEU-1 and 28.9 for BLEU-3, which are higher than normal for Bleu assessment results in other language datasets. the algorithm used to combine CNN and LSTM.

L. Abisha Anto Ignatius et al [7], The objects that have been recognised are given names using the semantic tags that are present in the image. The captions' ability to describe the objects more accurately is improved by including these factors contextual labels. The Sequence-to-Sequence language paradigm creates the captions one word at a time. The face identification algorithm uses the faces dataset, which includes the facial photos of 232 celebs, to find and identify celebrities' faces in pictures. The mentions of the people in the sentence were changed to their names to make personalized captions. Correlation and the Bilingual Evaluation Understudy measures were created to gauge the precision of the captions that were generated.

M. P. R, M. Anu et al [8], Using image descriptions is the best option for people whose work happen to be blind or who experience difficulty understanding visuals. If an individual's eyesight cannot be corrected, descriptive words can be generated as speech output when using a correlation-based picture caption generator. Today, the study of image processing will become more and more important, mostly for the sake of preserving lives.

S. Li and L. Huang et al [9], In the current encoding and decoding structure, the attention process is frequently used. The current image caption models, built on CNN and RNN, have issues like gradient explosion and are not very good at extracting important information from images. To solve these issues, the research suggests a procedure for creating context-based image captions. The procedure begins with labeling with SCST and LSTM, then progresses to feature extraction with SCST and scenario coding. The outcomes of the experiments show how successful the suggested approach is.

T-Y LIN et al [10], The information was thoroughly statistically analysed by the authors, who then contrasted it with PASCAL, SUNI, and ImageNet. Then, using a Deformable Parts Model, we show early functional testing for classifying identification and bounding box findings. The collection's images included 96 different object types that a 5-year-old could readily identify. Our dataset was developed using specialised software tools for subcategory recognition, case spotting, and instance segmentation, at a total of some million annotated occurrences in 3580 photographs.

A. Karpathy et al [11], The authors present an approach that can produce summaries of graphics and their areas in natural language. Our method uses records of images that have been explained in sentences to find the cross-modal connections between linguistic and visual data. Our alignment approach is based on CNN over image regions, concurrent ML algorithms throughout facial expressions and an organizational objective that coordinates the two categories using multimodal embedding. P J TANG et al [12], The extra layers enhance and reserve the LSTM model. A weighted average method is used to combine the final forecast probability for each of the Soft maximum functions that are given the correct categorization layers during the test. Experimental results Flickr30K, MSCOCO, and collections show that our model is efficient and outperforms other comparable approaches on a number of assessment measures.

CHAPTER 3
OBJECTIVES

3. Objectives

The objective behind developing an automatic digital watermark generator is to provide facility to the users that they can encrypt their documentations or media files and send them to any other person without fear of hacking.

Very few images can stand without captions and all images that are considered iconic have been supported by words. While ambiguity in photography as art may be a desirable outcome, in a journalistic context, captioning is as important to the news value of the photograph as the image itself. They convey vital information about who's doing what, when, where and (sometimes) why. Solid captions paired with interesting photographs can spark a reader's interest in a full text story. Without captions, people draw their own conclusions about a photo.

The project is to develop a web based interface for users to get the description of the image and to make a classification system in order to differentiate images as per their description. It can also make the task of SEO easier which is complicated as they have to maintain and explore enormous amounts of data.

CHAPTER 4
ARCHITECTURE

4. Architecture

4.1. Architecture of Watermarking

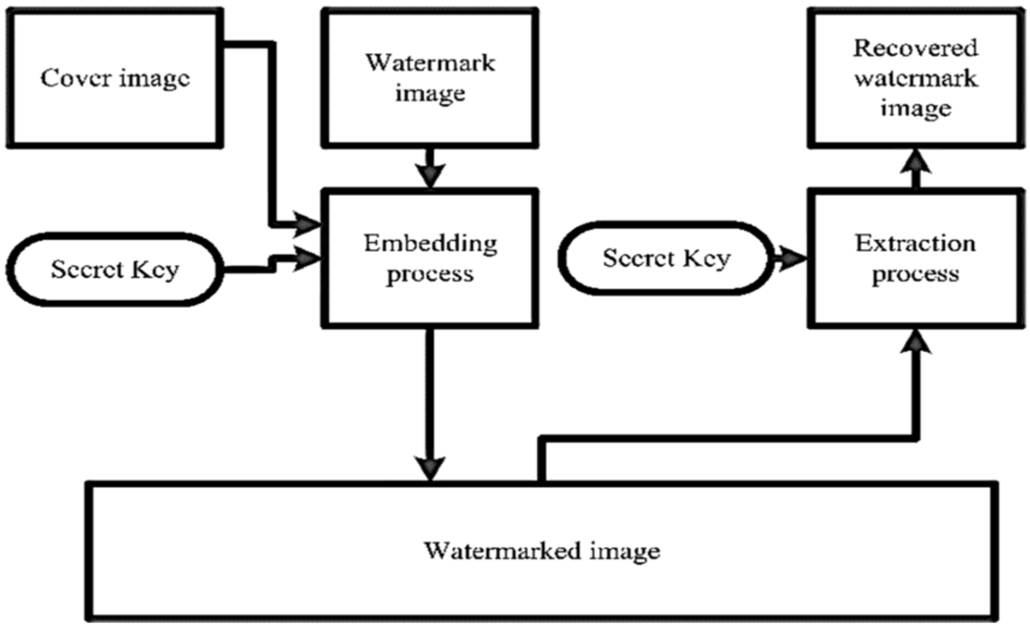


Figure 4.1. Architecture of Digital Watermarking

Watermarking is the process that embeds data called a watermark or digital signature or tag or label into a multimedia object such that watermark can be detected or extracted later to make an assertion about the object. The object may be an image or or video. In general, any watermarking scheme (algorithm) consists of three parts:

- The watermark
- The encoder (marking insertion algorithm)
- The decoder and comparator (verification or extraction or detection algorithm)

Each owner has a unique watermark or an owner can also put different watermarks in different objects the marking algorithm incorporates the watermark into the object. The verification algorithm authenticates the object determining both the owner and the integrity of the object.

4.2. Architecture of Caption Generator

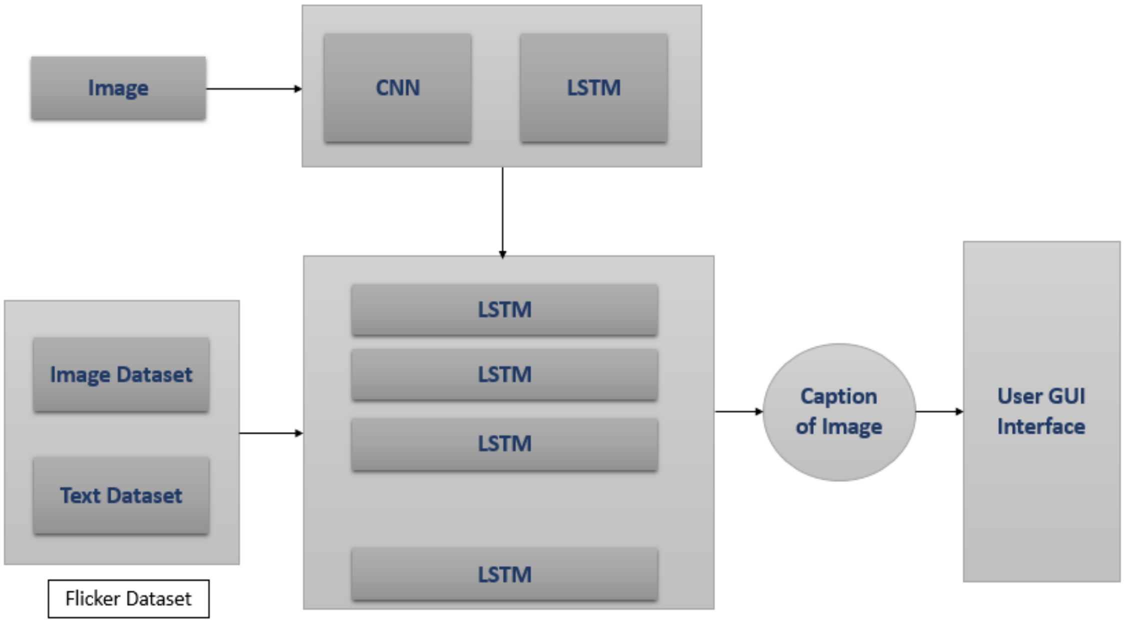


Figure 4.2. Architecture of Caption Generator

Input image is given & then A convolutional neural network is used to create a dense feature vector as shown in figure. This dense vector, also called an embedding, this vector can be used as input into other algorithms, and its generates [13] suitable caption for given image as output. For an image caption generaor, this embedding becomes a representation of the image and used as the initial state of the LSTM for generating meaningful captions , for the image.

CHAPTER 5
ALGORITHMS

5. Algorithm

Convolutional Neural Network CNN:

CNN is a subfield of Deep learning and specialized deep neural networks used for the recognition and classification of images. It is used to process the data represented as a 2D matrix like images. It can deal with scaled, translated, and rotated imagery. It analyzes the visual imagery by scanning them from left to right and top to bottom and extracting relevant features from that. Finally, it combines all the features for image classification.

Long short-term memory (LSTM):

Being a type of RNN (recurrent neural network), LSTM (Long short-term memory) is capable of working with sequence prediction problems. It is mostly used for the next word prediction purposes, as in Google search our system is showing the next word based on the previous text. Throughout the processing of inputs, LSTM is used to carry out the relevant information and to discard non-relevant information. To build an image caption generator model we have to merge CNN with LSTM.

We can drive that: **Image Caption Generator Model**
(CNN-RNN model) = CNN + LSTM.

- **CNN-** To extract features from the image. A pre-trained model called Xception is used for this.

- **LSTM-** To generate a description from the extracted information of the image.

- **Natural Language Processing (NLP)** - NLP algorithms are typically based on machine learning algorithms. Instead of handcoding large sets of rules, NLP can rely on machine learning to automatically learn these rules by analyzing a set of examples (i.e. a large corpus, like a book, down to a collection of sentences), and making a statistical inference.

- **AES Algorithm**

  AES is an encoding algorithm that transforms plain text data into a version known as ciphertext that's not possible for humans or machines to understand without an encryption key—a password.

- **DES Algorithm**

  Data encryption standard (DES**)** has been found vulnerable to very powerful attacks and therefore, the popularity of DES has been found slightly on the decline. DES is a block cipher and encrypts data in blocks of size of **64 bits** each, which means 64 bits of plain text go as the input to DES, which produces 64 bits of ciphertext. The same algorithm and key are used for encryption and decryption, with minor differences. The key length is **56 bits**.

CHAPTER 6
DATA FLOW DIAGRAM

6. Data Flow Diagram

The watermark embedding process is shown in figure 3 and its function is to embed the watermark signal into the original data. In the watermark embedding process, the selection of the watermark, the embedding position, the infiltration intensity, and the type of wavelet base selected will affect the performance of the watermark system.

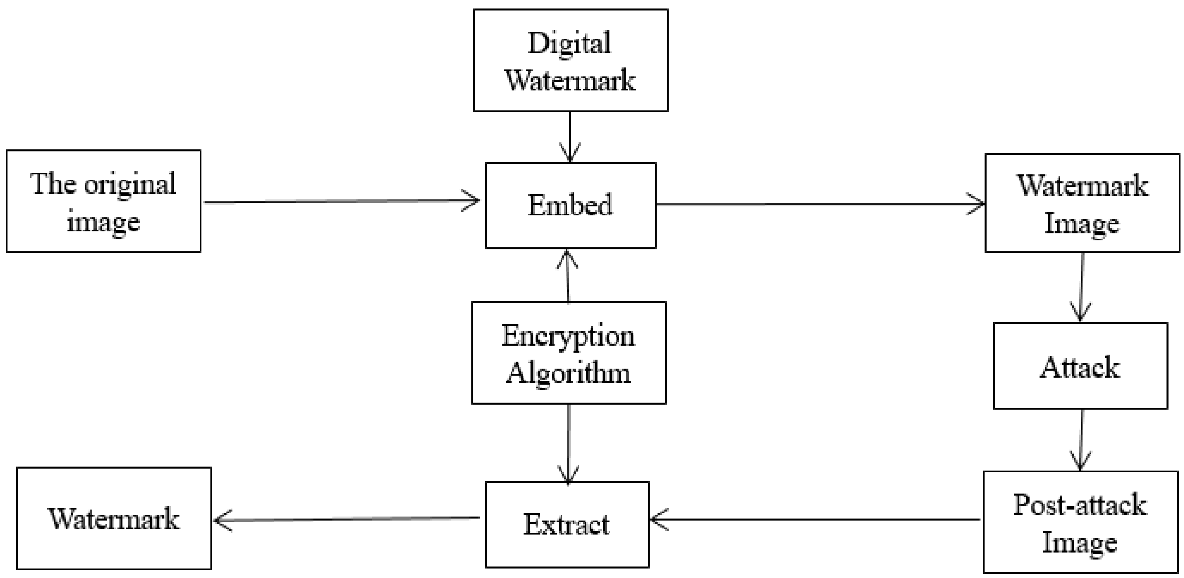


Figure 6.1. Digital Watermarking flow diagram

Figure 4 shows model of Image Caption Generator .Here in this model, input image is given & then a convolutional neural network is used to create a dense feature vector as shown in figure. This dense vector, also called an embedding, this vector can be used as input into other algorithms, and it generates suitable caption for given image as output. For an image caption generator, this embedding becomes a representation of the image and used as the initial state of the LSTM for generating meaningful captions, for the image.

