DETECTING THE MOVEMENT OF OBJECTS WITH WEB CAM

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ABSTRACT

Various Methods Are Used In Motion Detection Of A Particular Interest. Each Algorithm Is Found Efficient In One Way. But There Exists Some Limitation In Each Of Them. This Paper Proposes A Method For Detecting The Motion in a Particular Region Being Observed. The Motion Tracking Surveillance Has Gained A Lot Of Interests Over Past Few Years. This System Is Brought Into Effect Providing Relief To The Normal Video Surveillance System Which Offers Time-Consuming Reviewing Process. Through The Study And Evaluation Of Products, We Propose A Motion Tracking System Consisting Of Its Method For Motion Detection . In Our Proposed System Those Disadvantages Are Omitted And Combining The Usage Of Best Method We Are Creating A New Motion Detection Algorithm For Our Proposed Motion Tracking System.

INTRODUCTION

Motion detection is the process of detecting a change in the position of an object relative to its surroundings or a change in the surroundings relative to an object. Motion detection can be achieved by either mechanical or electronic methods.When motion detection is accomplished by natural organisms, it is called motion perception.A motion detector is a device that detects moving objects, particularly people. Such a device is often integrated as a component of a system that automatically performs a task or alerts a user of motion in an area.. An occupancy sensor detects the presence of an entity within a certain space.Motion controllers are also used for video game consoles as game controllers. A camera can also allow the body's movements to be used as an input device, such as in the Kinect system.In video editing motion estimation is a type of video compression scheme. The motion estimation process is done by the coder to find the motion vector

pointing to the best prediction macroblock in a reference frame or field.

EXISTING SYSTEM:

Digital surveillance systems are mostly specifically designed for commercial use and it has always been out of reach for other users. The cost for CCD cameras,networking devices and the software designed for this system has made it inaccessible and impractical for home users with moderate requirements. Also, not all the existing products have the motion detection function. In traditional systems for security operations, cameras are used to deliver analogue video images to monitors or time-lapse video cassette recorders (VCR). Although many local image processing functions are possible to improve the system application, this requires a lot of processing resources and high-powerconsuming hardware. Although Digital video surveillance and security systems are widely used, analogue systems still serve as a cheaper alternative.

Drawbacks of existing systems:

1.Used for Commercial purposes.

2. Inaccessible to the other users(common people).

3. CCD cameras, networking devices are Expensive.

4. Absence of motion detection functionality.

5. Requires a lot of processing resources.

PROPOSED PROJECT:

In this we are going to write a python program which is going to analyse the images taken from the webcam and try to detect the movement.Videos can be treated as a stack of pictures called frames. Here I am comparing different frames(pictures) to the first frame which should be static(No movements initially). We compare two images by comparing the intensity value of each pixel.In my project,I used Python Programming Language and its most important and specific libraries OpenCV which is most required for solving problems related to images and videos and this is an Open Source Computer Vision based personal project to detect Human Faces and different objects coming in front of the webcam for a specific time frame.This python scripts detects movement on your web-cam and outlines the moving object on your computer screen.

Advantages:

1. Requires less memory.

2. Analysis is done automatically.

3. Alert systems may be implemented automatically when the motion is detected.

2.SYSTEMDESIGN AND SPECIFICATION

MOTION DETECTORS:

Motion sensors and detectors have been around since the seventies and are designed to provide effective security to homeowners. Although technological

advancements have improved the functioning of motion detectors, the basic purpose and system of this device remains the same. A motion detector is basically designed to detect motion or movement in a designated area and may instantly send a signal to the security alarm system. A motion detector is a device that detects moving objects, particularly people. Such a device is often integrated as a component of a system that automatically performs a task or alerts a user of motion in an area.energy efficiency, and other useful systems.

