Identification And Detection of Fake Bank Currency Institute of Higher Education and Research Using Cnn Bharath

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Abstract: One of the most important assets of our country is the bank currency, and so as to create discrepancies in the cash, attackers introduce counterfeit notes into the economic marketplace, which can be just like the unique unique notes. Through demonetization, it's far visible that handiest fake foreign money is circulating inside the marketplace. In preferred, it's miles very hard for a person to distinguish counterfeit banknotes from actual ones not thru diverse parameters meant for identification, on the grounds that many signs of counterfeit banknotes are similar to the authentic ones. Distinguishing among faux forex and authentic banknotes is a hard venture. Therefore, there ought to be an automatic device that is to be had in banks or ATMs. To expand such an automatic gadget, it's miles important to expand an green set of rules which could predict whether or not bank notes are real or counterfeit banknotes, considering that counterfeit notes are diagnosed with the utmost care. In this newsletter, we use an set of rules based on statistics to be had within the UCI system mastering repository to discover real bank cash. To acquire this, we implemented machine getting to know algorithms, measuring their overall performance primarily based on numerous quantitative evaluation environments.

Keywords: Fake or imitation currency, deep convolution neural network, demonetization

OBJECTIVE

Design work is primarily based on image processing capabilities. The reason of this coverage is to apprehend the face cost of the banknotes. In this text we recommend a system based totally on the Jos (Convolution Neural Network) technique. Various modules are used to layout the foreign money based totally at the structural representation of those banknotes. A type version is constructed to test the proposed methods.

INTRODUCTION

Duplication of cash is unlawful duplication of individual money, inside the destiny, counterfeit money is money that does not believe the management. The foremost body is the RBI, which has the sole obligation of printing foreign money notes in India. The RBI is constantly faced with the trouble of as soon as-separated foreign money notes and flows in the marketplace. A counterfeit banknotes detection framework changed into created to come across counterfeit banknotes amongst verifiable ones. The important device this is gradually becoming to be had for the common man or woman to apprehend counterfeit foreign money is the device for detecting counterfeit notes. This device is usually only available in banks, which are not continually available to the common resident. . In each of those situations, a few reaction is essential in order that the Ordinary People could make a judgment approximately the format of the money certificate and now not devalue our money. The artwork of making ready an extract relies upon on the elucidation of Indian bankers. The pix are processed using special photo instruction strategies and assist to spotlight special factors of the photos. The method consists of exclusive segments along with picture processing, keyboard extraction, and photograph visualization. The essence of the technique is to focus on the primary factors from which we can make a fake mark. The protection elements of money are the primary ones to define the true and the fake currency. Common safety capabilities encompass fingerprints, clean pix, a security line, and an optical ink system. In the study, the counterfeit currency detection technique separates the commonplace capabilities of the hidden snap shots and the identification functions from the cash photo. Extracting capabilities from banknote images may be very overwhelming as it involves extracting a number of the extraordinary and unobservable capabilities of Indian currency. After demonetization, 500 and 2000 marks are the maximum precious in existence simplest, so there is a robust opportunity that those marks can be faked, to avoid this, we use faux marks software with gadget image processing.

PROBLEM DEFINITION

Due to demonetization, it seems that there are so many faux currencies in move within the market. In preferred, it is very hard for a person to distinguish counterfeit banknotes from actual ones no longer thru numerous parameters meant for identification, given that many symptoms of counterfeit banknotes are much like the authentic ones. Distinguishing among faux currency and unique banknotes is a tough assignment. Therefore, there should be an automatic gadget this is to be had in banks or ATMs. To broaden such an automatic device, it's far vital to broaden an efficient algorithm that could expect whether bank notes are authentic or counterfeit banknotes, given that counterfeit notes are recognized with the maximum care.

CNN Algorithm

Convolutional Neural Network is one of the main categories to do image classification and image recognition in neural networks. Scene labeling, objects detections, and face recognition, etc., are some of the areas where convolutional neural networks are widely used. CNN takes an image as input, which is classified and process under a certain category such as dog, cat, lion, tiger, etc. The computer sees an image as an array of pixels and depends on the resolution of the image. Based on image resolution, it will see as **h**

*** w * d**, where h= height w= width and d= dimension. For example, An RGB image is **6 * 6 * 3** array of the matrix, and the grayscale image is **4 * 4 * 1** array of the matrix.

