A

Project Report On

"Image Processing"

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Through

The Poona Gujrati Kelwani
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BBA(CA) DEPARTMENT
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COMPUTER APPLICATION DEPARTMENT

Certificate

This is to certify that Samruddhi Shivaji Pardeshi & Omkar Pandharinath Bate of H.V.Desai College, studying in class T.Y.BBA(CA) has submitted a report entitled

IMAGE PROCESSING

Which has been designed as a part of academic activity
in college for the year 2021-22 approved by University Of Pune
for the Graduation Degree of BBA (Computer Application)

Project Guide	Co-Ordinator
Internal Examiner	External Examiner

INDEX

PROJECT DESCRIPTION

A biometric authentication system based on measurements of the user's three-dimensional (3-D) hand geometry is proposed. The system relies on a novel real-time and low-cost 3-D sensor that generates a dense range image of the scene. By exploiting 3-D information we are able to limit the constraints usually posed on the environment and the placement of the hand, and this greatly contributes to the unobtrusiveness of the system. Efficient, close to real-time algorithms for hand segmentation, localization and 3-D feature measurement are described and tested on an image database simulating a variety of working conditions. The performance of the system is shown to be similar to state-of-the-art hand geometry authentication techniques but without sacrificing

the convenience of the user.

SYSTEM SPECIFICATIONS

Technical Details –

- **Software Requirements: -**
    1. **Type: JAVA BASED**
    2. **2. Front End: AWT**
    3. **3. Back End: Java version 8 and above.**
    4. **4. Documentation Tool: MS Office**

- **Hardware Requirements: -**
    1. **Processor: Dual core and above.**
    2. **Operating System: Windows 10**
    3. **Generation-G2 and above.**
    4. **RAM- 2GB**
    5. **Hard Disk-256GB**
    6. **Camera-4mp**

Overview of the system

The physiological biometrics are based on measurements and data derived from direct measurement of a part of the human body. Fingerprint, iris-scan, retina-scan, hand geometry, and facial recognition are leading physiological biometrics.
Behavioral characteristics are based on an action taken by a person. Behavioral biometrics, in turn, are based on measurements and data derived from an action, and indirectly measure characteristics of the human body. Voice recognition, keystroke-scan, and signature-scan are leading behavioral biometric technologies. One of the defining characteristics of a behavioral biometric is the incorporation of time as a metric – the measured behavior has a beginning, middle and end.

A biometric system is essentially a pattern recognition system which makes a personal identification by determining the authenticity of a specific physiological or behavioral characteristic possessed by the user. An important issue in designing a practical system is to determine how an individual is identified. Depending on the context, a biometric system can be either a verification (authentication) system or an identification system.

BIOMETRIC authentication, once used for granting access to high security infrastructures, is gradually finding place in a wider range of applications. However, until today the requirement for highly reliable authentication has led to compromises with respect to user acceptance. It is clear that reliability and user convenience should coexist in order to achieve a widespread acceptance of biometrics.
The work in this paper is partly motivated by applications where the convenience of the user is the first priority. These applications include personalization of services (home, office, car) and attendance tracking in working environments. A user authentication system based on measurements of three-dimensional (3-D) hand geometry is proposed. Unlike other hand geometry verification techniques the proposed system is less obtrusive. The user is not obliged to place his/her hand on a surface and generally there are less constraints regarding the placement of the hand (e.g., using pegs) or the environment (e.g., uniform background). To achieve this, a low-cost 3-D sensor is used that captures both an image of the hand as well as its 3-D structure, and novel algorithms for robust estimation of 3-D geometric hand features are proposed. Experimental results demonstrate that the accuracy of the system is comparable with state-of-the-art hand geometry recognition systems.

<u>Application Areas</u>

Biometrics is a rapidly evolving technology which is being widely used in forensics such as criminal identification and prison security, and has the potential to be used in a large range of civilian application areas. Biometrics can be used to prevent unauthorized access to ATMs, cellular phones, smart cards, desktop PCs, workstations, and computer networks. It can be used during transactions conducted via telephone and internet (electronic commerce and electronic banking). In automobiles, biometrics can replace keys with key-less entry devices.