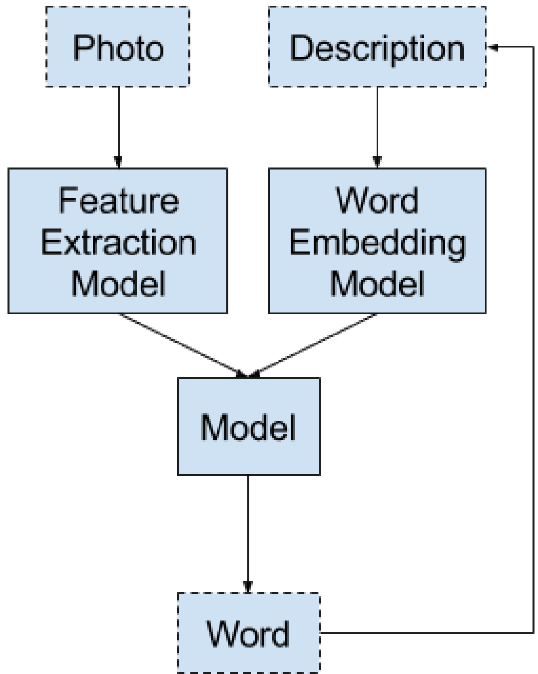


Figure 6.2. Dataflow model of Caption Generator

- **Implementation of the System:**
  Here we will discuss the implementation of the system.

- **Object Detection**
  Objects are detected from the image with the help of CNN Encoder.

- **Sentence Generation**
  By using LSTM, sentences are generated. Each predicted word is employed to get subsequent words. Using these words, appropriate sentence is formed with the help of optimal beam search. Here, Softmax function will be used for prediction of word.

- **Deployment**
  The final project will be deployed using Tkinter which is Python based GUI. It is the standard Python Interface for developing GUI's.

CHAPTER 7
MODULES

7. Modules

In order to watermark a digital image, watermark information must first be embedded into a multimedia product. This information must then be recovered from or recognized by the watermark in the information product. These methods guarantee image insertion, content validation, authentication, and tamper resistance. The entire endeavor is broken up into two modules, the first of which is for creating a digital stamp and the second of which is for creating captions described below briefly. Here, the word "digital watermark" refers to the process of using digital tools to embed a watermark into an input image and hide it during display. The watermark can serve as a visual representation of the content's uniqueness.

Module 1 –

Digital Watermarking: The method of watermarking involves encrypting or digitally combining the content. An electronic watermark is a type of marker that is subtly incorporated into a signal that can tolerate noise, such as audio, video, or picture data. It is usually used to establish who owns the copyright to a particular signal.

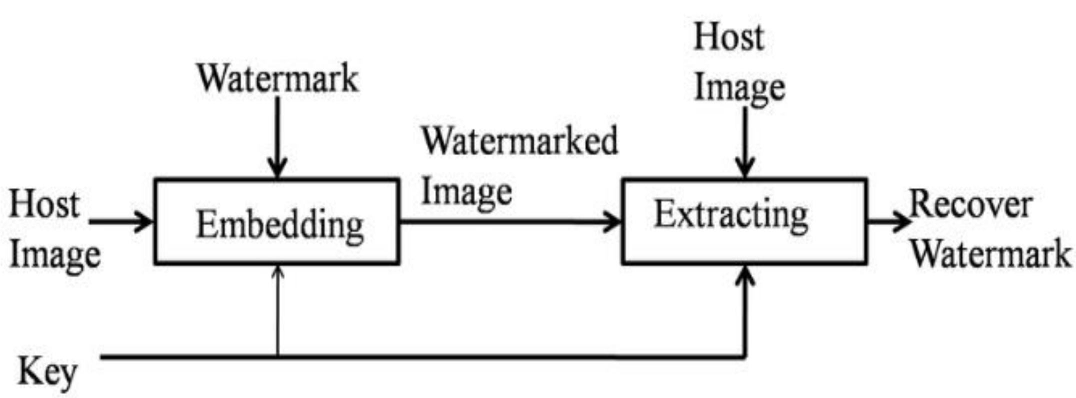


Figure 7.1. Digital Watermarking process flow

According to the flow diagram provided, the picture is first received from the browser, sent for embedding, and then it appears as watermarked content from which the original image can be extracted using the security key. The ultimate image is shown once the aforementioned steps have been completed.

Module 2 –

Caption Generator: Compared to picture classification and object recognition, the job of automatically creating captions and detailing the image is noticeably more difficult. The narrative of a photo must include not only the items in the image but also the relationships between those items and the activities and characteristics that are depicted in the image [6].

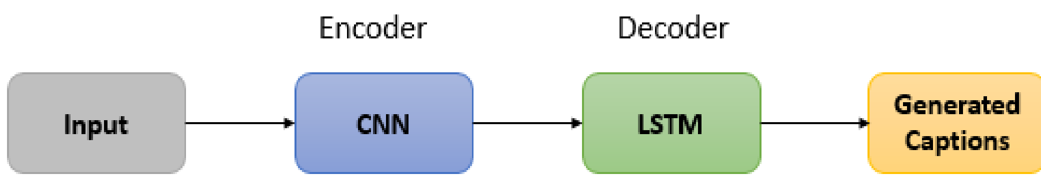


Figure 7.2. Caption Generator process flow

The foundation for common watermark techniques, which are broken down into procedures for incorporating and removing watermarks, is briefly revised in the first part of this study. The usual design criteria for judging the potency of watermarking systems are listed in the ensuing subsections. Because there are so many descriptions of similar apps, watermarking systems is now a very specialized area of study. Following that, a list of digital image watermarking techniques is provided according to their functional area.

The results of the research are then summarized in tabular form using the state-of-the-art methods described earlier. The foundation for common watermarking that have techniques, which are broken down into procedures for incorporating and removing watermarks, is briefly revised in the first part of this study. The usual design criteria for judging the potency of watermarking systems are listed in the ensuing subsections. Because there are so many descriptions of similar apps, watermarking systems is now a very specialised area of study. Following that, a list of digital image watermarking techniques is provided according to their functional area. The results of the research are then summarised in tabular form using the state-of-the-art methods described earlier.

A large entropy value is selected during the watermark extraction to provide greater robustness and imperceptibility. The watermark picture is separated from the image with the watermark using the same key, as seen in Figure 1b. The innovation demonstrates how straightforward, trustworthy, and undetectable it is to generate images that are input from the original image.

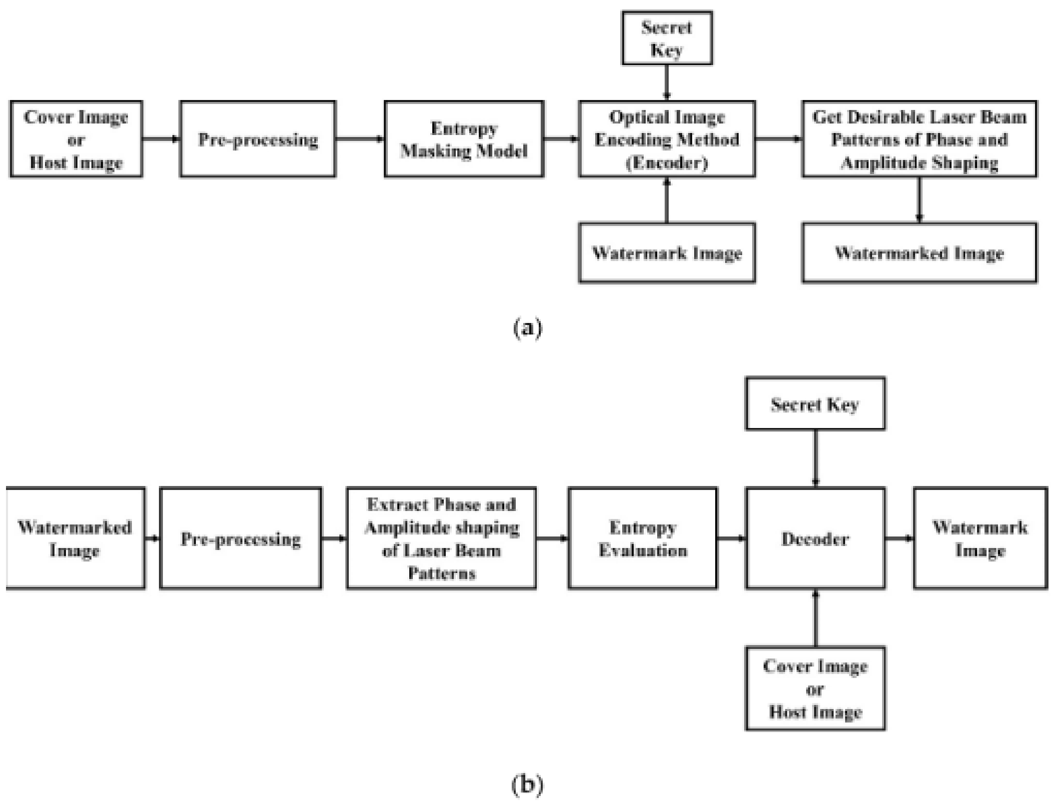


Figure 7.3. (a)Watermark Embedding (b) Watermark Extraction

As depicted in Fig. 3.3, the model is based on the Long short-term memory block, which is dependent on the LSTM without a peephole architecture. The LSTM's packet and gates are related in the ways listed below:

$$i_l = \sigma(W_{ix}x_l + W_{im}m_{l\text{-}1}) \quad (1)$$

$$f_l = \sigma(W_{fx}x_l + W_{fm}m_{l\text{-}1}) \quad (2)$$

$$o_l = \sigma(W_{ox}x_l + W_{om}m_{l\text{-}1}) \quad (3)$$

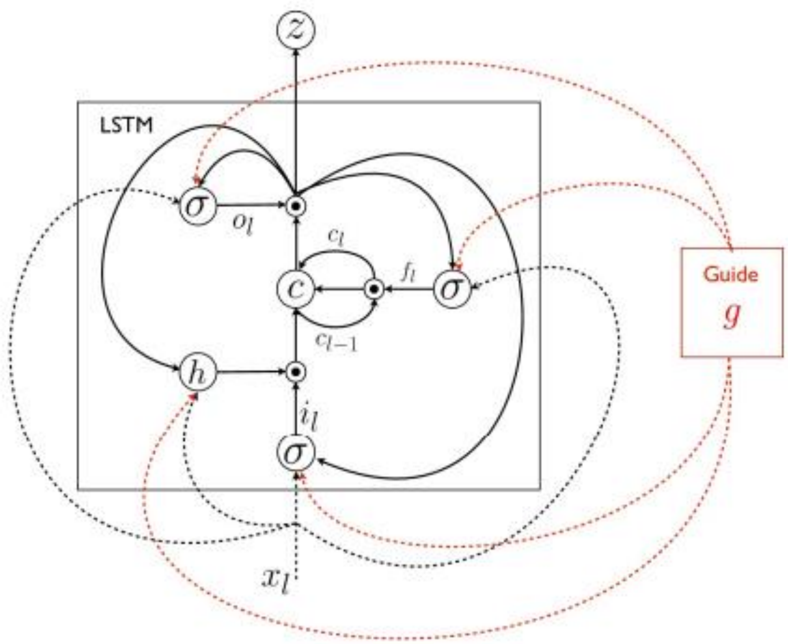


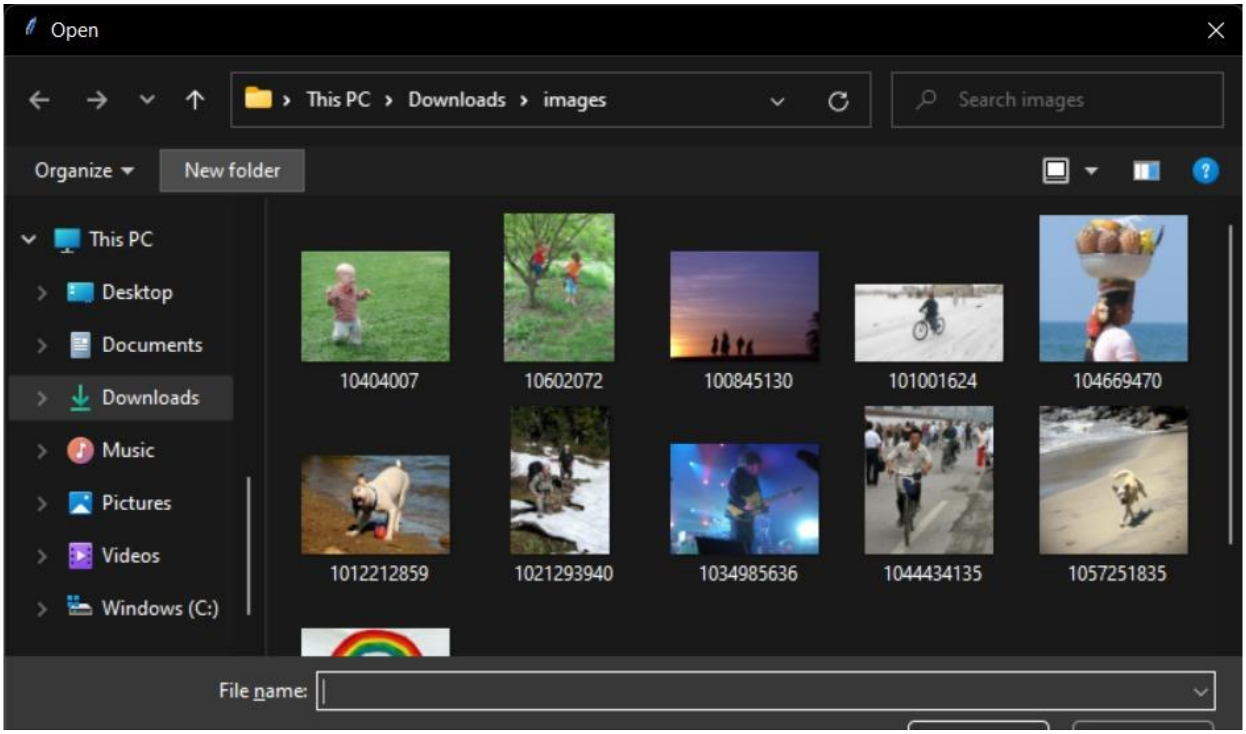
Figure 7.4. LSTM connection Diagram

Where the element-wise multiplication, hyperbolic tangent function, and sigmoid function are all noted. In the LSTM cell, the values il stand for the gate used for input, fl for the forgotten gate, ol for the gate that provides the output, cl for the current status of the memory cell in the unit, and ml to feed the hidden state, which also happens to be the result of the block processed in the LSTM.

CHAPTER 8
SCREENSHOTS

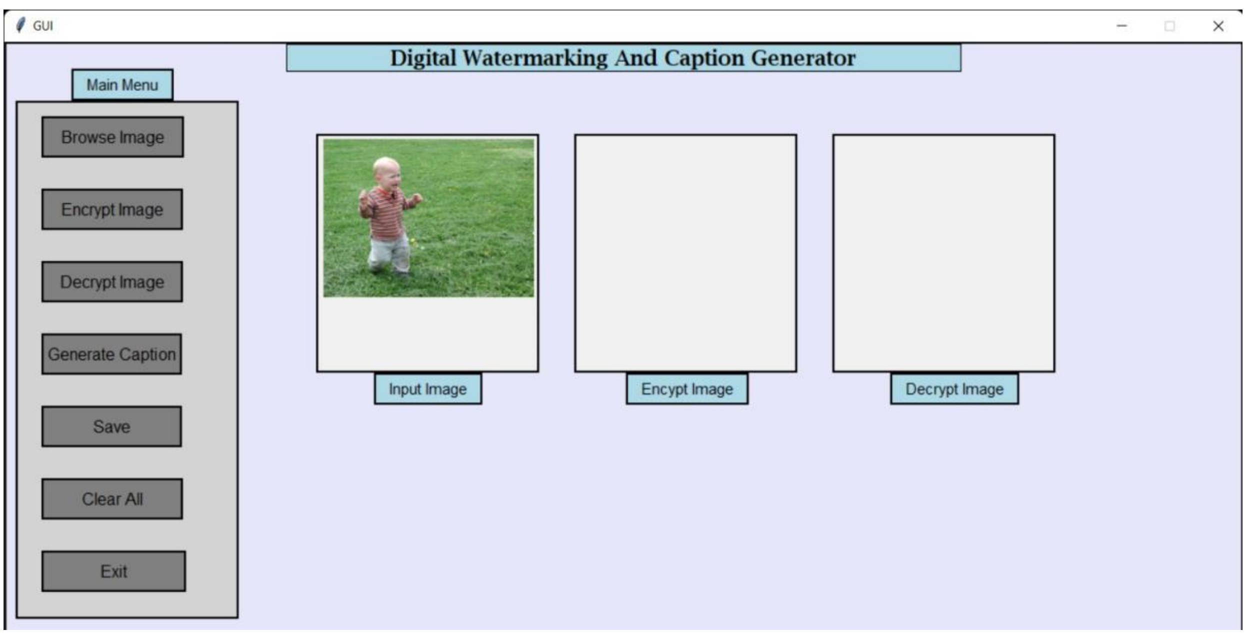
8. Application's Screenshots

1. Browse Image

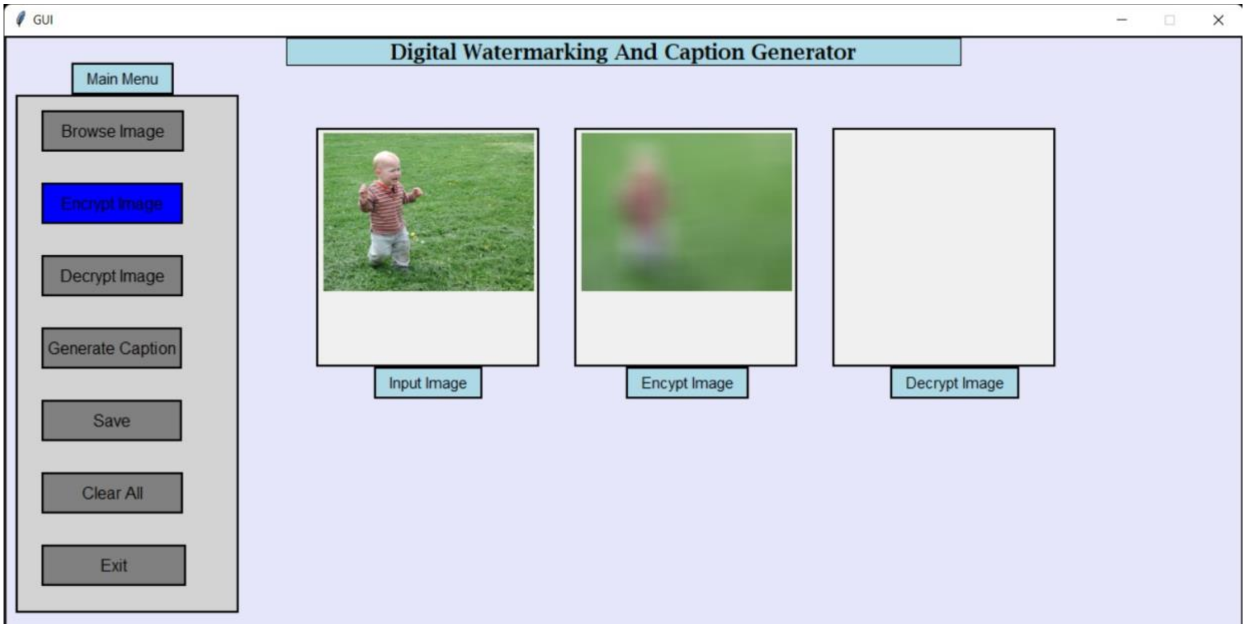


The first step is to browse the image from given dataset.

2. Home Page

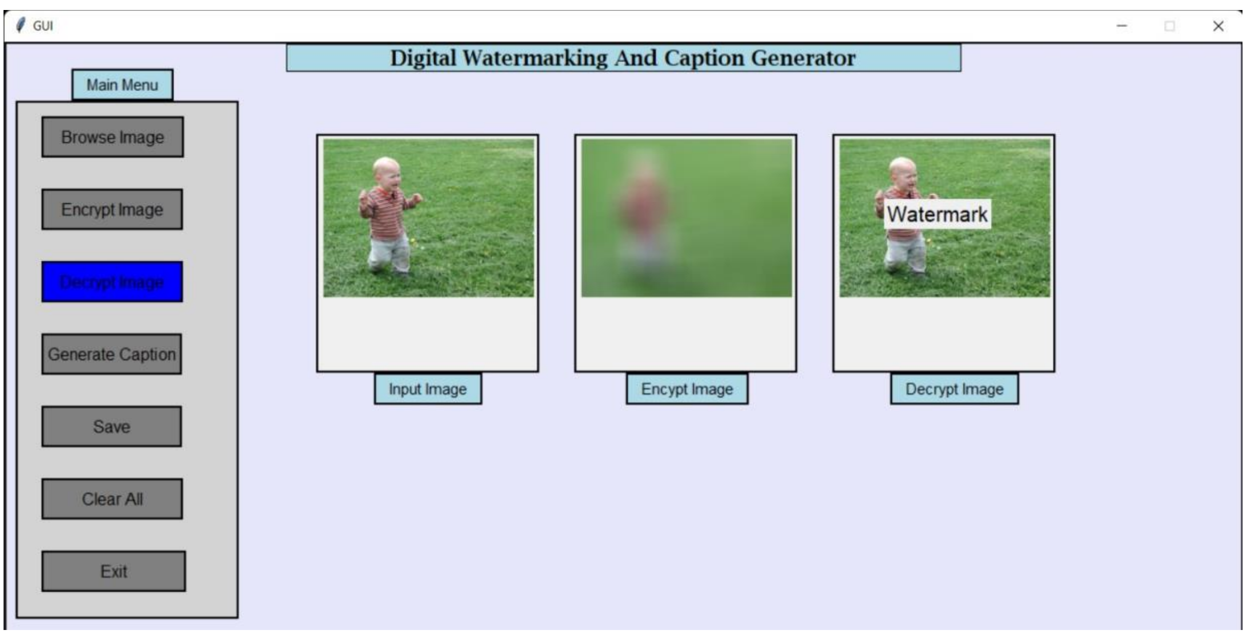


3. Encrypt Image



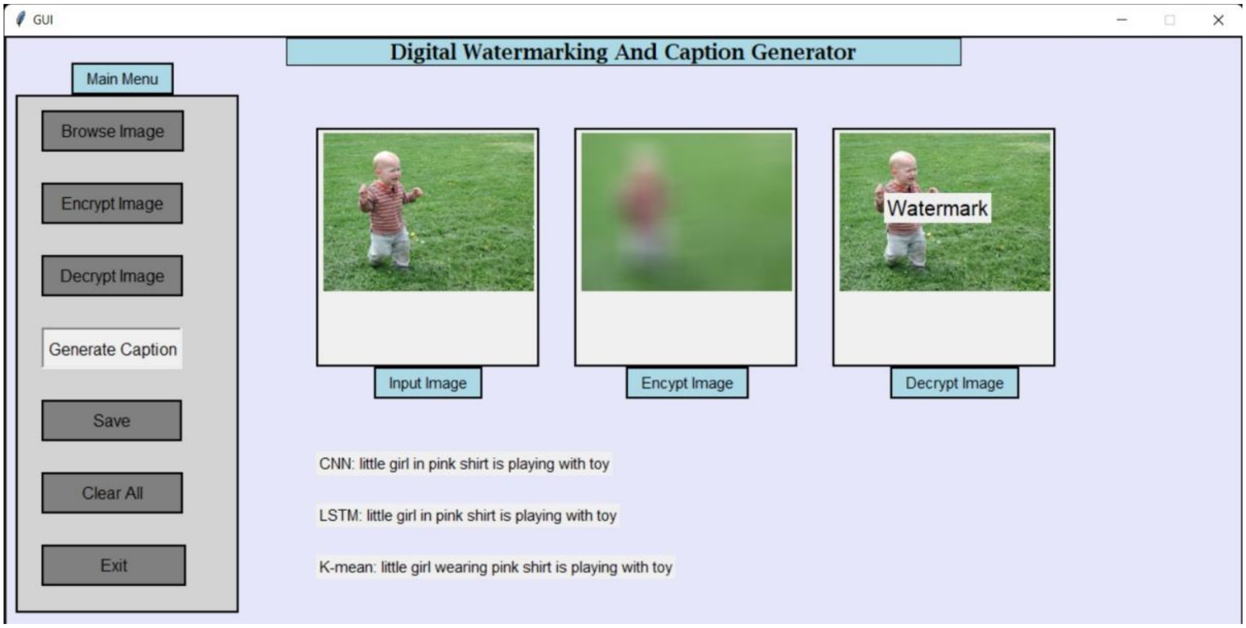
After browsing image , we have to encrypt that image. After encryption done ,we seen blur image on second image that means we successfully encrypt the image.