Convolution Layer

A convolution layer is the primary layer to extract the functions from the enter image. By studying the functions of an photograph with a small rectangular input information, the convolution layer continues the connection between the factors. It is a mathematical operation that takes inputs which include an photo matrix and a kernel or clear out.

- The dimension of the image matrix is **h×w×d**.
- The dimension of the filter is $\mathbf{f_h \times f_w \times d}$.
- The dimension of the output is $\mathbf{(h-f_h+1)\times(w-f_w+1)\times 1}$.

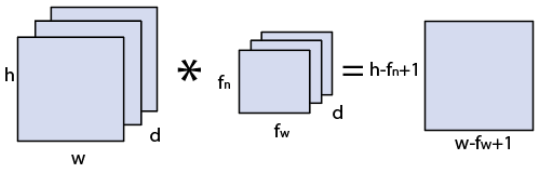


Image matrix multiplies kernl or filter matrix

Let's start with consideration a 5*5 image whose pixel values are 0, 1, and filter matrix 3*3 as:

$$\begin{bmatrix}1&1&1&0&0\\0&1&1&1&0\\0&0&1&1&1\\0&0&1&1&0\\0&1&1&0&0\end{bmatrix} \times \begin{bmatrix}1&0&1\\0&1&0\\1&0&1\end{bmatrix}$$

5 × 5 – Image Matrix 3 × 3 – Filter Matrix

The convolution of 5*5 image matrix multiplies with 3*3 filter matrix is called "**Features Map**" and show as an output.

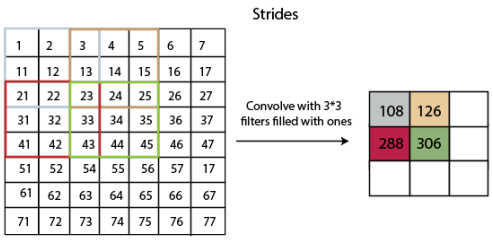
$$\begin{bmatrix}1&1&1&0&0\\0&1&1&1&0\\0&0&1&1&1\\0&0&1&1&0\\0&1&1&0&0\end{bmatrix} \times \begin{bmatrix}1&0&1\\0&1&0\\1&0&1\end{bmatrix} = \begin{bmatrix}4&3&4\\2&4&3\\2&3&4\end{bmatrix}$$

Convolved Feature

Convolution of an image with different filters can perform an operation such as blur, sharpen, and edge detection by applying filters.

Strides

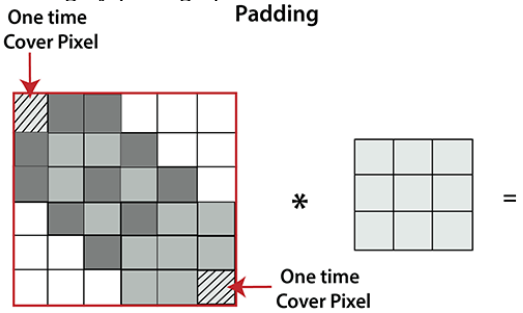
The step is the wide variety of photos which can be moved throughout the input matrix. When the step is 1, then we flow the filters 1 pixel at a time and in addition, if the step is two, then we flow the filters 2 pixels at a time. The following determine indicates the convolution running with step 2.



Padding

No element performs an crucial position in the creation of a neural convolutional community. If the image is going down, and if we take a neural community with loads of layers, it will provide us a small image after filtering on the cease.

If we take a 3 through 3 clear out on top of the gray photograph and do a convolution, what occurs?



Ex superior figure videri potest pixel in angulo semel tantum operiri, media autem pixel plus semel operietur. Hoc modo plura habemus de illa media pixel, ideo duo incommoda;

- Shrinking outputs
- Losing information on the corner of the image.