Biometrics Technologies –

The primary biometric disciplines include the following: -

- Fingerprint (optical, silicon, ultrasound, touch less)
- Facial recognition (optical and thermal)
- Voice recognition (not to be confused with speech recognition)
- Iris-scan
- Retina-scan
- Hand geometry
- Signature-scan
- Keystroke-scan
- Palm-scan (forensic use only)

Disciplines with reduced commercial viability or in exploratory stages include: -

- DNA
- Ear shape
- Odor (human scent)
- Vein-scan (in back of hand or beneath palm)
- Finger geometry (shape and structure of finger or fingers)
- Nailbed identification (ridges in fingernails)
- Gait recognition (manner of walking)

Hand Detection

The first step is the segmentation of the hand from the body, which is achieved using available depth information and exploiting *a priori* knowledge of the human body geometric structure and the authentication scenario. The distance of the user's hand from his/her face is not guaranteed to be sufficiently large(usuallybetween5–20cm). Therefore, we may not rely on simple thresholding to separate the hand from the face. Detection and segmentation of the hand is based on a more elaborate scheme that relies on statistical modeling of the hand, arm and head plus torso points in 3-D space.

In the proposed method the images are captured and kept in the data folder in my application. The proposed algorithm is invariant of the camera calibration. The image is passed through four stages before extracting feature points.

In the first stage, the input image is threshold in order to segment the finger from the background. Then this image is passed to second stage, where finger boundary points are extracted by linear edge detection. Then this image is passed to third stage, which is simple enlargement. That is, the finger boundary image is placed inside a large image in this stage. This is done in order to find/select the geometry points from the boundary points of the finger. In other words, the image is enlarged so that the entire edge-image is fit in the center and geometry-lines can be projected from outer.

In this proposed algorithm 3d geometry points of the segmented finger are extracted and feature points are extracted from these points. In the proposed method the images are captured and kept in the data folder in my application. The proposed algorithm is invariant of the camera calibration. The image is passed through four stages before extracting feature points.

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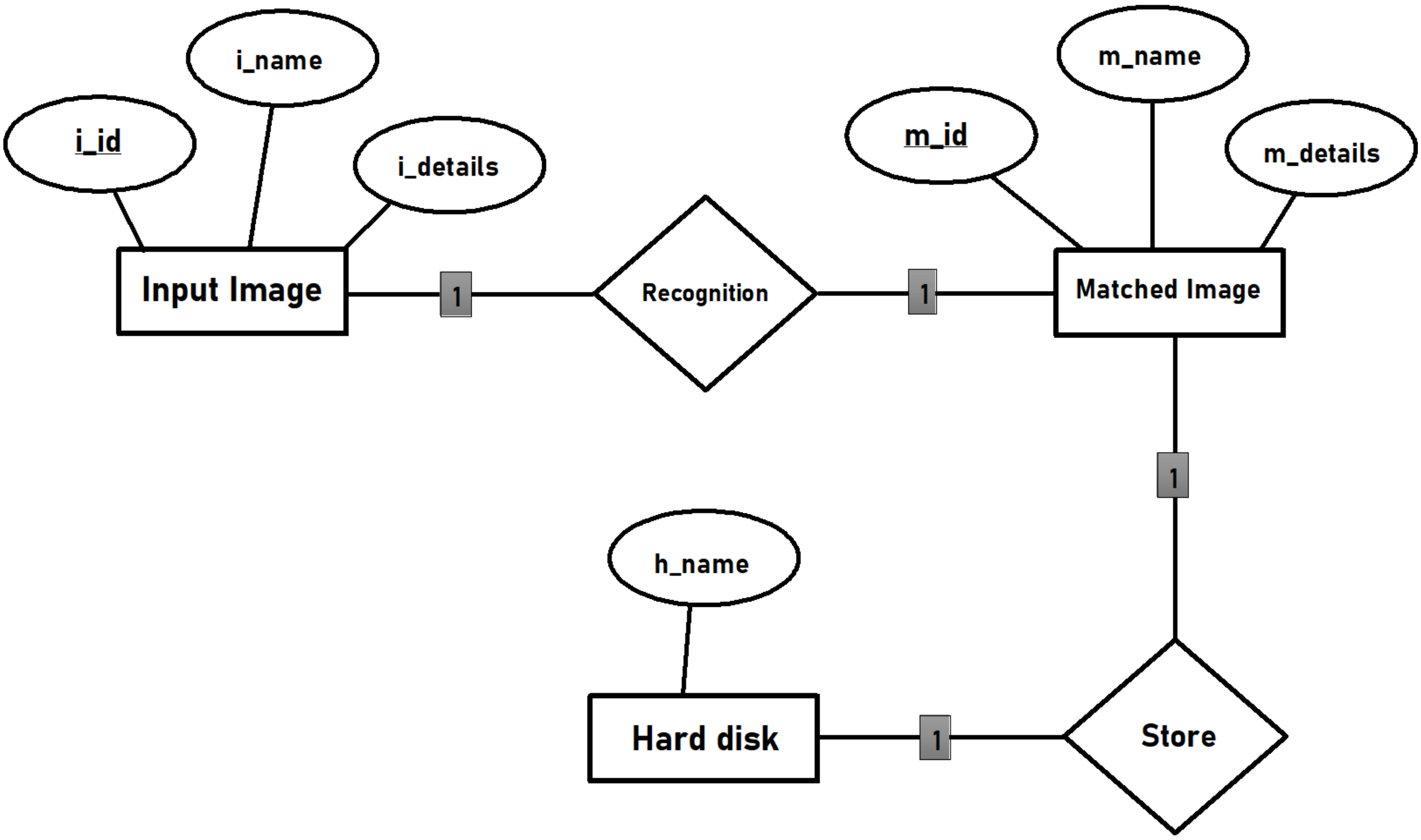
Using this enlarged image as input, the geometry points of the finger are found.