How motion detection cameras work:

Monitoring your data centers and building access points with CCD cameras can represent a boon to your overall security, but you need to know a little about camera terminology to make the best use of them. Don't think about "aim and shoot" when you think about these cameras. Think, instead, about how you might go about detecting motion in a series of still images. First off, let's examine the term "CCD". This stands for "charge-coupled device". A CCD is a silicon chip with a surface that is divided into light-sensitive pixels. When light hits these pixels, tiny electric charges are generated. With enough of these pixels, you can get a fairly high resolution image. With adequate "sensitivity" you can detect motion even in a dimly lit room.

The difference between digital cameras and security cameras is in their basic way of working. Digital cameras store images when you tell them to. Security cameras only provide images (save and transmit them) when they detect motion. And

motion detection is basically the process of comparing sequential images and determining whether the differences between them represent motion.

3.SYSTEM REQUIREMENTS:

3.1 HARDWARE REQUIREMENTS:
System   : MINIMUM i3.

Hard Disk   : 40 GB.

Ram   : 4 GB.

3.2 SOFTWARE REQUIREMENTS:

Operating System : Windows 8

Coding Language : Python 3.7

3.3 SYSTEM STUDY

FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

ECONOMICAL FEASIBILITY

TECHNICAL FEASIBILITY

SOCIAL FEASIBILITY

ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available.

Only the customized products had to be purchased.

TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it.

His level of confidence must be raised so that he is also able to make some .

4.SYSTEM DESIGN

4.1 IMPLEMENTATION: MODULES:

1.Add Product Details

To build project I used some sample products image to train product identification models

2.Train Model

In this Module screen train model generated with 100% accuracy and now show product to web cam.

3. Add/Remove Product from basket

To allow application to identify product image and then show in text area and if we again show same product then application will remove from text area

5.SOFTWARE ENVIRONMENT

What is Python :Below are some

facts about Python.

Python is currently the most widely used multi-purpose, high-level programming language.

Advantages of Python :-

Let's see how Python dominates over other languages.

1. Extensive Libraries

Python downloads with an extensive library and it contain code for various

purposes like regular expressions, documentation-generation, unit-testing, web browsers, threading, databases, CGI, email, image manipulation, and more. **2. Extensible**

As we have seen earlier, Python can be extended to other languages. You can write some of your code in languages like C++ or C. This comes in handy, especially in projects.

3. Embeddable

Complimentary to extensibility, Python is embeddable as well. You can put your Python code in your source code of a different language, like C++. This lets us add scripting capabilities to our code in the other language.

4. Improved Productivity

The language's simplicity and extensive libraries render programmers more productive than languages like Java and C++ do. Also, the fact that you need to write less and get more things done. **5. IOT Opportunities**

Since Python forms the basis of new platforms like Raspberry Pi, it finds the future bright for the Internet Of Things. This is a way to connect the language with the real world.

6. Simple and Easy

When working with Java, you may have to create a class to print 'Hello World'. But in Python, just a print statement will do. It is also quite easy to learn, understand, and code.

7. Readable

Because it is not such a verbose language, reading Python is much like reading English. This is the reason why it is so easy to learn, understand, and code.

8. Object-Oriented

This language supports both the procedural and objectoriented programming paradigms. While functions help us with code reusability, classes and objects let us model the real world. A class allows the encapsulation of data and functions into one.

9. Free and Open-Source

Like we said earlier, Python is freely available. But not only can you download Python for free, but you can also download its source code, make changes to it, and even distribute it. It downloads with an extensive collection of libraries to help you with your tasks.

10. Portable

When you code your project in a language like C++, you may need to make some changes to it if you want to run it on another platform. But it isn't the same with Python.

Advantages of Python Over Other Languages 1. Less Coding

Almost all of the tasks done in Python requires less coding when the same task is done in other languages. Python also has an awesome standard library support, so you don't have to search for any thirdparty libraries to get your job done **2. Affordable**

Python is free therefore individuals, small companies or big organizations can leverage the free available resources to build applications

3. Python is for Everyone

Python code can run on any machine whether it is Linux, Mac or Windows. Programmers need to learn different languages for different jobs but with Python, you can professionall

Disadvantages of Python

So far, we've seen why Python is a great choice for your project. But if you choose it, you should be aware of its consequences as well. Let's now see the downsides of choosing Python over another language.

