Fake-Currency-Detection-System

Detects Counterfeit Indian Currency using Image Processing Techniques

Overview

The aim of this project is to test the authenticity of Indian currency notes by preparing a system which takes the image of currency bill as input and gives the final result by applying various image processing and computer vision techniques and algorithms.

This currency authentication system has been designed completely using Python language in Jupyter Notebooks. **OpenCV** library has been used for image processing and **Tkinter** library has been used for building the GUI.

Libraries and Tools

1. OpenCV

2. Tkinter

3. Numpy

4. Matplotlib

5. Jupyter Notebook

Dataset

This currency detection currently works only for Indian Currency notes of denomination 500 and 2000. The dataset used for this purpose is included in this repository and has been custom- built by collecting necessary images from various sources. To know more about dataset refer to the report of this project present in this repository.

Structure

1. **Dataset:** Contains all necessary images. This directory also contains images of real 500 and 2000 rupee notes which you can use to test the system. Read the report to know more about structure of dataset.

2. **Fake Notes:** Contains images of fake 500 and 2000 rupee notes. You can use these images to test the system if you want.

3. **500_testing.ipynb:** This notebook processes input image of 500 denomination currency bills.

4. **2000_testing.ipynb:** This notebook processes input image of 2000 denomination currency bills.

5. **controller.ipynb:** This notebook is the main notebook which takes the input, runs all necessary notebooks and displays the output.

6. **gui_1.ipynb:** This notebook produces a GUI to take the input data from the user.

7. **gui_2.ipynb:** This notebook produces a GUI to display the result.

8. **FAKE_CURRENCY_DETECTOR_REPORT:** Report of this project. This file contains the complete information of the project. Refer to this report file for methodology, snapshots, results and other details regarding this project.

Working

1. Clone the repository to your local machine.

2. Open the notebook controller.ipynb as a Jupyter Notebook

3. Run the entire notebook:

> Cell > Run All

4. This will open a GUI window:

- Click 'Select An Image'.

- Browse the input image of the currency note that you want to authenticate. Sample images of currency notes (both real and fake) are already present in the dataset. You can select an image from there too.

- Choose the denomination of the currency note.

- Click 'Submit' button

5. This will lead to another GUI window. Select 'Click To Continue' and wait for the processing to end. The progress can be seen in the progress bar.

6. Finally, the results will be displayed in another GUI window. The following details will be displayed.

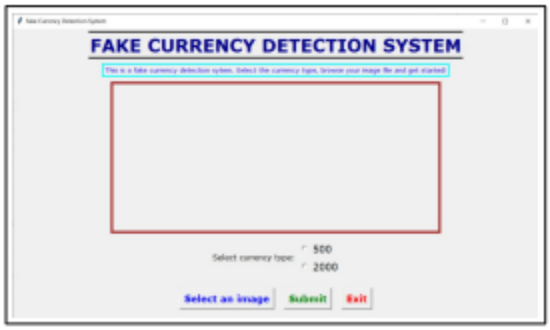
- Input image

- Result statement (Number of features that are authentic)

- Image of each feature of input currency note

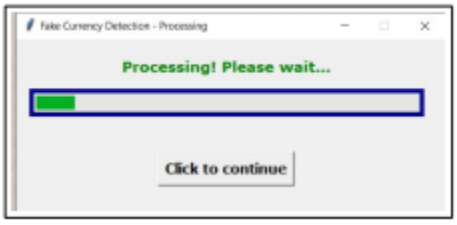
- Average and Maximum Similarity score (SSIM score) of each feature

- Status of each feature (Pass/ Fail)


FAKE CURRENCY DETECTION SYSTEM
500
2000
Select an image
Submit
Exit


SYSTEM
2000
Select an image
Submit
Exit


FAKE CURRENCY DETECTION SYSTEM
RESERVE BANK OF INDIA
₹2000
500
2000
Select an image
Submit
Exit


Fake Currency Detection - Processing
Processing! Please wait...
Click to continue

FAKE CURRENCY DETECTION SYSTEM

RESULT: 10 / 10 features PASSED!

Feature 1

Avg. SSIM Score: 0.771
Max. SSIM Score: 0.877
Status: PASS!

Feature 2

Avg. SSIM Score: 0.418
Max. SSIM Score: 0.726
Status: PASS!

Feature 3

Avg. SSIM Score: 0.622
Max. SSIM Score: 0.917
Status: PASS!

Feature 4

Avg. SSIM Score: 0.653
Max. SSIM Score: 0.914
Status: PASS!

Feature 5

Avg. SSIM Score: 0.658
Max. SSIM Score: 0.809
Status: PASS!

Feature 6

Avg. SSIM Score: 0.629
Max. SSIM Score: 0.867
Status: PASS!

Feature 7

Avg. SSIM Score: 0.536
Max. SSIM Score: 0.920
Status: PASS!

Feature 8

Avg. Number of lines: 7.000
Status: PASS!

Feature 9

Avg. Number of lines: 7.050
Status: PASS!

Feature 10

9 characters detected!
Status: PASS!

FAKE CURRENCY DETECTION SYSTEM

RESULT: 6 / 10 features PASSED!

Feature 1

Avg. SSIM Score: 0.799
Max. SSIM Score: 0.903
Status: PASS!

Feature 2

Avg. SSIM Score: 0.263
Max. SSIM Score: 0.365
Status: FAIL!

Feature 3

Avg. SSIM Score: 0.836
Max. SSIM Score: 0.853
Status: PASS!

Feature 4

Avg. SSIM Score: 0.251
Max. SSIM Score: 0.258
Status: FAIL!

Feature 5

Avg. SSIM Score: 0.647
Max. SSIM Score: 0.721
Status: PASS!

Feature 6

Avg. SSIM Score: 0.236
Max. SSIM Score: 0.236
Status: FAIL!

Feature 7

Avg. SSIM Score: 0.214
Max. SSIM Score: 0.226
Status: FAIL!

Feature 8

Avg. Number of lines: 7.000
Status: PASS!

Feature 9

Avg. Number of lines: 7.050
Status: PASS!

Feature 10

9 characters detected
Status: PASS!