for this, a large circle is drawn around the finger in the enlarged image and from each circle point (360 degree) one line is drawn towards the center and the point (x,y) in that line where first edge pixel of the finger is found is stored.

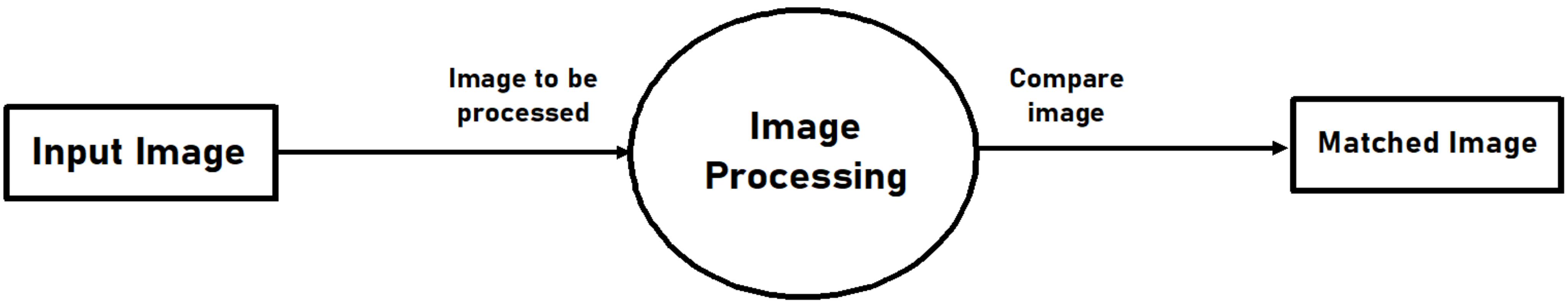
During recognition, feature vector for test-image is found and compared with all feature vectors of training images. The Euclidean-distance between test vector and training vectors are found and the matched image is the image with smallest distance. accuracy is 100-r where r is the ratio between smallest and maximum distance.