1. Speed Limitations

We have seen that Python code is executed line by line. But since <u>Python</u> is interpreted, it often results in slow execution. This, however, isn't a problem unless speed is a focal point for the project.

2. Weak in Mobile Computing and Browsers

While it serves as an excellent server-side language, Python is much rarely seen on the client-side. Besides that, it is rarely ever used to implement smartphonebased applications. One such application is called Carbonnelle.

3. Design Restrictions

As you know, Python is dynamicallytyped. This means that you don't need to declare the type of variable while writing the code.

4. Underdeveloped Database Access Layers

Compared to more widely used technologies like JDBC (Java DataBase Connectivity) and ODBC (Open DataBase Connectivity)

5. Simple

No, we're not kidding. Python's simplicity can indeed be a problem. Take my example. I don't do Java, I'm more of a Python person. To me, its syntax is so simple that the verbosity of Java code seems unnecessary.

6.History of Python

What do the alphabet and the programming language Python have in common? Right, both start with ABC. If we are talking about ABC in the Python context, it's clear that the programming language ABC is meant. ABC is a generalpurpose programming language and programming environment, which had been developed in the Netherlands, Amsterdam, at the CWI (Centrum Wiskunde &Informatica). The greatest achievement of ABC was to influence the design of Python.Python was conceptualized in the late 1980s. **What is Machine Learning : -**

Before we take a look at the details of various machine learning methods, let's start by looking at what machine learning is, and what it isn't. Machine learning is often categorized as a subfield of artificial intelligence, but I find that categorization can often be misleading at first brush. The

study of machine learning certainly arose from research in this context, but in the data science application of machine learning methods, it's more helpful to think of machine learning as a means of building models of data.

Categories Of Machine Leaning :-

Supervised learning involves somehow modeling the relationship between measured features of data and some label associated with the data; once this model is determined, it can be used to apply labels to new, unknown data. This is furthersubdivided into classification tasks and regression tasks: in classification, the labels are discrete categories, while in regression, the labels are continuous quantities. We will see examples of both types of supervised learning in the following section.

Need for Machine Learning:-

Human beings, at this moment, are the most intelligent and advanced species on earth because they can think, evaluate and solve complex problems. On the other side, AI is still in its initial stage and haven't surpassed human intelligence in many aspects. Then the question is that what is the need to make machine learn? The most suitable reason for doing this is, "to make decisions, based on data, with efficiency and scale".

Challenges in Machines Learning :-

While Machine Learning is rapidly evolving, making significant strides with cybersecurity and autonomous cars, this segment of AI as whole still has a long way to go. The reason behind is that ML has not been able to overcome number of challenges. The challenges that ML is facing currently are –

Applications of Machines Learning :applications of ML – Emotion analysis

Sentiment analysis

Error detection and prevention

Weather forecasting and prediction **How**

to start learning ML?

This is a rough roadmap you can follow on your way to becoming an insanely talented Machine Learning Engineer. Of course, you can always modify the steps according to your needs to reach your desired end-goal!

Step 1 – Understand the Prerequisites

In case you are a genius, you could start ML directly but normally, there are some prerequisites that you need to know which include Linear Algebra, Multivariate Calculus, Statistics, and Python. And if you don't know these, never fear! You don't need a Ph.D. degree in these topics to get started but you do need a basic understanding.

(a) Learn LinearAlgebra and Multivariate Calculus

Both Linear Algebra and Multivariate Calculus are important in Machine Learning. However, the extent to which you need them depends on your role as a data scientist.