To triumph over this, we added photo hash. "Padding is a further layer that may be added to the rims of an picture."

Pooling Layer

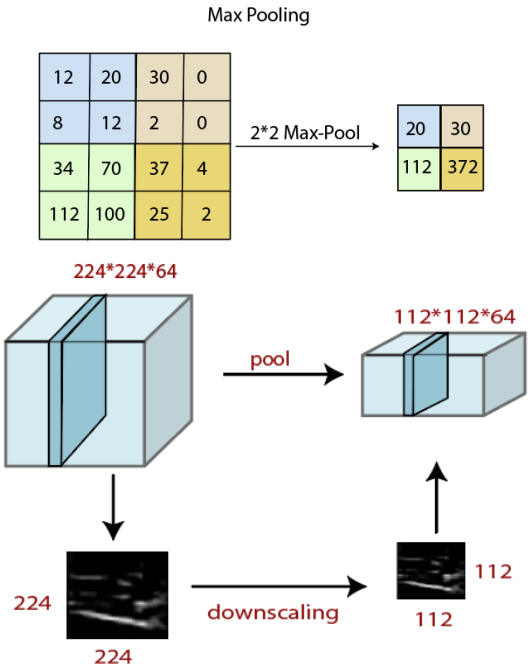
The compositing layer performs an essential role in photo pre-processing. The evaluation layer reduces the quantity of parameters whilst the photographs are too huge. Merging is the "descending" of the photograph received from the previous layers. This can be

in comparison to downscaling an photograph to reduce pixel density. Spatial downsampling is likewise referred to as downsampling or subsampling, which reduces the dimension of each photograph but keeps essential facts. These are the varieties of local associations;

Max Pooling

Max is a pure perfect discretization-primarily based process. The important aim is to lessen the dimensions of the input representation, lessen its dimensionality and give the opportunity to make inferences about capabilities contained in binned subdomains.

Maximum union is executed via applying a most filter out to the non-overlapping subareas of the original view.



Average Pooling

Downscaling can be performed by way of merging the averages with the aid of dividing the input statistics into rectangular merging regions and calculating the averages for each place.

Syntax

layer = mediumPooling2dLayer(pool length)

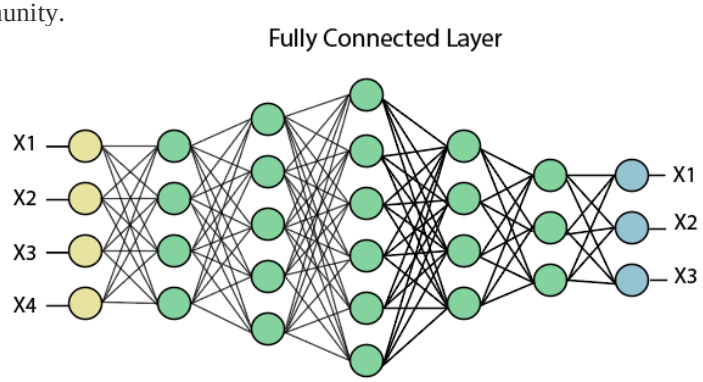
layer = mediumPooling2dLayer (pool size , call , cost)

Sum Pooling

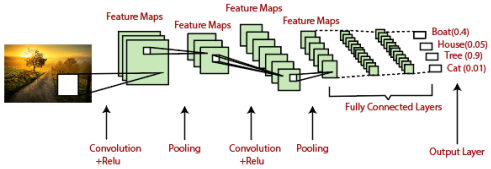
The subdomain of summation or average is precisely the same as the summation feature, but instead of using the maximum function, we use summation or common.

Fully Connected Layer

It is a fully connected layer where enter from other layers can be vectorized and sent. This output converts to the favored wide variety of genes from the community.



In the diagram above, the matrix map might be converted to a vector the usage of x1, x2, x3... Xn completely linked layers. We will combine features to create a model and use an activation feature including a soft max or sigmoid to refer to an output which include a automobile, canine, truck and so on.



