Fake Currency Detection using Basic Python Programming and Web Framework

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Abstract

Fake Indian Currency Note (FICN) is a term used by officials and media to refer to counterfeit currency notes circulated in the Indian economy. However several central and state agencies are working together and the Ministry of Home Affairs has constituted the Fake Indian Currency Notes Co-ordination Centre (FCORD) to curb this menace. We propose a new approach to detect fake Indian notes using mobile camera and Image processing. We will convert Indian currency into more the 150+ different currencies values to help tourist all over the world. In this project we match features between two images using Brute-Force Matching with ORB Descriptors. After applying BFMatcher with ORB we get Matcher Object and by using knnMatch we get the list of best k matches depending upon the value of k.

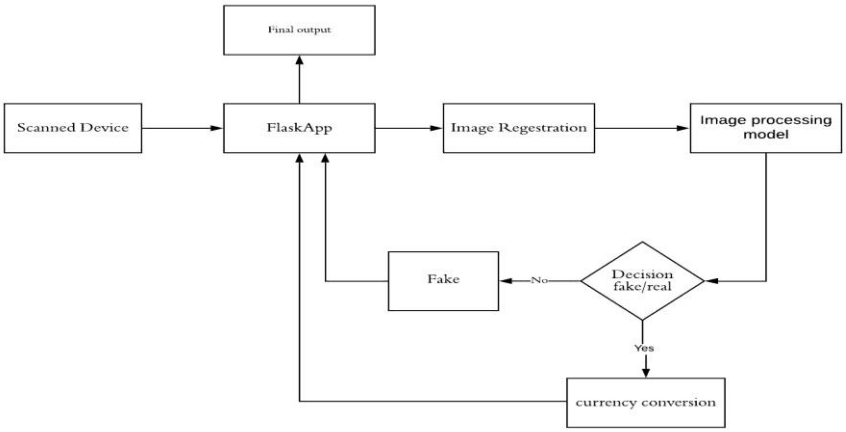
I. INTRODUCTION

Currency duplication also known as counterfeit currency is a vulnerable threat on economy. Although fake currency is being printed with precision, the Crime Investigation Department (CID) says that they can be detected with some effort. Currency printed by local racketeers can be detected easily as they use the photographic method, hand engraved blocks, lithographic processes and computer colour scanning. In counterfeit notes, the watermark is made by using opaque ink, painting with white solution, stamping with a dye engraved with the picture of Mahatma Gandhi. Tourists are the most vulnerable people to fake currencies, because they don't know the proper and precise way of finding the difference between fake and real currencies note. So automatic identification of currencies using image processing technique will be helpful to these peoples.it is also be useful at other workplaces. . The system designed to check the Indian currency note with denominations 10, 20, 50, 100, 200, 500 and 2000. It will pre-process the digital pictures and organise the prepared arrangement of information and it will distinguish in monetary forms. This paper proposes a convenient and cheapest method for identifying Indian currencies. At the end of the process user can know whether the currency note is fake or real and it's equivalent currency value into more then 150 counties

II. SYSTEM IMPLEMENTATION

This system is divided into four major parts, first is image scanning using cellular phone, and second is the flask app which is a web application and an interface between user and imaging processing model. Then after image registration the image is fed into image processing model as an input image. At the end Indian currency is converted into more than 150+ counties equivalent value

Block Diagram



III. SOFTWARE DESCRIPTION

A. Scanning image

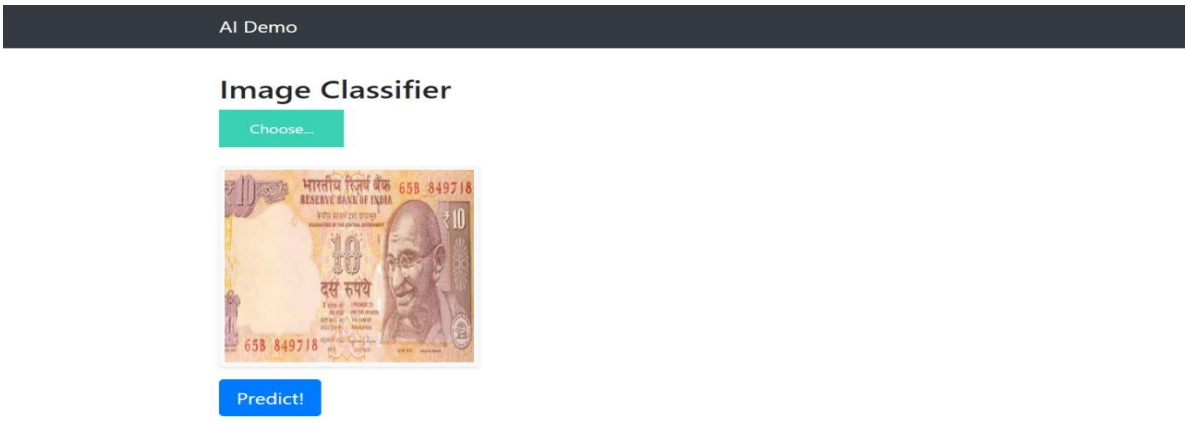
Input image is captured using mobile camera of any other camera in the presence of sufficient light