(b) Learn Statistics

Data plays a huge role in Machine Learning. In fact, around 80% of your time as an ML expert will be spent collecting and cleaning data. And statistics is a field that handles the collection, analysis, and presentation of data. So it is no surprise that you need to learn it!!! **(c) Learn Python**

Some people prefer to skip Linear Algebra, Multivariate Calculus and Statistics and learn them as they go along with trial and error. But the one thing that you absolutely cannot skip is <u>Python</u>! While there are other languages you can use for Machine Learning like R, Scala, etc. Python is currently the most popular language for ML.

Advantages of Machine learning :1.

Easily identifies trends and patterns

Machine Learning can review large volumes of data and discover specific trends and patterns that would not be apparent to humans. For instance, for an e-commerce website like Amazon.

2. No human intervention needed (automation)

With ML, you don't need to babysit your project every step of the way. Since it means giving machines the ability to learn, it lets them make predictions and also improve the algorithms on their own.

3. Continuous Improvement

As ML algorithms gain experience, they keep improving in accuracy and efficiency. This lets them make better decisions. Say

you need to make a weather forecast model. As the amount of data you have keeps growing, your algorithms learn to make more accurate predictions faster.

4. Handling multi-dimensional and multi-variety data

Machine Learning algorithms are good at handling data that are multi-dimensional and multi-variety, and they can do this in dynamic or uncertain environments. **5. Wide Applications**

You could be an e-tailer or a healthcare provider and make ML work for you. Where it does apply, it holds the capability to help deliver a much more personal experience to customers while also targeting the right customers.

Disadvantages of Machine Learning :1. Data Acquisition

Machine Learning requires massive data sets to train on, and these should be inclusive/unbiased, and of good quality. There can also be times where they must wait for new data to be generated. **2. Time and Resources**

ML needs enough time to let the algorithms learn and develop enough to fulfill their purpose with a considerable amount of accuracy and relevancy. It also needs massive resources to function. This can mean additional requirements of computer power for you.

3. Interpretation of Results

Another major challenge is the ability to accurately interpret results generated by the algorithms. You must also carefully choose the algorithms for your purpose. **4. High error-susceptibility**

Machine Learning is autonomous but highly susceptible to errors. Suppose you train an algorithm with data sets small enough to not be inclusive. You end up with biased predictions coming from a biased training set. This leads to irrelevant advertisements being displayed to customers.

Python Development Steps :

Guido Van Rossum published the first version of Python code (version 0.9.0) at alt.sources in February 1991. This release included already exception handling, functions, and the core data types of list, dict, str and others. It was also object oriented and had a module system. Python version 1.0 was released in January 1994. The major new features included in this release were the functional programming tools lambda, map, filter and reduce, which Guido Van Rossum never liked.Six and a half years later in October 2000, Python 2.0 was introduced.

Modules Used in Project :Tensorflow

TensorFlow is a free and opensource software library for dataflow and differentiable programming across a range of tasks. It is a symbolic math library, and is also used for machine learning applications such as neural networks. It is

used for both research and production at Google.

Numpy

Numpy is a general-purpose arrayprocessing package. It provides a highperformance multidimensional array object, and tools for working with these arrays.

Pandas

Pandas is an open-source Python Library providing high-performance data manipulation and analysis tool using its powerful data structures. Python was majorly used for data munging and preparation. It had very little contribution towards data analysis. Pandas solved this problem.

Matplotlib

Matplotlib is a Python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms.

Scikit – learn

Scikit-learn provides a range of supervised and unsupervised learning algorithms via a consistent interface in Python. It is licensed under a permissive simplified BSD license and is distributed under many Linux distributions, encouraging academic and commercial use. Python

Download the Correct version into the system

Step 1: Go to the official site to download and install python using Google Chrome or

any other web browser. OR Click on the following
link: **https://www.python.org**

Now, check for the latest and the correct version for your operating system. Step 2: Click on the Download Tab.

Step 3: You can either select the DownloadPython for windows 3.7.4 button in Yellow Color or you can scroll further down and click on download with respective to their version. Here, we are downloading the most recent python version for windows 3.7.4

Step 4: Scroll down the page until you find the Files option.