ENTITY RELATIONSHIP DIAGRAM

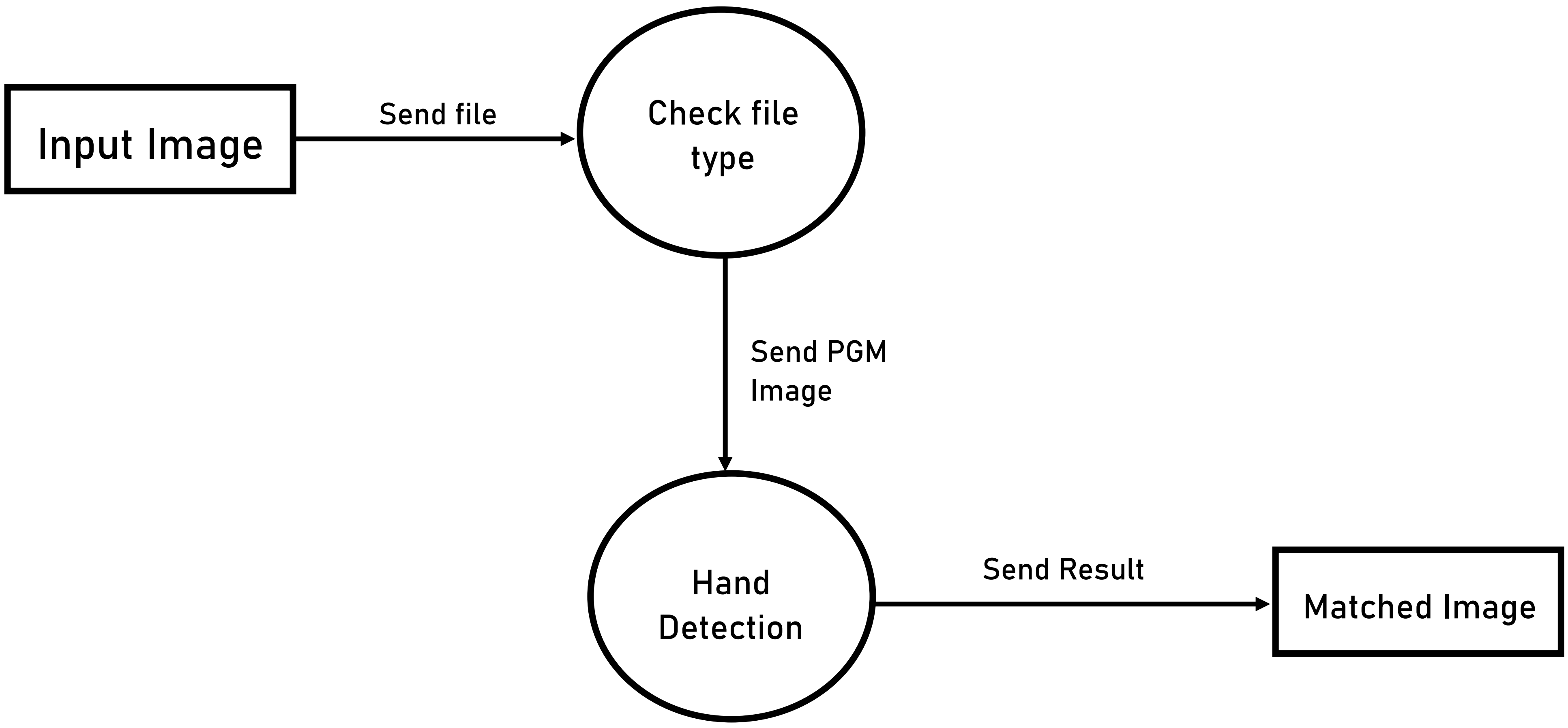


DATA FLOW DIAGRAM

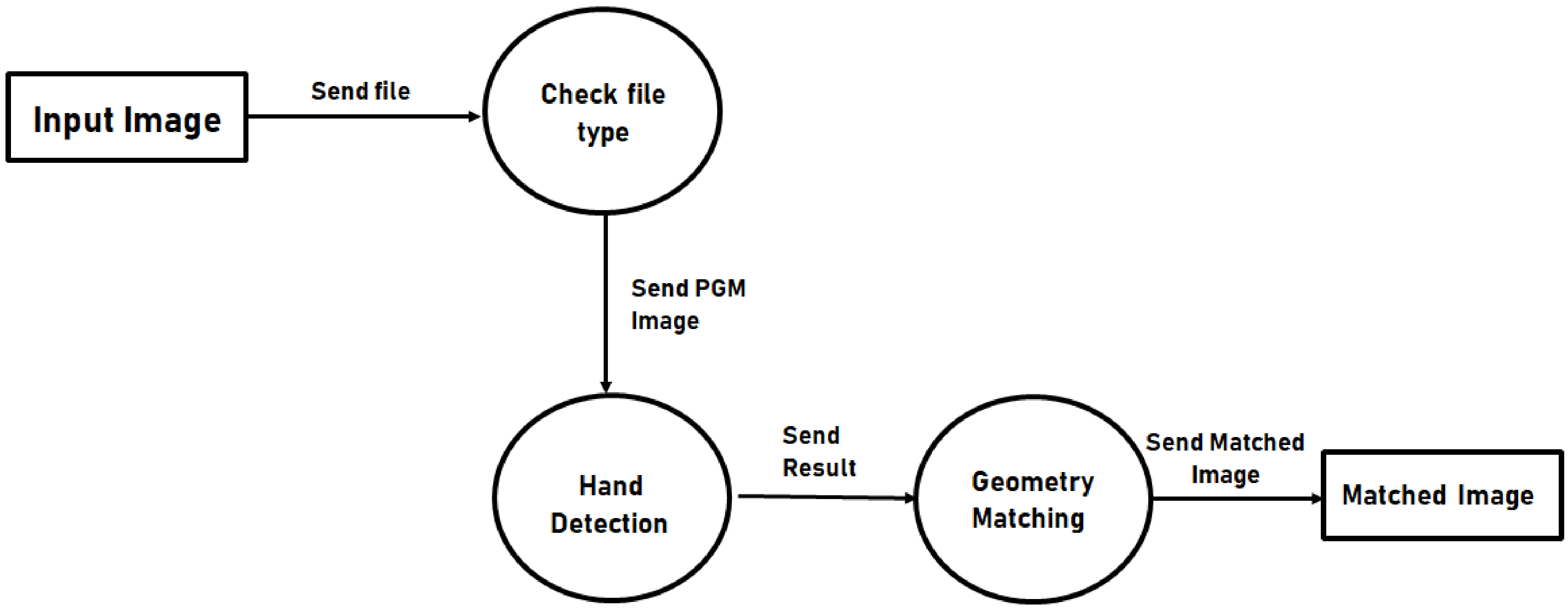
Context Level DFD



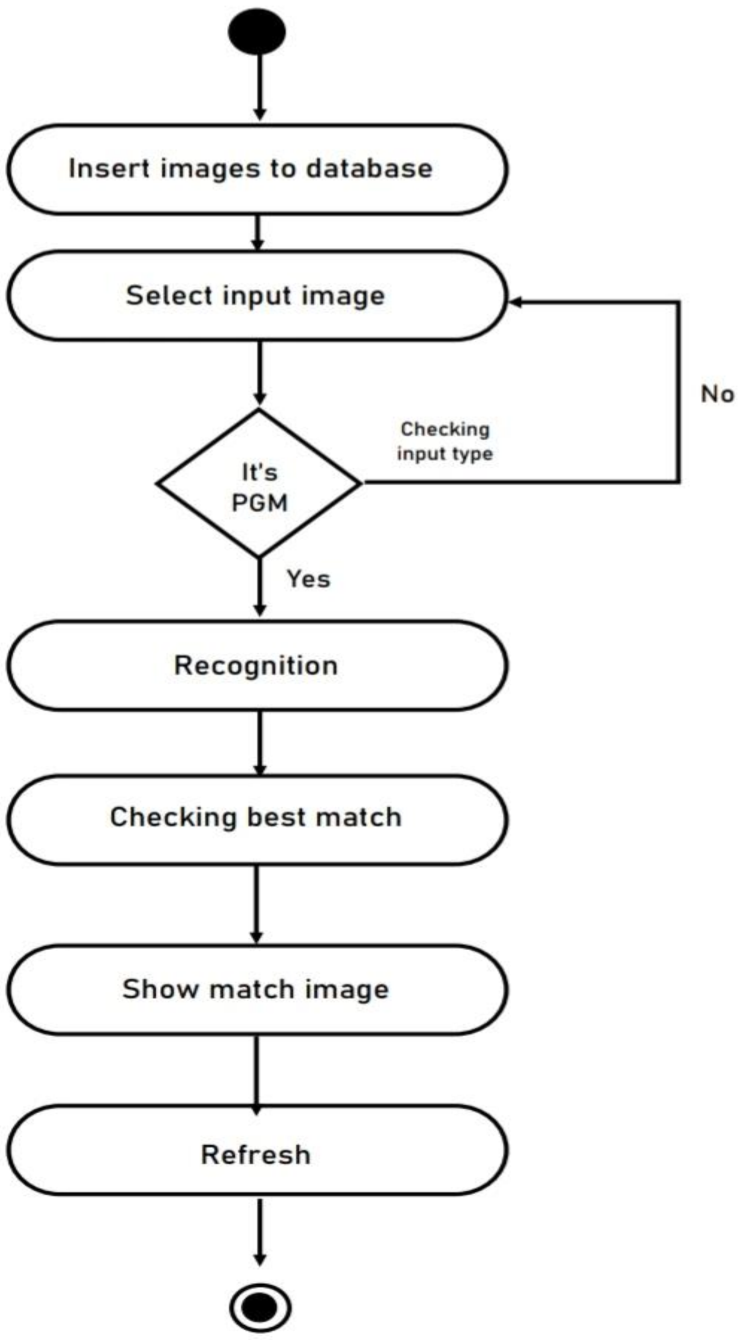
Level-1 DFD



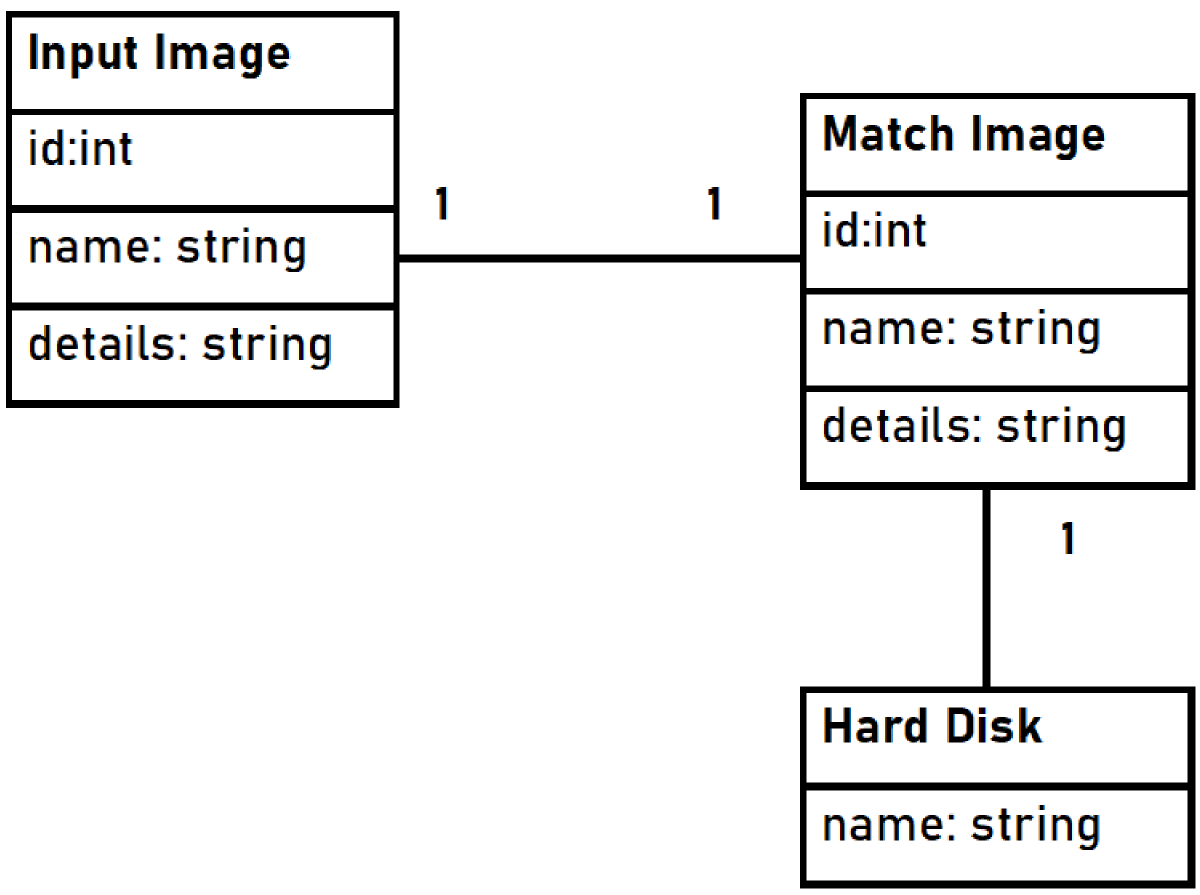
Level-2 DFD



Activity DIAGRAM



Class Diagram



<u>Test Case</u>

Test Steps	Test Case Description	Expected Result	Status
1.Opening Application	Opening Application using proper file type(PGM).	Application opened	Pass
2.Image Adding	Adding Proper Image from database for comparing.	Imaged Added	Pass
3.Image Recognition	Added Image should be recognized on button click.	Added Image should be processed and compared with other images in database.	Pass
4.Displaying Matched Best Imaged	After comparing images in database best matched image should be displayed.	Correct and Best Matched image should be displayed.	Pass
5.Wrong selection of Image	Selection of wrong type of image should display an exception.	Exception – FileNotFound Should be displayed.	Pass

Test Plan

Software Testing -

Software Testing is the process of confirming the functionality and correctness of software by running it. Software testing is usually performed for one of two reasons:

1) Defect detection
2) Reliability estimation.

White box testing is concerned only with testing the software product, it cannot guarantee that the complete specification has been implemented. Black box testing is concerned only with testing the specification, it cannot guarantee that all parts of the implementation have been tested. Thus, black box testing is testing against the specification and will discover *faults of omission*, indicating that part of the specification has not been fulfilled. White box testing is testing against the implementation and will discover *faults of commission*, indicating that part of the implementation is faulty. In order to fully test a software product both black and white box testing are required. The problem of applying software testing to defect detection is that software can only suggest the presence of flaws, not their absence (unless the testing is exhaustive). The problem of applying software testing to reliability estimation is that the input distribution used for selecting test cases may be flawed. In both of these cases, the mechanism used to determine whether program output is correct is often impossible to develop. Obviously, the benefit of the entire software testing process is highly dependent on many different pieces. If any of these parts is faulty, the entire process is compromised.