4. Decrypt Image



The next one is to decrypt that image. We successfully done image watermarking.

5. **Caption Generator**



The next one is to generate caption for that image

6. **Video Caption Generator**

And the last one is to generate caption for that image.

CHAPTER 9
SOFTWARE REQUIREMENT

9. Software Requirement

- **Technology :** Python
- **Frontend :** tkinter
- **Algorithm :** CNN , LSTM , NLP , KNN , AES , DES
- **Software :** Python version 3.10 and Pycharm community version
- **Dataset :** Flicker 8k ,30K

CHAPTER 10
CODING

10.Coding

```
from tkinter import *
from tkinter import filedialog
from PIL import Image
from PIL import ImageTk
import numpy as np
import cv2

#load the trained model to classify sign
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing.sequence import
pad_sequences
from tensorflow.keras.models import Model
from tensorflow.keras.applications.inception_v3 import
InceptionV3, preprocess_input
from pickle import dump, load
from tensorflow.keras.preprocessing.image import load_img,
img_to_array

base_model = InceptionV3(weights =
'inception_v3_weights_tf_dim_ordering_tf_kernels.h5')
vgg_model = Model(base_model.input, base_model.layers[-
2].output)


def preprocess_img(img_path):
    # inception v3 excepts img in 299*299
    img = load_img(img_path, target_size=(299, 299))
    x = img_to_array(img)
    # Add one more dimension
    x = np.expand_dims(x, axis=0)
    x = preprocess_input(x)
    return x


def encode(image):
    image = preprocess_img(image)
    vec = vgg_model.predict(image)
    vec = np.reshape(vec, (vec.shape[1]))
    return vec
```

```
pickle_in = open("wordtoix.pkl", "rb")
wordtoix = load(pickle_in)
pickle_in = open("ixtoword.pkl", "rb")
ixtoword = load(pickle_in)
max_length = 74


def greedy_search(pic):
    start = 'startseq'
    for i in range(max_length):
        seq = [wordtoix[word] for word in start.split() if word
in wordtoix]
        seq = pad_sequences([seq], maxlen=max_length)
        yhat = model.predict([pic, seq])
        yhat = np.argmax(yhat)
        word = ixtoword[yhat]
        start += ' ' + word
        if word == 'endseq':
            break
    final = start.split()
    final = final[1:-1]
    final = ' '.join(final)
    return final


def beam_search(image, beam_index=3):
    start = [wordtoix["startseq"]]
    while len(start_word[0][0]) < max_length:
        temp = []
        for s in start_word:
            par_caps = pad_sequences([s[0]], maxlen=max_length)
            e = image
            preds = model.predict([e, np.array(par_caps)])

            # Getting the top <beam_index>(n) predictions
            word_preds = np.argsort(preds[0])[-beam_index:]

            # creating a new list so as to put them via the
model again
            for w in word_preds:
                next_cap, prob = s[0][:], s[1]
```

```
                next_cap.append(w)
                prob += preds[0][w]
                temp.append([next_cap, prob])

        start_word = temp

        start_word = sorted(start_word, reverse=False,
key=lambda l: l[1])
        # Getting the top words
        start_word = start_word[-beam_index:]

    start_word = start_word[-1][0]
    intermediate_caption = [ixtoword[i] for i in start_word]

    final_caption = []

    for i in intermediate_caption:
        if i != 'endseq':
            final_caption.append(i)
        else:
            break

    final_caption = ' '.join(final_caption[1:])
    return final_caption


def on_enter1(p):
    bt1.config(bg='blue',fg='black')
def on_enter2(p):
    bt2.config(bg='blue',fg='black')
def on_enter3(p):
    bt3.config(bg='blue',fg='black')
def on_enter4(p):
    bt4.config(bg='blue',fg='black')
def on_enter5(m):
    bt5.config(bg="darkgreen", fg="black")
def on_enter6(n):
    bt6.config(bg="red",fg="black")
def on_enter7(n):
    bt7.config(bg="red",fg="black")
```

```
lb0=Label(win,text="Main
Menu",font=('bold',11),bg='lightblue',padx=13,pady=5,borderwidt
h=2,relief='solid')
lb0.place(x=63,y=24)

lb1 = Label(win, text="Digital Watermarking And Caption
Generator", bd=0,bg='lightblue',font=('Lucida
Bright',15,'bold'),width=50,borderwidth=1,relief='solid')
lb1.pack(padx=2, pady=0)

lb2=Label(win,width=30,height=33,bg='lightgray',borderwidth=2,r
elief='solid')
lb2.place(x=9,y=55)

lb3=Label(win,text="Input
Image",bg='lightblue',font=('bold',11),padx=13,pady=5,borderwid
th=2,relief='solid')
lb3.place(x=356,y=318)

lb3=Label(win,text="Encypt
Image",bg='lightblue',font=('bold',11),padx=13,pady=5,borderwid
th=2,relief='solid')
lb3.place(x=600,y=318)

lb3=Label(win,text="Decrypt
Image",bg='lightblue',font=('bold',11),padx=13,pady=5,borderwid
th=2,relief='solid')
lb3.place(x=856,y=318)

# lable to create border for image
lb4=Label(win,borderwidth=2,relief='solid',width=30,height=15)
lb4.place(x=300,y=87)

lb5=Label(win,borderwidth=2,relief='solid',width=30,height=15)
lb5.place(x=550,y=87)

lb6=Label(win,borderwidth=2,relief='solid',width=30,height=15)
lb6.place(x=800,y=87)

def encrypt():
    path = r'uploaded.jpg'
    image = cv2.imread(path)
```

```
    ksize = (30, 30)
    image = cv2.blur(image, ksize, cv2.BORDER_DEFAULT)
    cv2.imwrite("encrypt.jpg",image)
    uploaded = Image.open("encrypt.jpg")
    uploaded.thumbnail(((204), (224)))
    im = ImageTk.PhotoImage(uploaded)
    lb11.configure(image=im)
    lb11.image = im

def decrypt():
    uploaded = Image.open("uploaded.jpg")
    uploaded.thumbnail(((204), (224)))
    im = ImageTk.PhotoImage(uploaded)
    lb22.configure(image=im)
    lb22.image = im
    lb3 = Label(win, text="Watermark", font=('bold', 15))
    lb3.place(x=850, y=150)


def classify(file_path):
    global label_packed
    # filepath = Image.open("uploaded.jpg")
    enc = encode(file_path)
    image = enc.reshape(1, 2048)
    pred = greedy_search(image)

    lbl3 = Label(win, text="CNN: "+pred, font=('bold', 11))
    lbl3.place(x=300, y=400)
    beam_3 = beam_search(image)

    lbl4 = Label(win, text="LSTM: "+beam_3, font=('bold', 11))
    lbl4.place(x=300, y=450)
    beam_5 = beam_search(image, 5)

    lbl5 = Label(win, text="K-mean: "+beam_5, font=('bold',
11))
    lbl5.place(x=300, y=500)

def show_classify_button(file_path):

    classify_b=Button(win,text="Generate
Caption",bg="gray",font='Helvetica,13,bold',
```

```
fg='black',command=lambda:
classify(file_path),padx=0,pady=5,borderwidth=2,
relief='solid')
    # classify_b.configure(background='#364156',
foreground='white',font=('arial',10,'bold'))
    classify_b.place(x=34, y=280)

def upload_image():
    global file_path
    file_path = filedialog.askopenfilename()
    uploaded = Image.open(file_path)

    uploaded.thumbnail(((204), (224)))
    uploaded.save("uploaded.jpg")
    im = ImageTk.PhotoImage(uploaded)
    lb.configure(image=im)
    lb.image = im
    lb.configure(text='')
    lb.configure(text='')
    lb.configure(text='')
    show_classify_button(file_path)
def exit():
    win.destroy()

#To create buttons
bt1 = Button(win,text="Browse
Image",bg="gray",font='Helvetica,bold',fg='black',command=uploa
d_image,padx=13,pady=5,borderwidth=2,relief='solid')
bt1.place(x=34,y=70)

bt1.bind('<Enter>',on_enter1)
bt1.bind('<Leave>',on_leave1)

bt2=Button(win,text="Encrypt
Image",bg="gray",font='Helvetica,13,bold',fg='black',padx=13,pa
dy=5,borderwidth=2,relief='solid',command=encrypt)
bt2.place(x=34,y=140)

bt2.bind('<Enter>',on_enter2)
bt2.bind('<Leave>',on_leave2)
```

```
bt3=Button(win,text="Decrypt
Image",bg="gray",font='Helvetica,13,bold',fg='black',padx=12,pa
dy=5,borderwidth=2,relief='solid',command=decrypt)
bt3.place(x=34,y=210)

bt3.bind('<Enter>',on_enter3)
bt3.bind('<Leave>',on_leave3)

bt4=Button(win,text="Generate
Caption",bg="gray",font='Helvetica,13,bold',fg='black',padx=0,p
ady=5,borderwidth=2,relief='solid',command=classify)
bt4.place(x=34,y=280)

bt4.bind('<Enter>',on_enter4)
bt4.bind('<Leave>',on_leave4)

bt5=Button(win,text="Save",bg="gray",font='Helvetica,13,bold',f
g='black',padx=44,pady=5,borderwidth=2,relief='solid')
bt5.place(x=34,y=350)

bt5.bind('<Enter>',on_enter5)
bt5.bind('<Leave>',on_leave5)

bt6=Button(win,text="Clear
All",bg="gray",font='Helvetica,13,bold',fg='black',padx=33,pady
=5,borderwidth=2,relief='solid')
bt6.place(x=34,y=420)

bt6.bind('<Enter>',on_enter6)
bt6.bind('<Leave>',on_leave6)


bt7=Button(win,text="Exit",bg="gray",font='Helvetica,13,bold',f
g='black',padx=51,pady=5,borderwidth=2,relief='solid',command=e
xit)
bt7.place(x=34,y=490)

bt7.bind('<Enter>',on_enter7)
bt7.bind('<Leave>',on_leave7)

win.mainloop()
```

CHAPTER 11
APPLICATION AREA

11.Application Area

1. Visible watermarks can be used in following cases

- Visible watermarking for enhanced copyright protection. In such situations, where images are made available through Internet and the content owner is concerned that the images will be used commercially (e.g. imprinting coffee mugs) without payment of royalties. Here the content owner desires an ownership mark, that is visually apparent, but which doesn't prevent image being used for other purposes (e.g. scholarly research).

- Visible watermarking used to indicate ownership originals. In this case, images are made available through the Internet and the content owner desires to indicate the ownership of the underlying materials (library manuscript), so an observer might be encouraged to patronize the institutions that owns the material

2. Invisible robust watermarks find application in following cases:

- Invisible Watermarking to detect misappropriated images. In this scenario, the seller of digital images is concerned, that his, fee-generating images may be purchased by an individual who will make them available for free, this would deprive the owner of licensing revenue.

- Invisible Watermarking as evidence of ownership. In this scenario, the seller the digital images suspects one of his images has been edited and published without payment of royalties. Here the detection of the seller's watermark in the image is intended to serve as evidence that the published image is property of seller.

3. **Following are the applications of invisible fragile watermarks:**

- Invisible Watermarking for a trustworthy camera. In this scenario, images are captured with a digital camera for later inclusion in news articles. Here, it is the desire of a news agency to verify that an image is true to the original capture and has not been edited to falsify a scene. In this case, an invisible watermark is embedded at capture time its presence at the time of publication is intended to indicate that the image has not been attended since it was captured.
- Invisible Watermarking to detect alternation of images stored in a digital library. In this case, images (e.g. human fingerprints) have been scanned and stored in a digital library the content owner desires the ability to detect any alteration of the images, without the need to compare the images to the scanned materials.

Image Caption Generation has branched out into several applications ranging from assistive technology to agriculture and manufacturing sectors. The existing solutions use this deep learning application to aid visually impaired people by helping them understand their environment, in robotic and industrial applications by automating processes and limiting human intervention

CHAPTER 12
FUTURE SCOPE

12.Future Scope

As depicted in the image, we are able to implant a camera in the shoe's front face to capture real-time environment video and obtain a means to connect it wirelessly to the blind person's Bluetooth in-ear. The only difference now that this Arduino equipment is being used is that the annotations will be generated in a dynamic environment and made to be played on the blind person's Bluetooth device so that he can cross with more caution. This will undoubtedly reduce accidents and mishaps specifically involving blind people. Future scope is more than watermarking technique using robust and improve performance image processing attacks.