Step 5: Here you see a different version of

python along with the operating system.• To download Windows 32-bit python, you can select any one from the three options: Windows x86 embeddable zip file, Windows x86 executable installer or Windows x86 web-based installer.

•To download Windows 64-bit python, you can select any one from the three options: Windows x86-64 embeddable zip file, Windows x86-64 executable installer or Windows x86-64 web-based installer.

Installation of Python

Step 1: Go to Download and Open the downloaded python version to carry out the installation process.
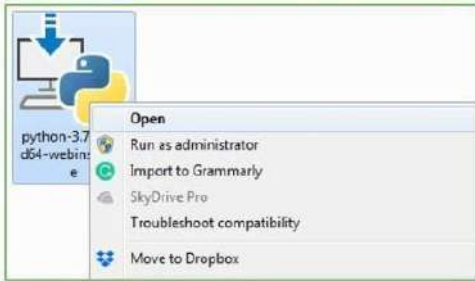
Step 2: Before you click on Install Now, Make sure to put a tick on Add Python 3.7 to PATH.

Step 3: Click on Install NOW After the installation is successful. Click on Close.

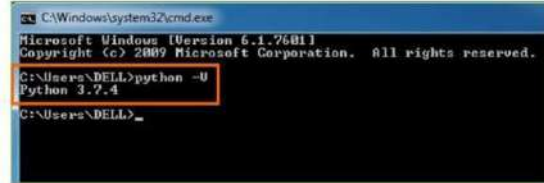Note: The installation process might take a couple of minutes

Verify the Python Installation

Step 1: Click on Start

Step 2: In the Windows Run Command, type "cmd".

Step 3: Open the Command prompt option.

Step 4: Let us test whether the python is correctly installed. Type python –V and press Enter.

Step 5: You will get the answer as 3.7.4

Note: If you have any of the earlier versions of Python already installed. You must first uninstall the earlier version and then install the new one.

Check how the Python IDLE works

Step 1: Click on Start

Step 2: In the Windows Run command, type "python idle".

If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order to perform the desired task using this reduced representation instead of the full size input. Modules

1. Graphical User Interface

2. Dataset Upload

3. Image Processing Module
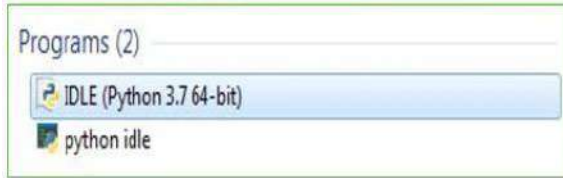
Step 3: Click on IDLE (Python 3.7 64-bit) and launch the program