B. Flask App

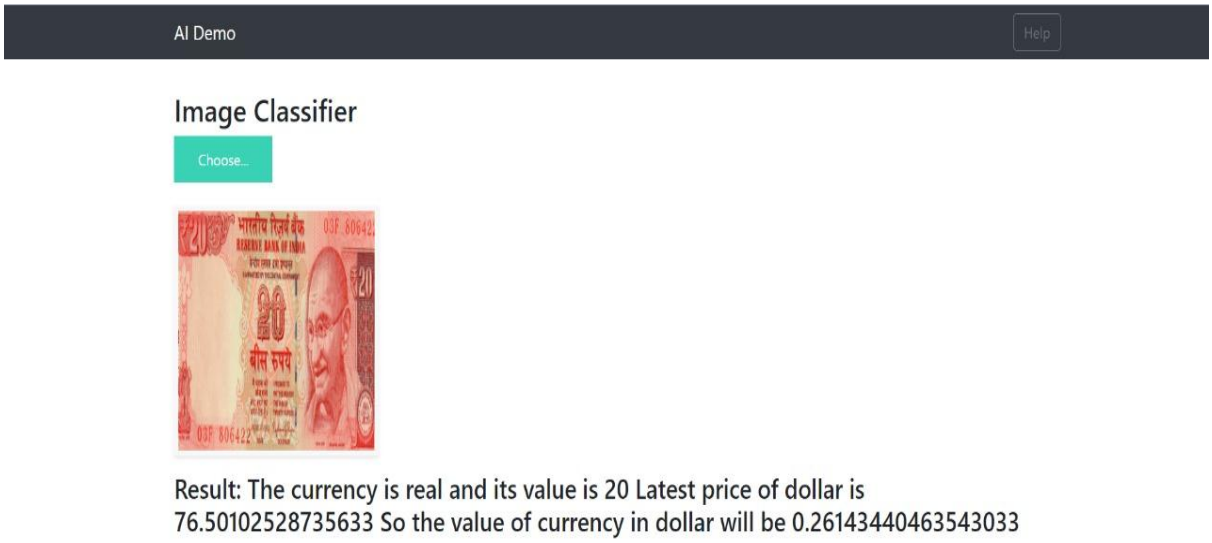
Flask is a web framework. Flask is part of the categories of the micro-framework. Micro-framework are normally framework with little to no dependencies to external libraries. It has no database abstraction layer, form validation, or any other components where pre-existing third-party libraries provide common functions. However, Flask supports extensions that can add application features as if they were implemented in Flask itself. Extensions exist for object-relational mappers, form validation, upload handling, various open authentication technologies and several common framework related tools. Extensions are updated far more frequently than the core Flask program.