LITERATURE SURVEY

Literature evaluation is the maximum critical step within the software development manner. Before the device is evolved, the time thing, the financial system and the power of the company ought to be determined. When most of these situations are met, the next step is to determine which running system and language may be used to expand the tool. When programmers begin constructing a device, they need numerous outside guide. This assist may be received from older software program, from books, or from web sites. Before developing a machine, the ones considerations are taken under consideration when the gadget is being advanced. The maximum a part of the assignment development is considering and absolutely discovering all of the necessities important for the improvement of the project. For any reason, literature evaluate is the maximum vital part of the software development method. Before the equipment are advanced and their related design, time component, aid necessities, manpower, financial and employer strengths are recognized and analyzed. With these items happy and completely understood, the subsequent step is to determine the specification of the software within the respective gadget, as to what sort of running machine will be required for the motive, and what's going to be had to pass all the important software. To the next steps to broaden related gear and sports.

H. Hassanpour and E. Hallajian, "Using Hidden Markov Models for Feature Extraction in Paper Currency Recognition.

This article proposes a new function extraction method for paper cash recognition. In this way, the texture belongings is used for popularity. The idea of a Markov chain has been used to version paper money as a random manner. The approach proposed within the article can identify paper cash from specific international locations. In this manner, only undamaged copies of paper cash of each denomination have been used to set up the machine. We tested this approach in more than one hundred denominations of various international locations, and the system was in a position to properly perceive 95% of the statistics. With the improvement of ultra-modern banking offerings, the strategies used to apprehend paper money have performed an important position in lots of packages along with ATMs and vending machines. The need for an automated banknotes recognition machine has led many researchers to develop a strong and dependable method.

M. N. Rathor and J. Sagar, "Expectations Using Counterfeit Currency Detection
feature extraction, vol. Eleven, pp. 407–411, 2019.

Counterfeit currency identification is a main hassle round the world that affects the economy of almost all nations, including India. Potential measurements use both the synthetic homes of the currency or its bodily look. The technique shown in this newsletter depends at the physical form of the Indian foreign money. The counters have been imaged to dispose of highlights including the security pin, engraving (RBI logo) and the government's personal imprint, which are common as protection features of Indian forex. In order to make the machine ever more potent and more accurate, it blended the last of all of the data of the 3 manufacturers to separate actual and fake monetary signs. The accuracy of counterfeit foreign money detection by the proposed system is 100%. Another parameter used to degree the overall performance of the proposed system is the same old error, which is set 1%. It can also be obtained from everyday residents who continually face the hassle of keeping apart real and faux currency notes.

M. N. Shende and P. P. Patil, "An Overview of Counterfeit Currency Detection Using Image Processing," Int. J. The future Rebellion Account common expertise English, vol. Four, no. 1, pp. 391–393, 2018.

Paper identity is one of the techniques of picture processing, that is, apparel to perceive the currencies of different nations. Let the currencies accumulated via special nations develop increasingly. However, the principle reason of the biggest currency is to recognize the same old reputation structures and simulated forex machines. Faces are extracted the usage of the MATLAB Image Processing Toolkit and pre-processed by using reducing the scale of the facts within the captured photo. Exposure enhancement is finished the usage of HSV (Hue Saturation Value). The pinnacle is a neural network classifier, and the subsequent step is popularity. MATLAB is used to expand this software. A new source of paper popularity is model recognition. But for monetary reputation, a conversion gadget is an photograph of a technical process used to perceive a currency and convert it to different currencies as wanted. The need for forex popularity and converters is to appropriately identify currencies and immediately convert one currency into some other. This application uses computing electricity to distinguish between unique currencies, which can be distinguished by means of their form of computing energy. Note that fakes are currently playing a key role for researchers. The understanding device consists of components. In the first way the picture is taken, and in the 2d reputation. Recognition of counterfeit forex is the main motive of the usual paper money identification machine. The most essential issue to do is to perceive the currency of the device, and it should be very accurate. The effectiveness of various methods for the accuracy of the forex recognition system is investigated.

M. A. Gaikwad, V. V. Bhosle, and V. D. Patil, "Automatic detection technique for brand new counterfeit Indian coins", Int. J. Inq. Things. Techn., vol. 6. No. Eleven, pp. 84–87, 2017.