Software is now unique unlike other physical processes where inputs are received and outputs are produced. Where software differs is in the manner in which it fails. Most physical systems fail in a fixed (and reasonably small) set of ways. By contrast, software can fail in many bizarre ways. Detecting all of the different failure modes for software is generally infeasible.

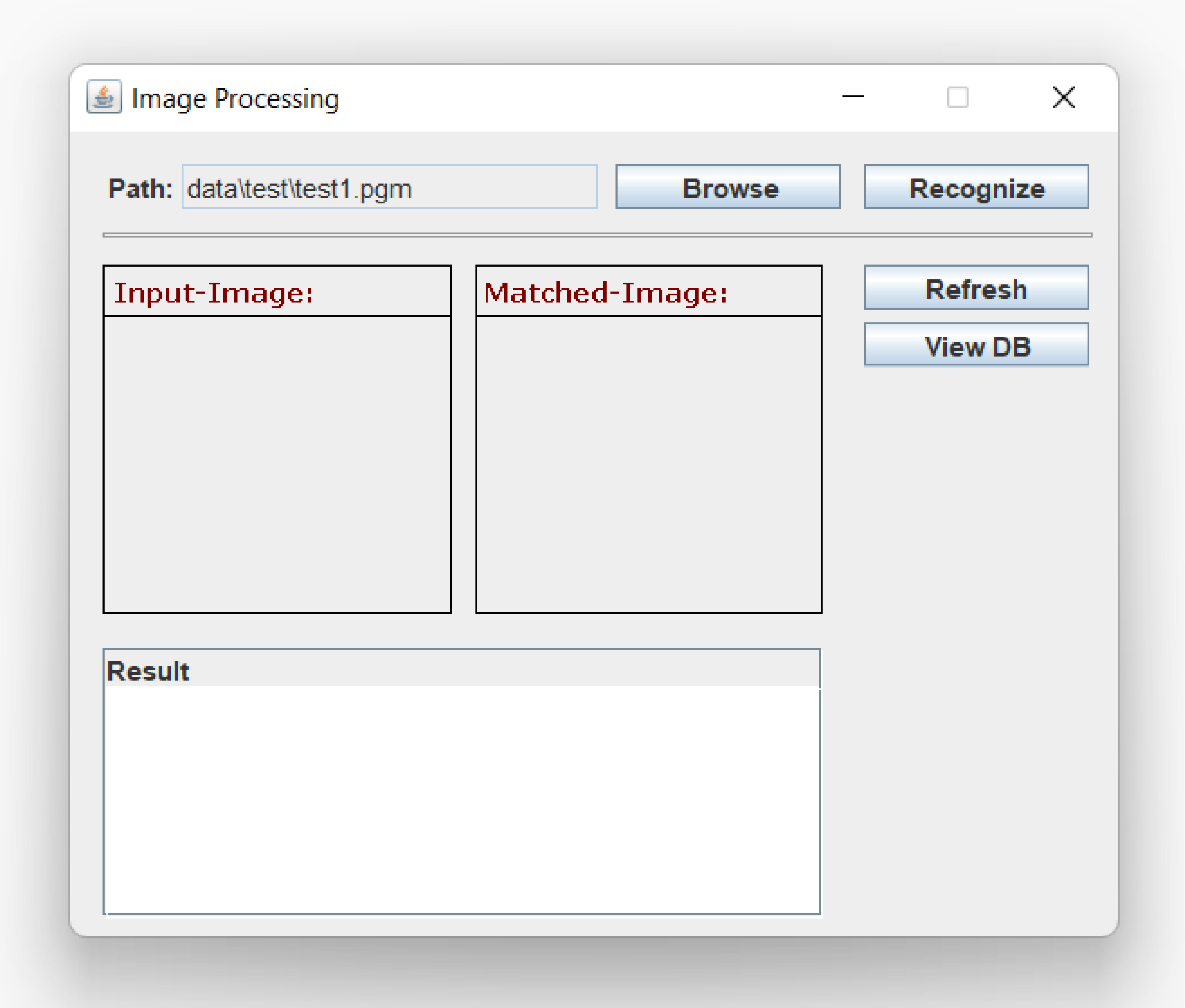
The key to software testing is trying to find the myriad of failure modes – something that requires exhaustively testing the code on all possible inputs. For most programs, this is computationally infeasible. It is commonplace to attempt to test as many of the syntactic features of the code as possible (within some set of resource constraints) are called *white box* software testing technique. Techniques that do not consider the code's structure when test cases are selected are called *black box technique.*

Functional testing is a testing process that is black box in nature. It is aimed at examine the overall functionality of the product. It usually includes testing of all the interfaces and should therefore involve the clients in the process.