STEP.1

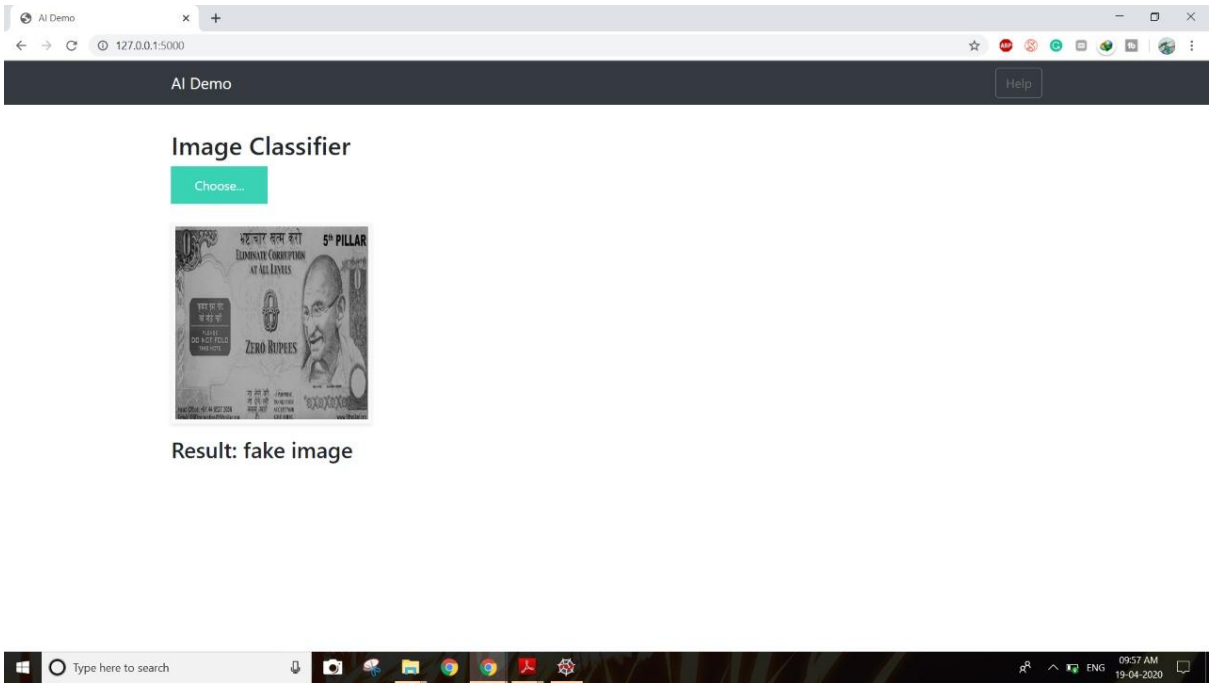
Uploading image using mobile camera



STEP.2



For fake note

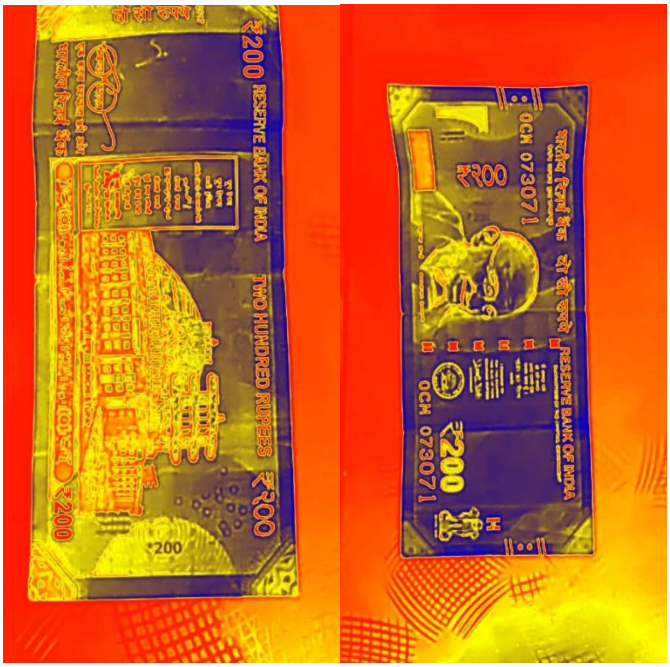


C. Image registration

Image registration is the process of aligning two or more images of the same scene. This process involves designating one image as the reference image, also called the fixed image, and applying geometric transformations or local displacements to the other images so that they align with the reference. Images can be misaligned for a variety of reasons. Commonly, images are captured under variable conditions that can change the camera perspective or the content of the scene. Misalignment can also result from lens and sensor distortions or differences between capture devices. Image registration is often used as a preliminary step in other image processing applications.

D. Image processing model

A UV detector verifies the UV marks on authentic notes by shining ultraviolet light onto the bills. These UV marks are created through the use of non-visible dyes that are only visible under UV light. If the UV printed images glow when subjected to the UV light, then the bank note is expected to be authentic.



E. Image processing model

Brute-Force Matcher

Brute-Force matcher is simple. It takes the descriptor of one feature in first set and is matched with all other features in second set using some distance calculation. And the closest one is returned.