In India, forex is the medium of enterprise, so currency is extra important for our social and economic development. Currency right here exists in the shape of cash, banknotes and digital notes. Fake foreign money or counterfeit forex is a risky or acute trouble against the whole world and India is also part of this faux foreign money. Modernization of the financial gadget is a milestone in economic development and now the Indian authorities has found out this, so the demonetization of 1000 and 500 rupiah notes is the most current instance. But again we have Rs 2000 as new foreign money inside the market. Whilst the banknotes are of the highest cost, there may be a threat that corrupt humans will try and cause them to fake. Therefore, the primary purpose of this text is to study the diverse primary traits of authentic new forex and to apply such techniques to hit upon and verify the flow of latest currency through the Reserve Bank of India. There are numerous approaches to distinguish fake banknotes from actual ones. Using various digital imaging techniques like picture processing, image segmentation, feature extraction, photograph assessment, and so forth., we will extract the features of genuine banknotes. It may be very hard to discover counterfeit forex.

SYSTEM REQUIREMENTS

HARDWARE REQUIREMENTS

System : Pentium i3 Processor
Hard Disk : 500 GB.

Monitor : 15'' LED
Input Devices : Keyboard, Mouse
Ram : 2 GB

SOFTWARE REQUIREMENTS

Operating system : Windows 10
Coding Language : Python

CHAPTER 4

SYSTEM ANALYSIS

PURPOSE

The motive of this record is to locate counterfeit currency the usage of machine mastering algorithms. In precise, this document consists of a widespread description of our project, together with user necessities, product perspective and necessities angle, and trendy constraints. In addition, it'll also provide specific requirements for this function and important features, such as interface, purposeful necessities, and overall performance requirements.

SCOPE

The scope of this SRS file is maintained throughout the existence of the venture. This file defines the very last nation of the software program necessities agreed upon by means of clients and developers. Finally, on the give up of the mission, all capability from the SRS can be added again to the product. The document describes the capability, performance, barriers, interface, and consistency at some stage in the life cycle of the object.

EXISTING SYSTEM

Hassanpour, H. Et al.; India is a developing country. Production and printing of fakes. This article describes the popularity of paper money using digital image media. About eight sorts of Indian forex notes had been decided on for counterfeit detection. The identity marks, the variable optical link, passing via the register and the coin's shade code define the foreign money's reputation. Security wires, fingerprints, hidden pictures and micro addresses are used to validate the currency. The extraction of characters is performed on the photo of the forex and in comparison with the characters of the real foreign money.

PROPOSED SYSTEM

In this machine, the detection of counterfeit forex is a major problem global, which impacts the economic system of almost all international locations, which includes India. The use of counterfeit currency is one of the important troubles going through the world today. This article discusses the difficulty of the identification of the currency, if this specimen of bank foreign money is counterfeit. Various traditional techniques and techniques are to be had for figuring out counterfeit forex. In fashionable, it's far very hard for a person to distinguish counterfeit banknotes from actual ones now not through various parameters intended for identity, due to the fact that many signs and symptoms of counterfeit banknotes are just like the original ones. Distinguishing among fake foreign money and original banknotes is a difficult mission.

SYSTEM DESIGN

INPUT DESIGN

The enter method is the link between the statistics machine and the consumer. It involves the development of a specification and procedure for information preparation, and these steps are vital to bring the transactional information into a usable manner form, which can be finished with the aid of computer analyzing the facts from a written or published script, or this could. It'll be performed with the assist of the humans, introducing the keys. Given immediately into defects. Input making plans makes a speciality of controlling the quantity of enter required, controlling mistakes, avoiding delays, keeping off greater steps, and retaining the system simple. The login is designed to be safe and comfy even as keeping person privateness. The committee's input became as follows:

- What data should be provided as enter?
- How is the information prepared or encoded?
- Dialog container to help personnel enter facts.
- Methods of getting ready enter for validation and what to do if an errors happens.