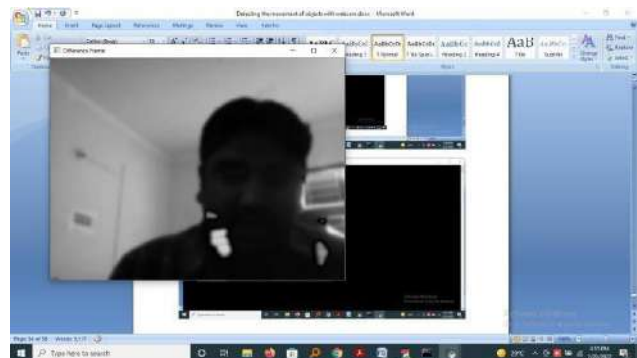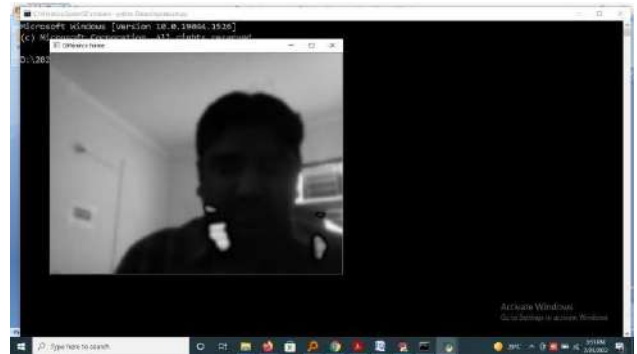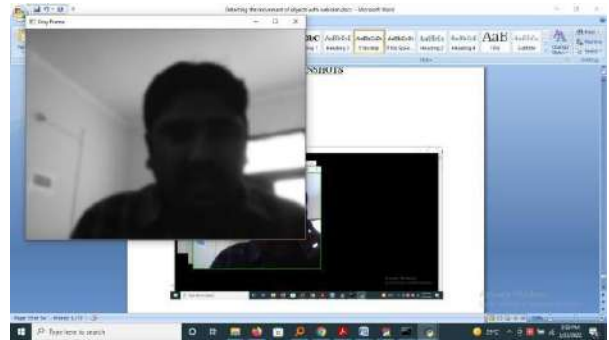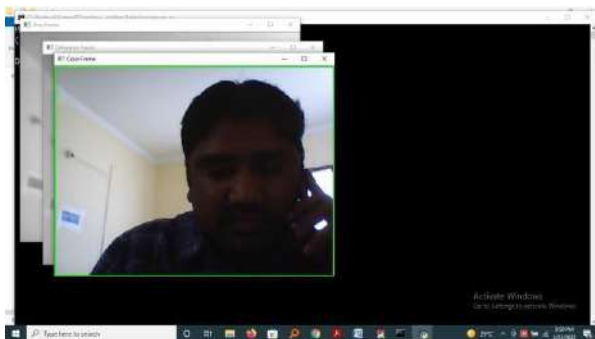Step 4: To go ahead with working in IDLE you must first save the file. Click on File > Click on
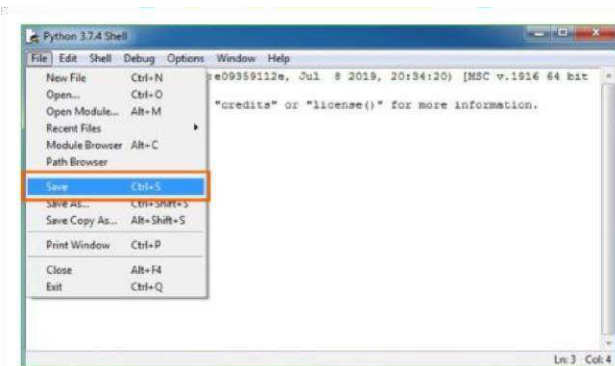
Step 5: Name the file and save as type should be Python files. Click on SAVE. Here I have named the files as Hey World.

Step 6: Now for e.g. enter print

7.SCREENSHOTS

8.BIOBIOGRAPHY

8.BIOBIOGRAPHY

Although it is implemented, the current algorithm implemented is much more efficient than that of before. It just takes the input frame of images and detects the difference considering it as the motion detection.Alert systems may be implemented automatically when the motion is detected.Outcome of the project

is to detect the motion through a webcam with much higher accuracy.

previously implemented motion detection algorithms.few things concluded fromproject which are absent in many previously implemented algorithms are...

- Requires less memory

- Saves a lot of time

- Most reliable

- No need of manual monitoring

- Analysis is done automatically

- Archive space to store videos isn't needed.

- Alert systems may be implemented automatically when the motion is detected.