Once it is created, two important methods are *BFMatcher.match()* and *BFMatcher.knnMatch()*. First one returns the best match. Second method returns *k* best matches where k is specified by the user. It may be useful when we need to do additional work on that

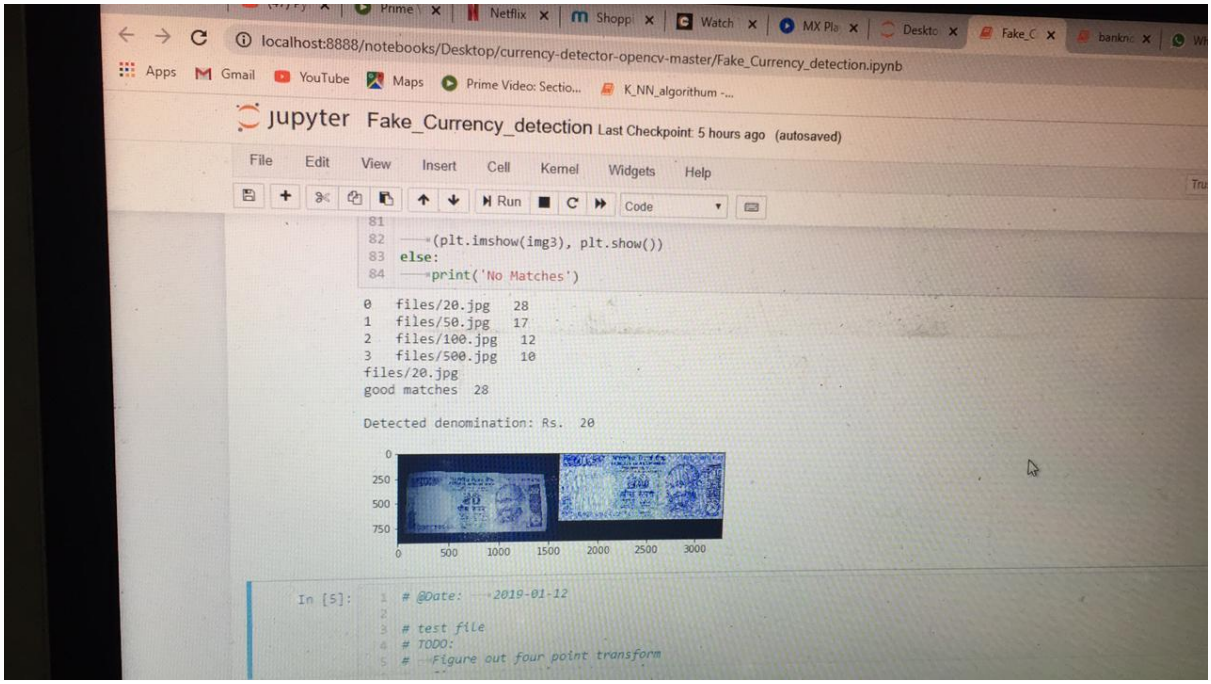
Brute-Force Matching with ORB Descriptors match features between two images

In this case, I have a Input currency image and a train Image. We will try to find the input currency image in train currency Image using feature matching. Next we create a BFMatcher object with distance measurement `cv2.NORM_HAMMING` (since we are using ORB) and `crossCheck` is switched on for better results. Then we use Matcher.match() method to get the best matches in two images. We sort them in ascending order of their distances so that best matches (with low distance) come to front. Then we draw only first 10 matches. Matcher Object