OUTPUT DESIGN

Quality is a result that meets the cease user's requirements and shows the data absolutely. In any system, the consequences of the process are reported to users and other structures via outputs. The output plan defines how statistics is to be moved for fast want as well as for revealed output. It is the primary and immediately source of facts for the user. Efficient and clever output layout of the connection system improves, helping the user to make decisions.

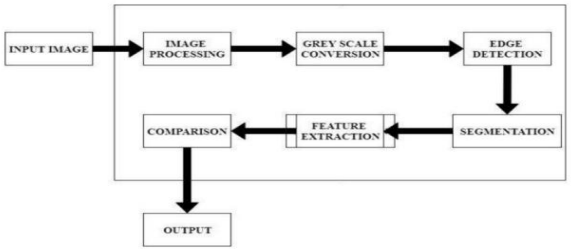
The output format of the information device should perform one or greater of the subsequent capabilities.

- percentage information about beyond activities, contemporary status or forecast
- The destiny.
- Important events, opportunities, problems, or reminders.
- to start an interest.
- Confirm action

DATA FLOW DIAGRAM

1. A DFD is also called a bubble chart. It is a easy graphical formalism that can be used to represent a gadget in phrases of inputs to the device, the numerous strategies performed on that facts, and the outputs generated by way of it.
2. Data glide diagram (DFD) is one of the main modeling tools. It is used to model parts of the system. These additives are the gadget methods, the information utilized by the process, the external item that corresponds to the gadget, and the records flows within the system.
3. The DFD suggests how records moves via the system and how it's miles changed thru a series of modifications. It is a graphical approach that depicts the waft of data and the adjustments which can be implemented to transport the facts from enter to output.

4. A DFD is also known as a bubble chart. A DFD can be used to represent a device at any degree of abstraction. A DFD may be divided into layers that represent incremental records float and person operations.



UML DIAGRAMS

UML stands for Code of Canon Law. UML is a trendy purpose modeling language for item-orientated software program development. The flag is controlled and created via the item control organization.

UML is supposed to turn out to be a not unusual language for creating item-oriented pc application fashions. In its current shape, UML has two foremost components: the metamodel and the notation. Certain methods or varieties of processes can also be brought within the destiny; or to the UML.

The Unified Modeling Language is a general language for expressing, visualizing, constructing, and documenting the structure of software structures, as well as for modeling commercial enterprise and different non-software structures.

UML Sets engineering pleasant practices that have confirmed to be effective in modeling huge and complicated structures.

UML is an critical part of object-orientated software improvement and the software program development manner. UML mainly uses graphical notation to layout software tasks.

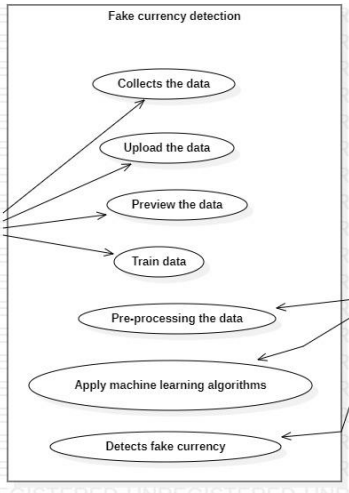
GOALS:

The fundamental dreams of UML improvement are as follows:

1. Provide users with a geared up-to-use expressive language of visual layout in order that meaningful examples can be developed and shared.
2. Provide enlargement and specialization of engineering tools to increase core principles.
3. Be impartial from specific programming languages and the development process.
4. Provide a proper foundation for understanding language formation.
5. Strengthen the growth of the marketplace for OOP tools.
6. Support higher-degree improvement principles, consisting of collaboration, frameworks, fashions, and components.
7. Complete with the first-class capabilities.