Future work Image captioning has become an important problem in recent days due to the exponential growth of images in social media and the internet. This report discusses the various research in image retrieval used in the past and it also highlights the various techniques and methodology used in the research. As feature extraction and similarity calculation in images are challenging in this domain, there is a tremendous scope of possible research in the future. Current image retrieval systems use similarity calculation by making use of features such as color, tags, IMAGE RETRIEVAL USING IMAGE CAPTIONING 54 histogram, etc. There cannot be completely accurate results as these methodologies do not depend on the context of the image. Hence, a complete research in image retrieval making use of context of the images such as image captioning will facilitate to solve this problem in the future. This project can be further enhanced in future to improve the identification of classes which has a lower precision by training it with more image captioning datasets. This methodology can also be combined with previous image retrieval methods such as histogram, shapes, etc. and can be checked if the image retrieval results get better.

CHAPTER 13
CONCLUSION

13. Conclusion

By creating a model based on LSTM-based CNN adept at screening and obtaining information from any provided image and converting it to a single-line phrase based on the natural language of English, we have overcome past limitations that were experienced in the field of image captioning. Although it is acknowledged that avoiding the overfitting of data can be challenging, we are happy to have succeeded in doing so. The algorithmic core of various attention methods received the majority of attention. Hereby, we may claim that we were successful in creating a model that is a vastly superior version of every other image caption generator that was previously available.

To embed a hidden robust watermark to digital multimedia is the ultimate goal of watermarking system. Digital watermarking technology is an emerging field in computer science, cryptology, signal processing and communications. We have discussed the algorithms for watermarking and dewater marking of image as part of the project. The watermarking research is more exciting as it needs collective concepts from all the fields along with Human Psychovisual analysis, Multimedia and Computer Graphics. The watermark may be of visible or invisible type and each has got its own applications. To maintain the security of the watermark, it should be embedded into randomly selected regions in some domain of the watermark signal. By doing this, it is difficult to remove the watermark.

This Project combines the DWT digital watermarking algorithm of the human visual system HVS model in the wavelet domain and proves it through a large number of simulation experiments. The DWT algorithm used in this paper can well resist JEPG compression attacks, noise attacks, scaling attacks and rotation for digital watermark attacks, including attacks and filtering attacks. This algorithm has good robustness against various watermark attacks. Therefore, it can be concluded that the proposed algorithm is an excellent image digital watermarking algorithm with large embedding information, imperceptibility and robustness.

Although deep learning-based image captioning methods have achieved a remarkable progress in recent years, a robust image captioning method that is able to generate high quality captions for nearly all images is yet to be achieved. With the advent of novel deep learning network architectures, automatic image captioning will remain an active research area for some time. We have used Flickr_8k dataset which includes nearly 8000 images, and the corresponding captions are also stored in the text file. Although deep learning -based image captioning methods have achieved a remarkable progress in recent years, a robust image captioning method that is able to generate high quality captions for nearly all images is yet to be achieved. With the advent of novel deep learning network architectures, automatic image captioning will remain an active research area for sometime. The scope of image-captioning is very vast in the future as the users are increasing day by day on social media and most of them would post photos. So this project will help them to a greater extent.

CHAPTER 14
REFERENCE

14.Reference

1. Theano Development Team, “A python framework for fast computation of mathematical expressions,” 2016.arXiv e-prints, abs/1605.02688
2. E. L. Merrer, P. Perez, and G. Tredan, “Adversarial frontier stitching for ´remote neural network watermarking,” arXiv preprint, arXiv:1711.01894, 2017
3. A. Verma, H. Saxena, M. Jaiswal and P. Tanwar, "Intelligence Embedded Image Caption Generator using LSTM based RNN Model," 2021 6th International Conference on Communication and Electronics Systems (ICCES), Coimbatre, India, 2021, pp. 963-967, doi: 10.1109/ICCES51350.2021.9489253.
4. V. Agrawal, S. Dhekane, N. Tuniya and V. Vyas, "Image Caption Generator Using Attention Mechanism," 2021 12th International Conference on Computing Communication and Networking Technologies (ICCCNT), Kharagpur, India, 2021, pp. 1-6, doi: 10.1109/ICCCNT51525.2021.9579967.
5. C. Amritkar and V. Jabade, "Image Caption Generation Using Deep Learning Technique," 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), Pune, India, 2018, pp. 1-4, doi: 10.1109/ICCUBEA.2018.8697360.
6. E. Mulyanto, E. I. Setiawan, E. M. Yuniarno and M. H. Purnomo, "Automatic Indonesian Image Caption Generation using CNN-LSTM Model and FEEH-ID Dataset," 2019 IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications (CIVEMSA), Tianjin, China, 2019, pp. 1-5, doi: 10.1109/CIVEMSA45640.2019.9071632.
7. L. Abisha Anto Ignatious., S. Jeevitha., M. Madhurambigai. and M. Hemalatha., "A Semantic Driven CNN – LSTM Architecture for Personalised Image Caption Generation," 2019 11th International Conference on Advanced Computing (ICoAC), Chennai, India, 2019, pp. 356-362, doi: 10.1109/ICoAC48765.2019.246867.

8. M. P. R, M. Anu and D. S, "Building A Voice Based Image Caption Generator with Deep Learning," 2021 5th International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India, 2021, pp. 943-948, doi: 10.1109/ICICCS51141.2021.9432091.
9. S. Li and L. Huang, "Context-based Image Caption using Deep Learning," 2021 6th International Conference on Intelligent Computing and Signal Processing (ICSP), Xi'an, China, 2021, pp. 820-823, doi: 10.1109/ICSP51882.2021.9408871.
10. T-Y LIN, M MAIRE, S BELONGIE et al., "Microsoft COCO:Common Objects in Context", Proceedings of the 2014 Euro-pean Conference on Computer Vision, pp. 740-755, 2014
11. A KARPATHY and F-F. LI, "Deep visualsemantic alignments for gen-erating image descriptions", Proceedings of the 2015 International Conference on Computer Vision and Pattern Recognition, pp. 3128-3137, 2015. [Google Scholar].
12. P J TANG, H L WANG and K S XU, "Multiobjective layer-wise optimization and multilevel probability fusion for image description generation using LSTM", Acta Automatica Sinica, vol. 44, no. 7, pp. 1237-1249, 2018. [Google Scholar].
13. M. Z. Hossain, F. SOHEL, M. F. SHIRATUDDIN and H. LAGA, "A Comprehensive Survey of Deep Learning for Image Captioning," ACM Journals, vol. 51, no. 6, 14 Octomber 2018.

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DIGITAL WATERMARKING & CAPTION GENERATOR USING DEEP LEARNING

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Abstract –

This paper is discussing the use of Deep Neural Networks in watermarking multimedia digitally and for generating image captions. With the increase in the use of social media, it is becoming more important to have data security and integrity for the users. We are proposing using of Deep Neural Network algorithms to analyze and pre-process data sets to encrypt confidential data so that hackers cannot access it. The objective is to help users to have the copyright on their data. Our project is to watermark the image digitally and provide the secured content to the user and the original image can be extracted whenever needed with a security key provided by the host or admin. Using the AES algorithm, encryption and decryption of the image will be performed. Also , Another feature of this project is to give a detailed description of each image that is of what the picture actually consists of because some of the images cannot be recognized. Deep learning and machine vision are used to comprehend the context of a picture and add the appropriate captions to it. It entails categorizing a photograph with English keywords using datasets made accessible during model training. Using the imagenet dataset, the CNN classifier Xception also is trained. Xception handles the retrieval of image features. These extracted characteristics will change the LSTM model to produce the caption for the image.

Keywords - Image captioning, video captioning, Machine Learning, LSTM, neural network, image processing, Digital Watermarking, Encryption, Decryption.

I. INTRODUCTION

Science and business have both benefited greatly from image analysis, and this trend will continue. It has been used in a variety of contexts, including scene interpretation and perception of sights, to mention a few. A large number of researchers depended on imaging methods that worked well on rigid components in controlled environments using specialized equipment before the introduction of deep learning. Convolutional neural networks powered by deep learning have recently had a beneficial and significant impact on picture captioning, enabling significantly more versatility. In this article, we discuss new developments in the field of deep learning-based image and video labeling. Convolutional neural networks powered by deep learning have recently had a significant and beneficial impact on the field of picture captioning, offering significantly more freedom. In relation to the topic of deep learning, we have chosen to highlight current developments in the area of image and video annotation and also worked on Data that identifies the creator or owner of electronic intellectual property is known as a watermark. A digital watermark monitors how digital media is used online and issues a cautionary note about possible unauthorized access and/or use. Digital watermarks are a useful addition to DRM systems.

Figure 1.1 Working of Advance Encryption Standard (AES) Algorithm

AES 128 Encryption:

The most widely used method of encoding plain-text data using a 128-bit AES secret and a 128-digit AES key. In general, 128-bit AES encryption may also highlight how well-rounded the AES encryption score is. The AES key lengths of 128, 192, and 256 slots have little impact on the rectangle length of data combined with AES, which is still 128 parts.

AES 192 Encryption:

The process of using a 192-piece AES key to create encrypted plaintext records is referred to as 192-piece encryption using AES. The National Security Agency (NSA) uses 192-piece AES encryption, which aims for 12 more rounds to convert plaintext to ciphertext and guarantees that affiliation information is kept, hidden, and phenomenally covered.

AES 256 Encryption:

It is generally advised to use 256-cycle AES encryption when hiding plaintext data using AES assessment and a 256-bit key length.

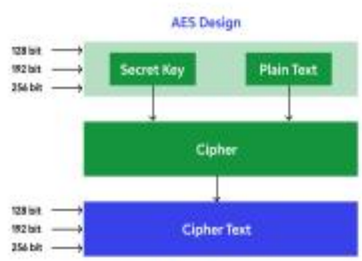

Figure 1.2 AES Design

II. LITERATURE SURVEY

A. Verma, H. Saxena, et al [1], this research undertakes the task of caption development with an LSTM and RNN based establishes an approach that relies on the same to produce effective and relevant captions by correctly training the dataset. Our model was effectively trained using the Flicker8k dataset. The model's precision is evaluated using standard evaluation measures.

V. Agrawal, S. Dhekane, et al [2], using a variety of techniques, involving DL, CV, and NLP, among others, the task is to produce concise captions. The system that produces the captions in this research makes use of an encoder as well as a decoder, along with an attention technique. It uses an RNN called GRU to supply the proper caption after first extracting the characteristics of the photograph using a CNN with prior training called Inception V3. The proposed model generates captions using a well-positioned attention algorithm. The MS-COCO dataset is used to train the algorithm. The results show that the model is capable of producing text and fairly understanding images.

C. Amritkar and V. Jabade et al [3], the model of regenerating neurons is created. It is reliant on computer imagery and machine translation. This method results in organic phrases that ultimately describe the image. RNN and CNN are additional elements of this strategy. The RNN is used to create sentences, while the CNN algorithm is employed to extract characteristics from images. When provided an input image, the simulation has been trained to generate titles that almost verbatim describe the image. On different datasets, the model's accuracy as well as its fluency or comprehension of the language it picks up from its visual representations are evaluated.

E. Mulyanto et al [4], this study is crucial because there isn't an Indonesian corpus for picture captioning. This research will contrast the experimental results in the FEEH-ID dataset with datasets in English, Chinese, and Japanese using the CNN and LSTM models. The performance of the suggested model in the test set indicates promise with scores of 60.0, down for BLEU-1 and 28.9 for BLEU-3, which are higher than normal for Bleu assessment results in other language datasets. The algorithm used to combine CNN and LSTM.

L. Abisha Anto Ignatius et al [5], the objects that have been recognised are given names using the semantic tags that are present in the image. The captions' ability to describe the objects more accurately is improved by including these factors contextual labels. The Sequence-to-Sequence language paradigm creates the captions one word at a time. The face identification algorithm uses the faces dataset, which includes the facial photos of 232 celebs, to find and identify celebrities' faces in pictures. The mentions of the people in the sentence were changed to their names to make personalized captions. Correlation and the Bilingual Evaluation Understudy measures were created to gauge the precision of the captions that were generated.
M. P. R, M. Anu et al [6], Using image descriptions is the best option for people whose work happen to be blind or who experience difficulty understanding visuals. If an individual's eyesight cannot be corrected, descriptive words can be generated as speech output when using a correlation-based picture caption generator. Today, the study of image processing will become more and more important, mostly for the sake of preserving lives.

S. Li and L. Huang et al [7], in the current encoding and decoding structure, the attention process is frequently used. The current image caption models, built on CNN and RNN, have issues like gradient explosion and are not very good at extracting important information from images. To solve these issues, the research suggests a procedure for creating context-based image captions. The procedure begins with labeling with SCST and LSTM, then progresses to feature extraction with SCST and scenario coding. The outcomes of the experiments show how successful the suggested approach is.