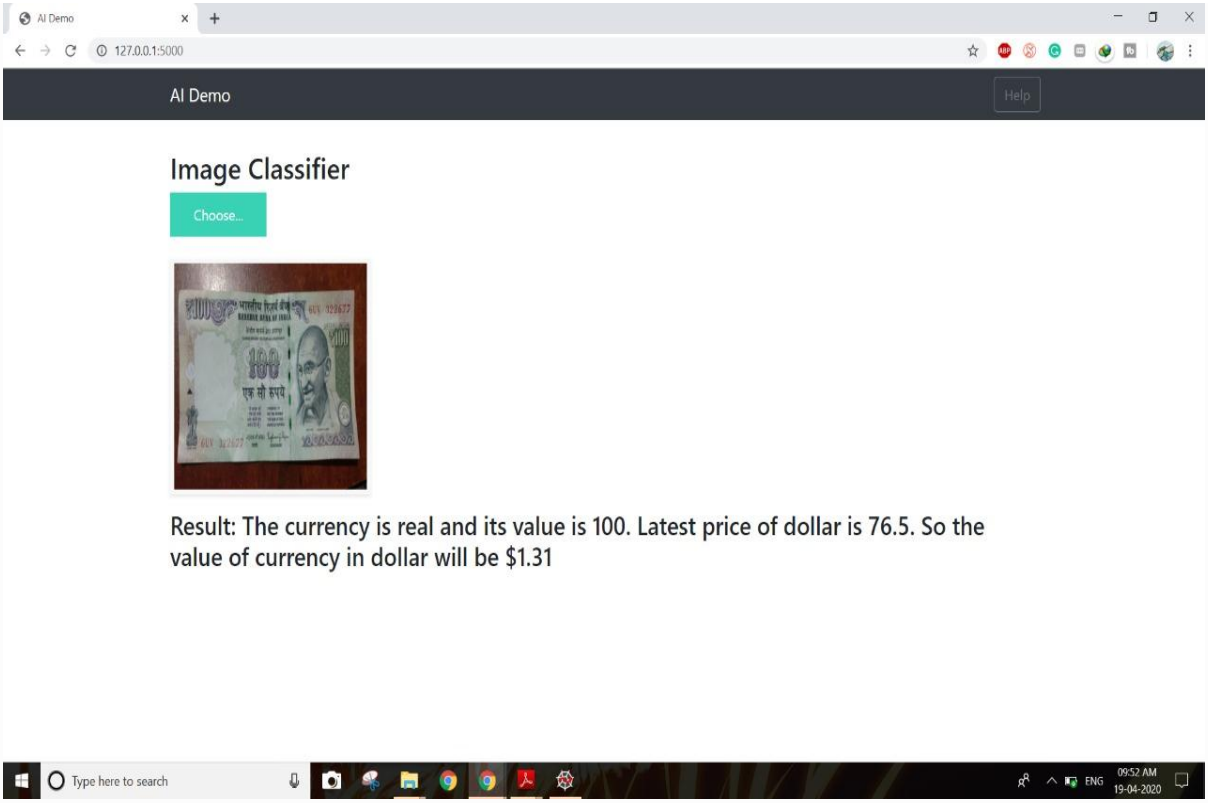
The result of `matches = bf.match(des1,des2)` line is a list of DMatch objects. This DMatch object has following attributes:

- `DMatch.distance` - Distance between descriptors. The lower, the better it is.

- DMatch.trainIdx - Index of the descriptor in train descriptors
- DMatch.queryIdx - Index of the descriptor in query descriptors
- DMatch.imgIdx - Index of the train image.



App result:

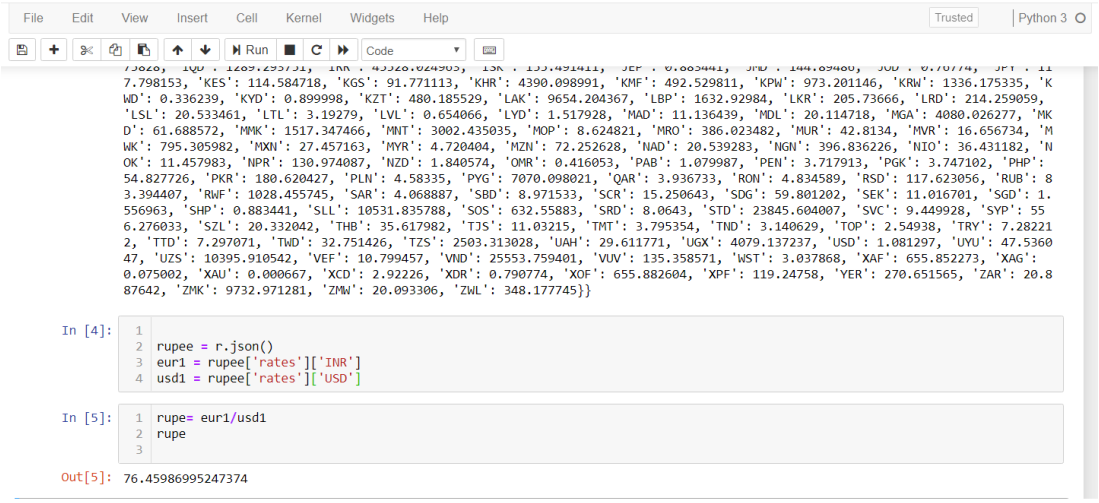


F. Currency conversion

A currency conversion is software code that is designed to convert one currency into another in order to check its corresponding value. The code is generally a part of a web site or it forms a mobile app and it is based on current market or bank exchange rates.

Currency converters aim to maintain real-time information on current market or bank exchange rates, so that the calculated result changes whenever the value of either of the component currencies does. They do so by connecting to a database of current currency exchange rates. The frequency at which currency converters update the exchange rates they use varies: Yahoo currency converter updates its rates every day, while Convert My Money< every hour.

This **API** provides automation capability for **converting** one **currency** into another with our Forex Reference Suite service. It provides an easy way to **convert currencies** using the latest available **conversion** rates data.



4. Result

At the end of this process user can now make the difference between the real and a fake currency note and can get the equivalent value in different currencies .

5. References

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