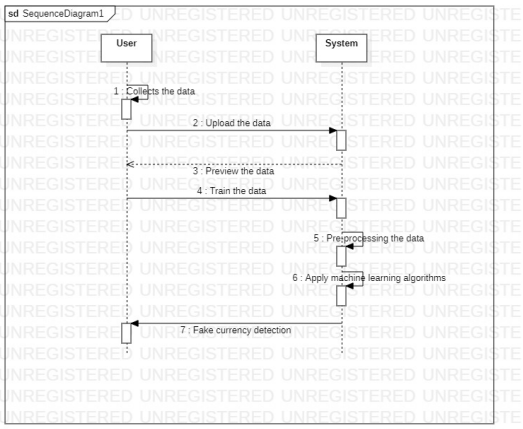
USE CASE DIAGRAM:

A Unified Modeling Language (UML) use case diagram is a sort of human diagram described and constituted of use case analysis. The aim is to provide a graphical evaluation of the capability of the system in terms of actors, their goals (represented as use cases), and any dependencies between consumer instances. The most important use case of a diagram is to expose which gadget functions are accomplished for which actor. You can describe the jobs of the actors in the machine.



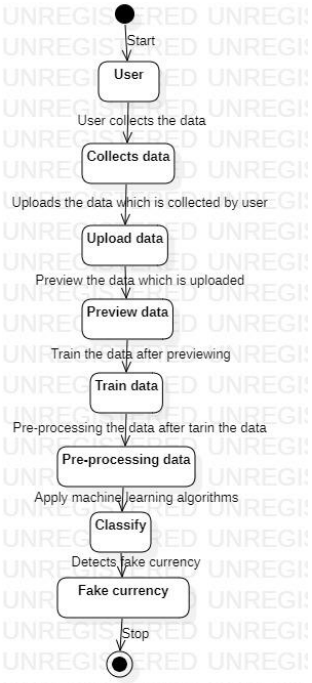
SEQUENCE DIAGRAM:

A Unified Modeling Language (UML) sequence diagram is a type of interplay diagram that indicates how processes engage with every different and in what order. This post is a sequence of posts. Sequence diagrams are on occasion called event diagrams, occasion scripts, and timing diagrams.



ACTIVITY DIAGRAM:

Activity charts are a graphical representation of step-with the aid of-step and working activities with help for choice, iteration and concurrency. In a completely unique modeling language, an pastime diagram can be used to explain the operations and step-through-step workflow of additives in a device. The action diagram indicates the overall flow of control.



SYSTEM IMPLEMENTATION

SYSTEM ARCHITECTURE

The description of the commonplace capabilities of the program has a deep that means for the definition of the requirements and the set up. In the architectural design, the numerous pages and their relationships are diagnosed and designed. Major software components are diagnosed and broken down into processing strategies and conceptual facts structures, and relationships between modules are recognized. The proposed device consists of these modules.

SYSTEM ARCHITECTURE

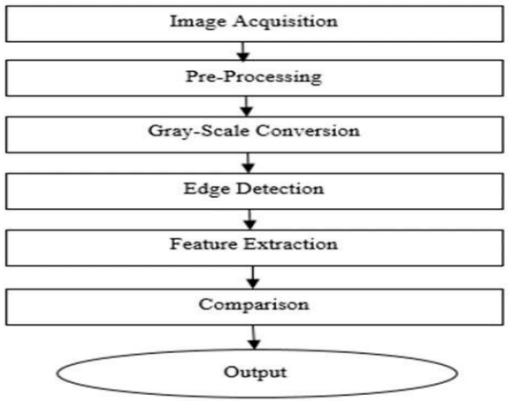


Fig: System Architecture

The structure above describes the shape of the system's operation.

- Acquisition and processing of image statistics are finished after preprocessing.
- After completing the preliminary facts collection, and making use of device studying algorithms, the banker predicts whether or not or now not the foreign money has been lied to.

Problem Statement:

Through demonetization, it's miles visible that only fake forex is circulating within the market. In standard, it's far very tough for a person to distinguish counterfeit banknotes from real ones no longer thru various parameters supposed for identity, given that many symptoms of counterfeit banknotes are much like the authentic ones. Distinguishing among faux forex and unique banknotes is a difficult assignment. Therefore, there have to be an automatic gadget this is to be had in banks or ATMs. To broaden such an automatic gadget, it's miles vital to develop an efficient set of rules which could are expecting whether or not bank notes are real or counterfeit banknotes, since counterfeit notes are recognized with the maximum care.

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