T-Y LIN et al [8], the information was thoroughly statistically analysed by the authors, who then contrasted it with PASCAL, SUNI, and ImageNet. Then, using a Deformable Parts Model, we show early functional testing for classifying identification and bounding box findings. The collection's images included 96 different object types that a 5-year-old could readily identify. Our dataset was developed using specialised software tools for subcategory recognition, case spotting, and instance segmentation, at a total of some million annotated occurrences in 3580 photographs.

A. Karpathy et al [9], the authors present an approach that can produce summaries of graphics and their areas in natural language. Our method uses records of images that have been explained in sentences to find the cross-modal connections between linguistic and visual data. Our alignment approach is based on CNN over image regions, concurrent ML algorithms throughout facial expressions and an organizational objective that coordinates the two categories using multimodal embedding.

P J TANG et al [10], the extra layers enhance and reserve the LSTM model. A weighted average method is used to combine the final forecast probability for each of the Soft maximum functions that are given the correct categorization layers during the test. Experimental results Flickr30K, MSCOCO, and collections show that our model is efficient and outperforms other comparable approaches on a number of assessment measures.

Rouhani's et al. [11] goal involved investigating a sparsely populated area to consider a collection of random photos and labels as a watermark. The watermark key is used to identify the key pairs and to fine-tune the target DNN model using watermark embedding. The intersection of the keys that the highlighted model adequately predicts and the unmarked model erroneously predicts forms the final WM key set. With the definitive Watermark key established, the investigation of the hypothetical hypothesis is performed in the multinomial distribution of the detection phase for the output prediction.

Automatically describing the content of a picture is the central issue in artificial intelligence identified by O. Vinyal et al. [12] and linking computer vision with natural language processing. In this research, A.L. thoroughly examines a deep neural network-based method for creating image captions. In this case, an image is an input, and the method's output takes the form of an English sentence that describes the image's content. Convolutional neural networks (CNN), recurrent neural networks (RNN), and sentence generation are the three parts of the method that they examine.

D. S. Whitehead et al. [13] current image captioning approaches generate descriptions that lack specific information, such as named entities involved in the images. Here, Di Lu and Spencer Whitehead suggested a brand-new task that creates evocative image descriptions from input photographs. We will train a CNN-LSTM model to be able to generate a caption based on the image as our straightforward answer to this issue.

Mohanarathinam et al. [14] paper is a study of watermarking techniques and their merits and demerits. Digital watermarking is the process of integrating confidential data into real information. Digital watermarking methods are divided into three broad groups based on the domain, the type of document (text, image, music, or video), and the perception of the viewer.

Ching-Sheng Hsu and Shu-Fen Tu [15] proposed in their a paper that Digital watermarking scheme is a common way of protecting copyright or verifying the integrity of digital images. Either spatial or frequency is the watermark's operational domain. Subsequent research attempts have focused on a different field that results from matrix factorization.

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To solve the description task, a model framework has recently been proposed. H. Wang et al. [17] have compiled all aspects of the image caption generation task, discussed the model framework, concentrated on the algorithmic core of various attention mechanisms, and summarised how the attention mechanism is used. They provided an overview of the sizable datasets and widely-used evaluation standards.

Krishnakumar et al[18] suggested an approach, which is based on multi label classification utilising quick Text and CNN, is effective for recognising and extracting objects from images, as well as generating captions depending on the datasets provided. And also discussed a variety of ways for Image Caption Generator, including (Recurrent Neural Network, Convolutional Neural Network, Long Short-Term Memory).

III. METHODOLOGY

In order to watermark a digital image, watermark information must first be embedded into a multimedia product. This information must then be recovered from or recognized by the watermark in the information product. These methods guarantee image insertion, content validation, authentication, and tamper resistance.

The entire endeavor is broken up into two modules, the first of which is for creating a digital stamp and the second of which is for creating captions described below briefly. Here, the word "digital watermark" refers to the process of using digital tools to embed a watermark into an input image and hide it during display. The watermark can serve as a visual representation of the content's uniqueness.

Module 1 - Digital Watermarking:

The method of watermarking involves encrypting or digitally combining the content. An electronic watermark is a type of marker that is subtly incorporated into a signal that can tolerate noise, such as audio, video, or picture data. It is usually used to establish who owns the copyright to a particular signal.

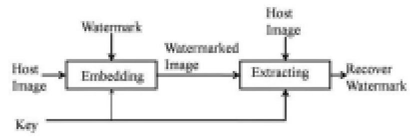

Figure 3.1 Digital Watermark Process Flow

According to the flow diagram provided, the picture is first received from the browser, sent for embedding, and then it appears as watermarked content from which the original image can be extracted using the security key. The ultimate image is shown once the aforementioned steps have been completed.

Module 2 - Caption Generator:

Compared to picture classification and object recognition, the job of automatically creating captions and detailing the image is noticeably more difficult. The narrative of a photo must include not only the items in the image but also the relationships between those items and the activities and characteristics that are depicted in the image [21].

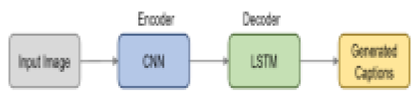

Figure 3.2 Caption Generation Process Flow

The foundation for common watermark techniques, which are broken down into procedures for incorporating and removing watermarks, is briefly revised in the first part of this study. The usual design criteria for judging the potency of watermarking systems are listed in the ensuing subsections. Because there are so many descriptions of similar apps, watermarking systems is now a very specialized area of study. Following that, a list of digital image watermarking techniques is provided according to their functional area.

The results of the research are then summarized in tabular form using the state-of-the-art methods described earlier. The foundation for common watermarking that have techniques, which are broken down into procedures for incorporating and removing watermarks, is briefly revised in the first part of this study. The usual design criteria for judging the potency of watermarking systems are listed in the ensuing subsections. Because there are so many descriptions of similar apps, watermarking systems is now a very specialised area of study. Following that, a list of digital image watermarking techniques is provided according to their functional area. The results of the research are then summarised in tabular form using the state-of-the-art methods described earlier.

The embedding and extraction steps of the digital image watermarking process are for an encrypted communications paradigm. The data embedding portion pre-processes the cover image before evaluating its entropy to determine what image's integrating ability data. The encoder then uses a secret key and an autofocus encoding method to embed a watermark image within the highly entropy-rich host image.The system then gathers data on a laser beam's phase and shape before creating the watermarked picture. Before beginning the watermark extraction procedure, the watermarked image must first undergo some pre-processing. The device then gathers data on the amplitudes and phases that shape the light source's beam patterns. The entropy of these radiation patterns is then calculated.

A large entropy value is selected during the watermark extraction to provide greater robustness and imperceptibility. The watermark picture is separated from the image with the watermark using the same key. The innovation demonstrates how straightforward, trustworthy, and undetectable it is to generate images that are input from the original image.

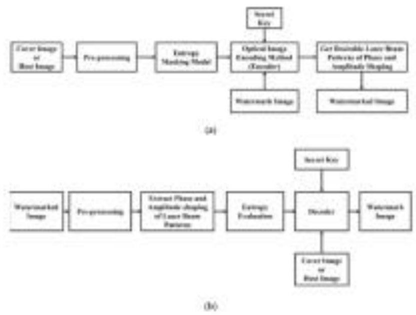

Fig. 3.3 (**a**) Watermark embedding, (**b**) watermark extraction.

As depicted in Fig. 3.3, the model is based on the Long short-term memory block, whichW is dependent on the LSTM without a peephole architecture. The LSTM's packet and gates are related in the ways listed below:

$$(1)\ \ i_1 = \sigma(W_{ix}x_1 + W_{im}m_{1-1})$$

$$(2)\ \ f_1 = \sigma(W_{fx}x_1 + W_{im}m_{1-1})$$

$$(3)\ \ o_1 = \sigma(W_{ox}x_1 + W_{om}m_{1-1})$$

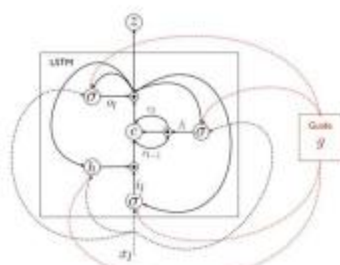

Fig. 3.4 LSTM Connection Diagram

Where the element-wise multiplication, hyperbolic tangent function, and sigmoid function are all noted. In the LSTM cell, the values il stand for the gate used for input, fl for the forgotten gate, ol for the gate that provides the output, cl for the current status of the memory cell in the unit, and ml to feed the hidden state, which also happens to be the result of the block processed in the LSTM.

The parameter values of the series at time step l is represented by the variable. The term "model parameters" refers to the quantity gives the loss function, where St is the generated sentence at time t. This loss is uniformly minimized for all LSTM and embedding of words settings.

IV. RESULT

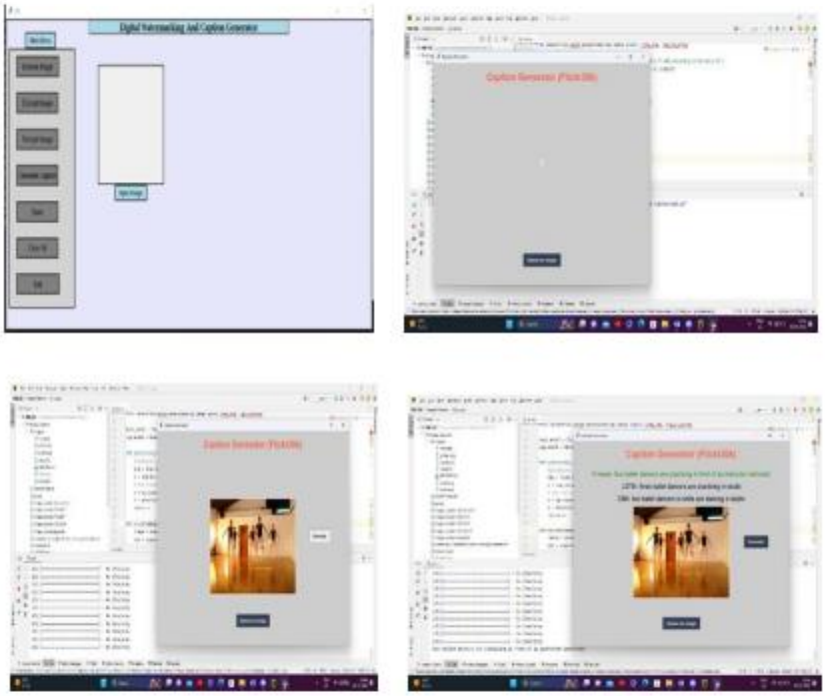

Fig. 4.1 Module 1 Result (Generating Captions for input images)

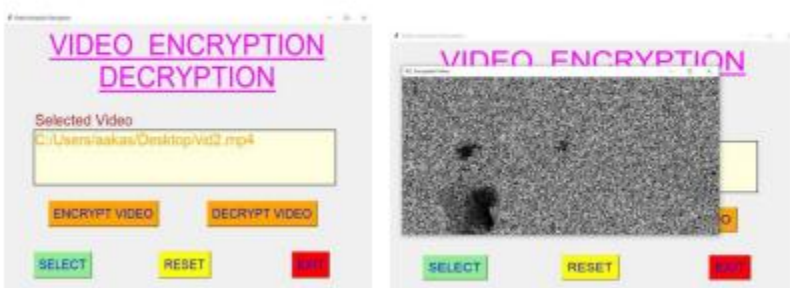

Fig. 4.2 Module 2 Result (Digital Watermarking)

V. CONCLUSION

This paper has highlighted the various techniques and algorithms used in an automatic digital watermark generator which can be used to provide facility to the users that they can encrypt their documentations or media files and send them to any other person without fear of hacking. It has also discussed the advantages and limitations of various watermarking technique. Also, this paper proposes to develop a web based interface for users to get the description of the image and to make a classification system in order to differentiate images as per their description. We have overcome previous restrictions in the field of image captioning by developing a model based on LSTM-based CNN capable of screening and extracting information from any given image or video and translating it to an interrelationship-line phrase focused in the natural language of English. By doing so, we can say that we succeeded in developing a model that is a greatly improved version of every other picture caption generator previously made available. And also with the fresh concept of digital watermarking technique to keep the user data safe and secure.

IV. REFERENCES

1. A. Verma, H. Saxena, M. **Jaiswal, thiab** P. Tanwar, **"Ib qho Intelligent** Embedded Image Caption Generator **Siv LSTM-Based** RNN **Modelleri",** 6th International Conference on Communication and **Electronic** Systems (ICCES), 2021, **Hindistan Coimbatore, 2021 , pab.**963-967, **Ministry of Interior:** 10.1109/ICCES51350.2021.9489253.