9.IMPLEMENTATION

9.1 Overview of the project

Image Acquisition Performing image acquisition in image processing is always the first step in the workflow sequence because, without an image, no processing is possible. After the image has been obtained, various Methods of processing can be applied to the image to perform the many different vision tasks. There are various ways to acquire image such as with the help of camera or scanner. Acquired Image should retain all the features. Pre-Processing The main goal of the pre-processing to enhance the visual appearance of images and improve the manipulation of data sets. Image preprocessing, also called image restoration, involves the correction of distortion, degradation, and noise introduced during the imaging process. Interpolation is the Technique mostly used for tasks such as zooming, rotating, shrinking, and for geometric corrections. Removing the noise is an important step when processing is being performed. . If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order to perform the desired task using this reduced representation instead of the full size input. Modules 1. Graphical User Interface 2. Dataset Upload 3. Image Processing Module

9.2 Tools and Technologies Used

OpenCV Library OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV is a free open source library used in real-time image processing OpenCV is a great tool for image processing and performing computer vision tasks.It is an opensource library that can be used to perform tasks like face detection, objection tracking, landmark detection, and much more. In this application OpenCV library we are using for Feature extraction of the Indian Currency. Feature extraction is a special form of dimensional reduction. When the input data to an algorithm is too large to be processed and it is suspected to be very redundant then the input data will be transformed into a reduced representation set of features.

9.3.1 Algorithm

Decision Tree Decision Tree algorithm belongs to the family of supervised learning algorithms. Unlike other supervised learning algorithms, the decision tree algorithm can be used for solving regression and classification problems too. Step-1: Begin the tree with the root node, says S, which contains the complete dataset. Step-2: Find the best attribute in the dataset using Attribute Selection Measure (ASM). Step-3: Divide the S into subsets that contains possible values for the best attributes. Step-4: Generate the decision tree node, which contains the best attribute. Step-5: Recursively make new decision trees using the subsets of the dataset created in step -3.Continue this process until a stage is reached where you cannot further classify the nodes and called the final node as a leaf node. **9.4 Sample Code** import os import sys

If name == "_main_": os.environ.setdefault("DJANGO_SETTINGS_MODULE",

"currencydetection.settings")

try:

from django.core.management import

execute_from_command_line except

ImportError:

The above import for some other reason. Ensure that the

issue is really that Django is missing to avoid masking other try:

import django except ImportError: raise ImportError(

"Couldn't import Django. Are you sure it's installed and "

"available on your PYTHONPATH environment variable? Did you "

"forget to activate a virtual environment?"

) raise

execute_from_command_line(sys.argv)

9.5 Screenshots & Conclusion

Fig : login

Fig : 3upload currency

10. TESTING

10.1 System Test

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product.

10.2 Types of Testing :

10.2.1 Unit testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive.

10.2.2 Integration test

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

10.2.3 Functional test

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing.

10.2.4 System Testing

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing predriven process links and integration points.

10.2.5 White Box Testing

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black box level.

10.2.6 Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document

10.2.7 Unit Testing

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases. **10.3 Test strategy and approach**

Field testing will be performed manually and functional tests will be written in detail.

10.3.1 Test objectives

All field entries must work properly. Pages must be activated from the identified link.The entry screen, messages and responses must not be delayed. **10.3.2 Features to be tested**

Verify that the entries are of the correct format.No duplicate entries should be allowed .All links should take the user to the correct page.

11.CONCLUSION

In this technique, the authentication of currency is described by applying image processing. Basically some features are extracted including various domination parts of note (like identification marks of the currency).The features are extracted using image based segmentation using template matching and works well in the whole process with less computation time. The complete methodology works for 100, 500 and 1000 currency notes. The method is very simple and easy to implement. This technique is very adaptive to implement in real time world.
The process begins from image acquisition and end at comparison of features.

11.1 Future Enhancement

In this project, we actually worked on 5 currencies and it was found that the proposed algorithm based on color and feature analysis works well for four currencies. The USD Banknotes has very minute differences, when it comes to size and color, making it difficult to recognize using proposed algorithm. But for INR, AUD, SAR, the algorithm works very well. So we can conclude that with above proposed algorithm, we can recognize currencies, which have good differentiation in color and size related to features. Also NN based approach give quicker results. We have also successfully retrieved currency conversion rates from the internet, using web service.

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