2. V. Agrawal, S. Dhekane, N. **Tuniya, thiab** V. Vyas, "Image Caption Generator **using** Attention **Mechanism",** 2021 12th International Conference on **Computational** Communication and Networking Technologies (ICCCNT), Kharagpur, **Hindistan,** 2021, **No**

3. .C. Amritkar and V. Jabade, **"Signature creation using deep learning techniques",** 2018 **4th** International Conference on **Computational** Communication Control and Automation (ICCUBEA), Pune, India, 2018, **p.** 1-4, doi: 10.1109/ICCUBEA.

4. Yuniarno **ve** M. H. Purnomo, "Automatic **Generation of** Indonesian **Imagery** using CNN-LSTM Model and FEEH-ID **Dataset",** 2019 IEEE International Conference on **Artificial** Intelligence and Virtual Environments for **Evaluation Measure** and **Use** (CIVEMSA), Tianjin, **Çin,** 2019, **s .** 1-5, doi: 10.1109/CIVEMSA45640.**The year is** 2019.9071632.

5. **Maduram Loj. thiab** M. Hemalatha., **"Semantics-Driven CNNs -** LSTM **Architectures** for **Personalized** Caption **Generation",** 2019 11th International Conference on Advanced Computing (ICoAC), Chennai, **Hindistan,** 2019, **s. 356-362 ,** doi: 10.

6. M. P. R, M. **Anu,** and D. S, **"Developing a speech-based image signaling machine using deep learning",** 2021 5th International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India, 2021, **page number** 943-948, **Ministry of Interior:** 10.1109/ICICCS51141.2021.9432091

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A REVIEW ON DIGITAL WATERMARKING AND CAPTION GENERATOR APPLICATION USING DEEP NEURAL NETWORK

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Abstract

This review paper is discussing the use of Deep Neural Networks in watermarking multimedia digitally and for generating image captions. With the increase in the use of social media, it is becoming more important to have data security and integrity for the users. The authors are proposing using Deep Neural Network algorithms to analyze and pre-process data sets to encrypt confidential data so that hackers cannot access it. Also in this paper, by using Long Short Term Memory Algorithm, how to automatically describe the content of images has been discussed. The objective is to help users to have the copyright on their data. The paper focuses on using DNN and LSTM techniques on Digital Watermarking and Caption Generators to achieve this goal.

Keywords: *Watermarking, Deep Learning, Video Summarization.*

I. INTRODUCTION

Inconspicuously embedded into a signal that can withstand noise, such as audio, video, or image data, a digital watermark is a sort of marking. To determine who owns the copyright to a certain signal, it is frequently utilised. Digital data is hidden within a carrier signal using the "watermarking" technique; the hidden data may or may not be connected to the carrier signal. The legitimacy or integrity of the carrier signal may be confirmed using digital watermarks, and their owners' identities may also be revealed. It is frequently used for banknote authentication and for tracking copyright violations.

Depending on the use case, a digital watermark may require different characteristics. A digital watermark needs to be fairly resistant to changes that can be made to the carrier signal to mark media files with copyright information. Instead, a delicate watermark would be used to assure integrity if it were necessary.

It is a fundamental and difficult task to automatically describe the content of photographs using natural language. Building models that can create captions for a picture is now achievable thanks to improvements in computer power and the accessibility of enormous datasets. Humans, however, can accurately describe the environments they are in. Given a picture, it's normal for a person to quickly skim over a vast amount of information about it. Although there has been a significant advancement in computer vision, it is still a relatively new task to allow a computer to describe an image that is sent to it in the form of a human-like sentence. Tasks like object recognition, action classification, image classification, attribute classification, and scene recognition are all possible.

II. LITERATURE REVIEW

The first method for incorporating watermarks into deep neural networks was first presented by Uchida et al. [1], who did this by incorporating the data into the weights of the DNN. It would be challenging to rapidly obtain access to model parameters because the majority of deep learning models are used as online help, especially for the prototypes that were taken. It therefore assumes that the stolen prototypes may be easily available nearby in order to retrieve the set of parameters.. DNN models are routinely targeted by adversaries as they are widely used and become more crucial. Opponents can steal the model and create a similar AI service.

If the opponent was successful in their attack, the related samples are known as "real opponents," and Merrer et al. [2] recommend constructing contentious patterns. In this method, the set of opposing samples is used as the WM key set to change the target neural network's decision boundary. Attacks fail, but the pictures persist. The watermark key consists of a variety of phoney and real enemies. The model is questioned and the null hypothesis is looked at utilising the Binary distribution during the watermark detection stage.

Three distinct key generation techniques—content-based, noise-based, and unrelated-based images—were introduced by Zhang et al. [3]. The user delivers the watermark key to the DNN model during the detection phase after precisely adjusting the pre-train model using watermark keys. The external service provider who eventually submits the Boolean decision classification threshold is this one.

Zhang et al. [3] introduced three different key generation schemes content-based, noise-based, and unrelated-based images. Pre-train model is accurately adjusted with watermark keys and in the detection phase, the user sends the watermark key to the DNN model. This is the external service provider that ultimately submits the threshold to classify the Boolean decision.

Rouhani's et al. [4] goal involved investigating a sparsely populated area to consider a collection of As a watermark, use random images and labels. The target DNN model is adjusted using watermark embedding and the watermark key to pinpoint the key pairs. the intersection of the keys that the model with the asterisks correctly predicts and the model without the asterisks erroneously predicts forms the final WM key set. With the definitive Watermark key established, the investigation of the hypothetical hypothesis is performed in the detection phase's multinomial distribution for output prediction.

Automatically describing the information in a picture is the central issue in artificial intelligence identified by O. Vinyal et al. [5] and linking computer vision with natural language processing. In this research, A.L. thoroughly examines a deep neural network-based method for creating image captions. In this case, an image is an input, and the method's output takes the form of an English sentence that describes the image's content. Convolutional neural networks (CNN), recurrent neural networks (RNN), and sentence generation are the three parts of the method that they examine.

D. S. Whitehead et al. [6] current image captioning approaches generate descriptions that lack specific information, such as named entities that are involved in the images. Here, Di Lu and Spencer Whitehead suggested a brand-new task that creates evocative image descriptions from input photographs. We will train a CNN-LSTM model to be able to generate a caption based on the image as our straightforward answer to this issue.

Mohanarathinam et al. [7] paper is a study of watermarking techniques and their merits and demerits. Integrating private data into actual information is done by digital watermarking. Depending on the domain, the type of document (text, image, music, or video), and the viewer's perception, there are three primary categories for digital watermarking techniques. In order to evaluate the performance of the watermarked photos, peak signal-to-noise ratio, mean square error, and bit error rate are utilized. across all media applications, including copyright protection, medical reports (MRI scans and X-rays), annotation, and privacy, for its specialized and modern viability management, watermarking of images has been thoroughly investigated.

Ching-Sheng Hsu and Shu-Fen Tu [8] proposed in their paper that a Digital watermarking scheme is a common way of protecting copyright or verifying the integrity of digital images. Either spatial or frequency is the watermark's operational domain. Subsequent research attempts have focused on a different field that results from matrix factorization. The host picture has a robust or delicate watermark, depending on the intended use. The goal of the suggested technique in this study is to simultaneously embed a strong and fragile watermark into the host image, allowing the proposed scheme to serve the twin purposes of copyright protection and tamper detection. Lastly, it offers some experiments to demonstrate how well the suggested approach works.

J. Aneja and others [9] discussed a convolutional approach for image captioning and showed that it performs on par with existing LSTM techniques. They also analyzed the differences between RNN-based learning and our method and found gradients of lower magnitude as well as overly confident predictions to be existing LSTM network concerns.

To solve the description task, a model framework has recently been proposed. H. Wang et al. [10] have compiled all aspects of the image caption generation task, discussed the model framework, concentrated on the algorithmic core of various attention mechanisms, and summarised how the attention mechanism is used. They provided an overview of the sizable datasets and widely-used evaluation standards.

Krishnakumar et al[11] suggested an approach, which is based on multi-label classification utilizing quick Text and CNN, which is effective for recognizing and extracting objects from images, as well as generating captions depending on the datasets provided. And also discussed a variety of ways for Image Caption Generators, including (Recurrent Neural Networks, Convolutional Neural Networks, and Long Short-Term Memory).

By fine-grained analysis and even numerous levels of reasoning, P. Anderson, X. He, C. Buehler, and others [12] suggested a Top-down visual attention method that has been widely employed in picture captioning and visual question answering (VQA). They presented a hybrid bottom-up and top-down attention mechanism in this work, allowing attention to be calculated at the level of objects and other prominent picture regions. This is the logical foundation on which to focus attention. In their method, the top-down process sets feature weightings while the bottom-up mechanism (based on Faster R-CNN) suggests image regions, each with an associated feature vector.

In their study, Aishwarya Naidu1, Satvik Vats, Gehna Anand, and Nalina V [13] proposed a deep learning model that effectively demonstrated the creation of an image caption generation tool by utilizing Long-Short-Term Memory (LSTM) and Recurrent Neural Networks (RNNs). The acquired findings for the fresh input photographs demonstrate that the trained model was able to identify relationships between different items in the images as well as the behaviors/positions of those objects (such as surfing, standing, sitting next to, etc.).

Li, J., Chen, X., Yu, C., and Li, X. [14] This work proposes an adaptive secure picture watermarking technique that integrates the encrypted hologram into the SFLCT domain based on entropy and edge entropy. The provided technique can be used to extract the watermark without requiring the host image.

For copyright protection, a blind resilient 3D mesh watermarking method based on visual saliency and wavelet coefficient vectors is proposed by Hamidi, M. et al.[15] in this study. To provide high imperceptibility and resilience, the suggested technique makes full use of mesh saliency and QIM quantization of wavelet coefficients.While the performance of imperceptibility is ensured by altering the embedding process in response to the visual saliency, the visual saliency, the robustness requirement is met by quantifying the wavelet coefficients using the QIM scheme.

III. EXISTING METHODOLOGY

Table 1. Comparison of Previously Developed Systems

Sr No.	Title of the Paper	Algorithm Used	Work	Reference
1.	"Embedding watermarks into deep neural networks,"	DNN(Deep Neural Network)	1. Embedding watermarks into deep neural networks by	[1]

			incorporating the data into the weights of the DNN	
2.	"Adversarial frontier stitching for 'remote neural network watermarking,"	RNN(Remote Neural Network)	Using neural networks enabling remote operation of a neural network (or any other machine learning model) to extract the watermark,	[2]
3.	"Using watermarking to protect the intellectual property of deep neural networks,"	DNN(Deep Neural Network)	This work focuses on black-box DNN watermarking, with which an owner can only verify his ownership by issuing special trigger queries to a remote suspicious model	[3]
4.	"Designs: a general approach for watermarking that protects deep learning models from infringement,"	Deep Learning	In this paper, an unique end-to-end IP protection architecture called DeepSigns is proposed the insertion of coherent digital watermarks in contemporary DL models	[4]
5.	, "A Neural Image Caption Generator,"	Convolutional neural networks(CNN) & recurrent neural networks (RNN)	In this, it anticipates a generative model that combines the most recent developments in computer vision and natural language translation to produce meaningful words that describe a picture. It is built on a deep recurrent neural network topology.	[5]
6.	"Entity aware Image Caption Generation, "in Empirical Methods in Natural Language Processing,	Convolutional neural networks (CNN) & LSTM	The paper proposes an end-to-end model which generates captions for images embedded in news articles	[6]
7.	Image Caption Generator using Deep Learning,	Deep Learning	Using CNN-LSTM architecture such that CNN layers will help in the extraction of the input data and LSTM will extract relevant information throughout the processing of input such that the current word acts as an input for the prediction of the next word.	[12]

8.	"Bottom-up and top-down attention for image captioning,"	R-CNN	This proposes a combined bottom-up and top-down attention mechanism that enables attention to be calculated at the level of objects and other salient image regions.	[13]
9.	An Adaptive and Secure Holographic Image Watermarking Scheme	the entropy and edge entropy	This work suggests an adaptive secure image watermarking technique based on entropy and edge entropy that incorporates the encrypted hologram into the SFLCT domain.	[15]
10.	Blind Robust 3D Mesh Watermarking for Copyright Protection Based on Mesh Saliency and Wavelet Transform Information	mesh saliency and QIM quantization of wavelet coefficients.	This work proposes a blind robust 3-D mesh watermarking approach for copyright protection based on mesh saliency and Quantization Index Modulation (QIM).	[16]

IV. PROPOSED METHODOLOGY

The paper introduces digital watermarking technology which is a data caching technique that embeds communication into a multimedia work similar to an image or textbook or other digital objects. The proposed application has several important operations; the majorly important is digital imprint protection. The digital watermarking system like any other data-hiding tool has conditions that make the digital watermark strong as possible. This design also proposes Image Summarization which aims to induce a short synopsis that summarizes the image content by opting for its most instructional and important corridor. The produced summary is generally composed of a set of representative image frames.

4.1 Proposed Methodology for Digital watermarking:

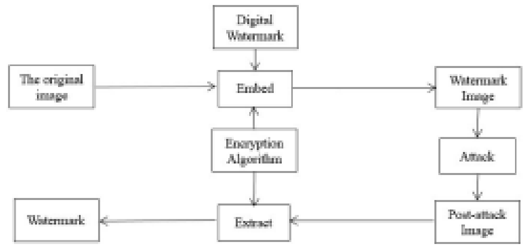
Digital watermarking is being used in numerous applications. Most of the current applications are devoted to copyright protection.

It has the following purposes in general:

Covert Communications: These are mainly applications of steganography.

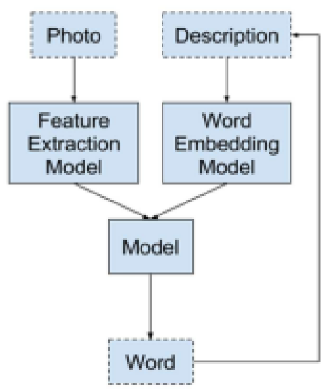
Authentication: For authentication purposes, fragile watermarks seem to be a good solution; a properly designed fragile watermarking algorithm should be able to detect any alterations.

Identification of Ownership: Robust watermarking algorithms are developed to identify the ownership of digital media



4.2 Proposed Methodology for Image Caption Generator:

The proposed model of the Image Caption Generator is shown in the above figure 1. Here in this model, an input image is given & then a convolutional neural network is used to create a dense feature vector as shown in the figure. This dense vector also called an embedding, this vector can be used as input into other algorithms, and it generates a suitable caption for a given image as output. For an image caption generator, this embedding becomes a representation of the image and is used as the initial state of the LSTM for generating meaningful captions, for the image.



V. CONCLUSION

This paper has highlighted the various techniques and algorithms used in an automatic digital watermark generator which can be used to provide a facility to the users that they can encrypt their documentations or media files and send them to any other person without fear of hacking. It has also discussed the advantages and limitations of various watermarking techniques. Also, this paper proposes to develop a web-based interface for users to get the description of the image and to make a classification system to differentiate images as per their description. It can also make the task of SEO easier which is complicated as they have to maintain and explore enormous amounts of data. The paper concludes that the algorithm's efficiency will increase over time as more data is fed into it. However, the results should be taken with caution, as the experiment was based on a limited dataset.

VI. ACKNOWLEDGEMENT

We would like to acknowledge the support and guidance of Dr. (Mrs.) Archana V. Dehankar in the development of the Digital Watermarking and Caption generator system using the Advanced Encryption Standard (AES) Algorithm and Long Short Term Memory Algorithm(LSTM) respectively. We would like to extend our gratitude to our colleagues and mentors who provided us with valuable insights and advice during the development of this system.

REFERENCES

1. Y. Uchida, Y. Nagai, S. Nakazawa, and S. Satoh, "Embedding watermarks into deep neural networks," in Proc. the 2017 ACM on International Conference on Multimedia Retrieval, pp. 269-277.

2. E. L. Merrer, P. Perez, and G. Tredan, "Adversarial frontier stitching for ´remote neural network watermarking," arXiv preprint, arXiv:1711.01894, 2017

3. J. Zhang, Z. Gu, J. Jang, H. Wu, M. P. Stoecklin, H. Huang, and I. Molloy, "Protecting the intellectual property of deep neural networks with watermarking," in Proc. the 2018 Asia Conference on Computer and Communications Security, pp. 159–172.

4. B. D. Rouhani, H. Chen, and F. Koushanfar, "Deepsigns: A generic watermarking framework for IP protection of deep learning models," arXiv preprint, arXiv:1804.00750, 2018.

5. O. Vinyals, A. Toshev, S. Bengio, and D. Erhan, "A Neural Image Caption Generator," CVPR 2015 Open Access Repository, vol. Xiv, 17 November 2020.

6. D. S. Whitehead, L. Huang, H., and S.-F. Chang, "Entity aware Image Caption Generation, "in Empirical Methods in Natural Language Processing, Brussels, 2018.

7. Mohanarathinam, A.; Kamalraj, S.; Venkatesan, G.P.; Ravi, R.V.; Manikandababu, C.S. Digital Watermarking Techniques for Image Security: A Review. J. Ambient Intell. Humans. Comput. 2019, 1–9.

8. Hsu, C.S.; Tu, S.F. Digital Watermarking Scheme for Copyright Protection and Tampering Detection. Int. J. Inf. Technol. Secur. 2019, 11, 107–119.

9. J. Aneja, A. Deshpande, and S. Alexander, "Convolutional image captioning," in Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, Salt Lake City, UT, USA, June 2018.

10. Haoran Wang, Yue Zhang, and Xiaosheng Yu, An Overview of Image Caption Generation Methods, Published: 09 Jan 2020

11. Krishnakumar, K.Kousalya, S.Gokul, R.Karthikeyan D.Kaviyarasu, Image Caption Generator using Deep Learning, International Journal of Advanced Science and Technology, Vol. 29, No. 3s, (2020), pp. 975-980 ISSN: 2005-4238 IJAST

12. P. Anderson, X. He, C. Buehler et al., "Bottom-up and top-down attention for image captioning," in Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, Salt Lake City, UT, USA, June 2018.

13. Aishwarya Naidu1, Satvik Vats, Gehna Anand, Nalina V, A Deep Learning Model for Image Caption Generation, Published: 30/June/2020

14. Yu, C.; Li, X.; Chen, X.; Li, J. An Adaptive and Secure Holographic Image Watermarking Scheme. Entropy 2019, 21, 460.

15. Hamidi, M.; Chetouani, A.; El Haziti, M.; El Hassouni, M.; Cherifi, H. Blind Robust 3D Mesh Watermarking Based on Mesh Saliency and Wavelet Transform for Copyright Protection. Information 2019, 10, 67.

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Tulsi Mundada

From

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Poster for the project “**Digital Watermarking and Caption Generator Using Deep Neural Network**”.

Priyadarshini College of Engineering, Nagpur

Department of Computer Technology (Session 2022-23)

“DIGITAL WATERMARKING AND CAPTION GENERATOR USING DEEP NEURAL NETWORK”

Name of Guide : Dr.Mrs.Archana Dehankar

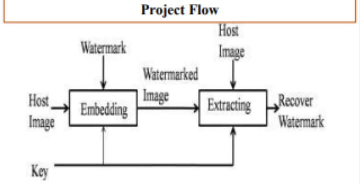
Name of Projectees: Tulsi Mundada , Pranali Kadukar ,Khushi Sahu ,Sakshi Kubde ,Dhyananda Ittadwar

ABSTRACT: This paper is discussing the use of Deep Neural Networks in watermarking multimedia digitally and for generating image captions. With the increase in the use of social media, it is becoming more important to have data security and integrity for the users. We are proposing using of Deep Neural Network algorithms to analyze and pre-process data sets to encrypt confidential data so that hackers cannot access it. The objective is to help users to have the copyright on their data. Our project is to watermark the image digitally and provide the secured content to the user and the original image can be extracted whenever needed with a security key provided by the host or admin. Using the AES algorithm, encryption and decryption of the image will be performed. Also , Another feature of this project is to give a detailed description of each image that is of what the picture actually consists of because some of the images cannot be recognized. Deep learning and machine vision are used to comprehend the context of a picture and add the appropriate captions to it. It entails categorizing a photograph with English keywords using datasets made accessible during model training.

INTRODUCTION: Science and business have both benefited greatly from image analysis, and this trend will continue. It has been used in a variety of contexts, including scene interpretation and perception of sights, to mention a few. A large number of researchers depended on imaging methods that worked well on rigid components in controlled environments using specialized equipment before the introduction of deep learning. Convolutional neural networks powered by deep learning have recently had a beneficial and significant impact on picture captioning, enabling significantly more versatility. In this article, we discuss new developments in the field of deep learning-based image and video labeling. Convolutional neural networks powered by deep learning have recently had a significant and beneficial impact on the field of picture captioning, offering significantly more freedom. In relation to the topic of deep learning, we have chosen to highlight current developments in the area of image and video annotation and also worked on Data that identifies the creator or owner of electronic intellectual property is known as a watermark. A digital watermark monitors how digital media is used online and issues a cautionary note about possible unauthorized access and/or use. Digital watermarks are a useful addition to DRM systems.

Working:

Project Flow



CO’S:

CO1: Acquire a sound technical knowledge for problem identification and formulation through the prior knowledge, literature, review and original ideas.

CO2: Use software engineering tools to analyse, design,implement, validate and maintain a project.

CO3:Develop solution to the identified problems by applying and integrating the knowledge acquired through- out his/her undergraduate study and modern techniques.

CO4: Prepare and present a well-organised progress of a project written and verbal form periodically.

CO5:Work in a team and communicate with superiors, peers and the community.

CO6:To publish and share their project works with outside world at national and international level.

PO'S:

1.Engineering knowledge: Apply the knowledge of mathematics, science engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2.Problem analysis: Identify, formulate review literature ,and analyze complex engineering problem reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences

3. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modem engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

4. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

5. Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

6. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

7. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

8. Project management and finance: Demonstrate Knowledge under standing of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

9. Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Publication:

“A review on Digital Watermarking and Caption Generator Using Deep Neural Network” NOVYI MIR Research Journal | ISSN: 0130-7673

Future Scope:

This project can be enhanced in future to improve the identification of classes which has a lower precision by training it with more image captioning datasets. This methodology can also be combined with previous image retrieval methods such as histogram, shapes, etc. and can be checked if the image retrieval results get better.

Applications:

1. Used for Security Purposes
2. Used for generating captions for the image
3. Watermarking is Used in security and owner identification is needed in multimedia securities

Conclusion:

This paper has highlighted the various techniques and algorithms used in an automatic digital watermark generator which can be used to provide facility to the users that they can encrypt their documentations or media files and send them to any other person without fear of hacking. Also, this paper proposes to develop a web based interface for users to get the description of the image and to make a classification system in order to differentiate images as per their description.

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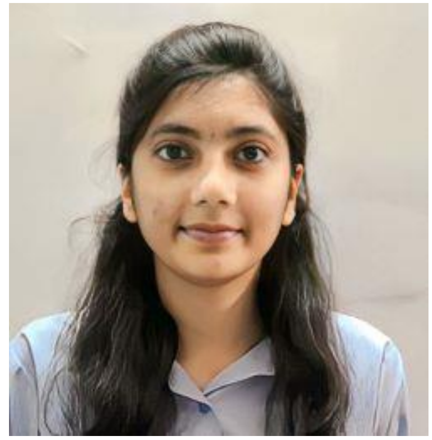
Tulsi Mundada **Address:** Sunder niwas, Old mondha, Nanded, 431603 **Email:** tulsimundada@gmail.com **Mobile No.:** +91- 8830976055	
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Projectees at a Glance

Project Relevance with Project Outcomes

Priyadarshini College of Engineering, NagpurDepartment of Computer Technology

Session (2022-2023)

Course Outcomes of Final Year Project, Program Outcomes

and Program SpecificOutcomes Mappings

By the end of the course, the students will be able to:

CO 1	Acquire a sound technical knowledge for problem identification and formulation through the prior knowledge, literature, review and original ideas.
CO 2	Use software engineering tools to analyse, design, implement, validate and maintain a project
CO 3	Develop solution to the identified problems by applying and integrating the knowledge acquired throughout his/her undergraduate study and modern techniques.
CO 4	Prepare and present a well-organised progress of a project in written and verbal form periodically.
CO 5	Work in a team and communicate with superiors, peers and the community.
CO 6	To publish and share their project works with outside world at national and international level.

Program Outcomes

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public healthand safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, andmodern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding ofthe limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverseteams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of theengineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independentand life-long learning in the broadest context of technological change.

Program Specific Outcomes

1. An ability to analyze a problem and identify its solution by applying knowledge of computing andfundamental concepts appropriate to the discipline.
2. An ability to design and develop a computerized systems using conventional and modern techniques, toolsfor solving real world engineering problems of varying complexity.
3. An ability to employ the knowledge of Programme specific domains for professional growth and pursuinghigher education to meet the current industrial needs.

		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO	1	3	3	-	-	-	-	-	-	-	-	-	3	3	-	3
CO	2	3	-	-	-	3	-	-	-	-	-	-	3	3	3	3
CO	3	3	3	3	3	3	-	-	-	-	-	3	3	-	3	3
CO	4	3	-	-	-	-	-	-	3	3	3	3	3	3	3	3
CO	5	-	-	-	-	-	-	-	3	3	3	3	3	-	-	-
CO	6	-	-	-	-	-	-	-	3	3	3	-	3	3	-	3
Cavg		3	3	3	3	3	-	-	3	3	3	3	3	3	3	3

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W	URL: https://www.researchgate.net/publication/325480419_Protecting_Intellectual_Property_of_Deep_Ne... Fetched: 10/16/2019 10:32:29 AM	1