Final stage of the testing process should be System Testing. This type of test involves examination of the whole computer system, all the software components, all the hard ware components and any interfaces.

The whole computer-based system is checked not only for validity but also to meet the objectives.

Screenshot



Browse image

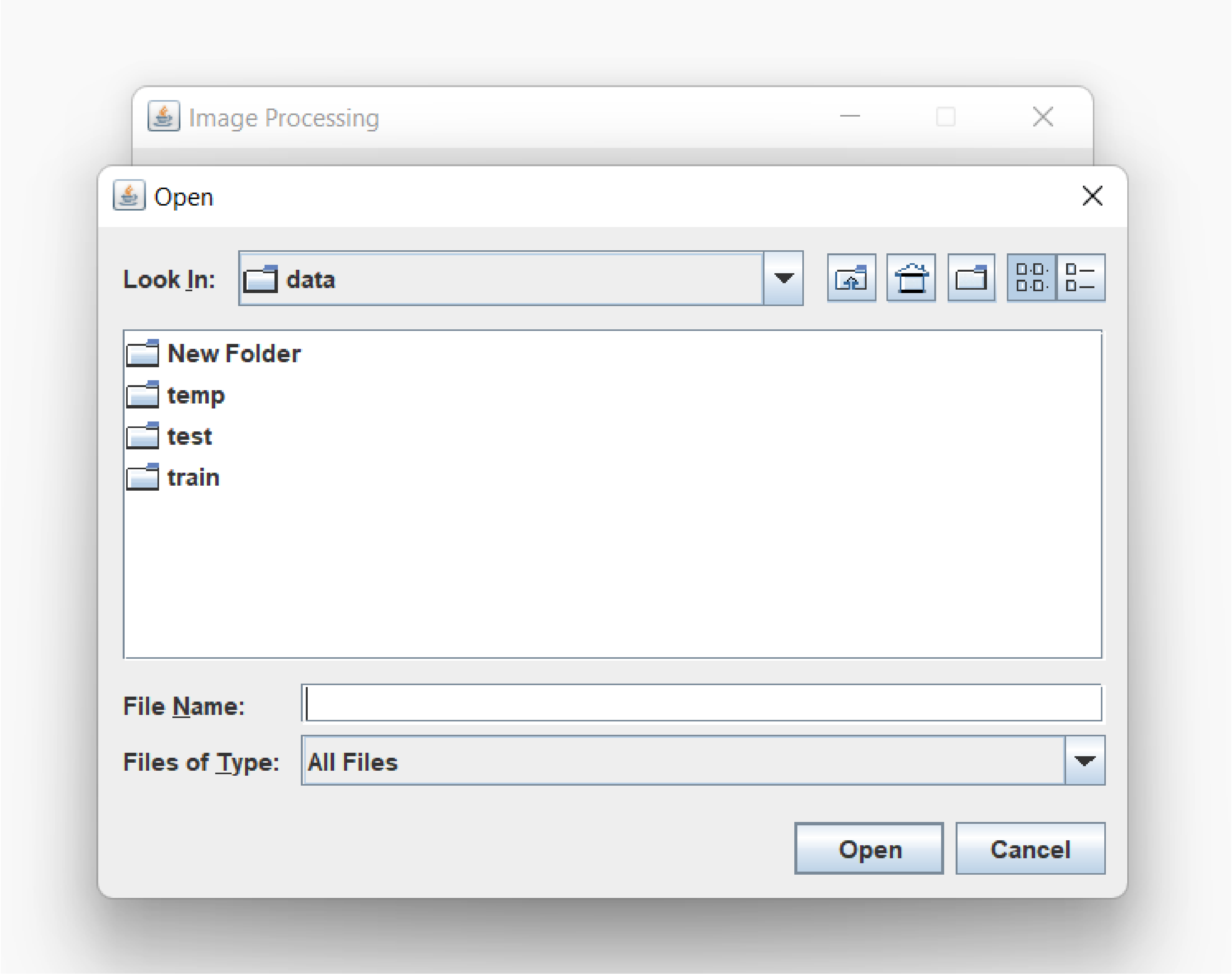


Image Selection

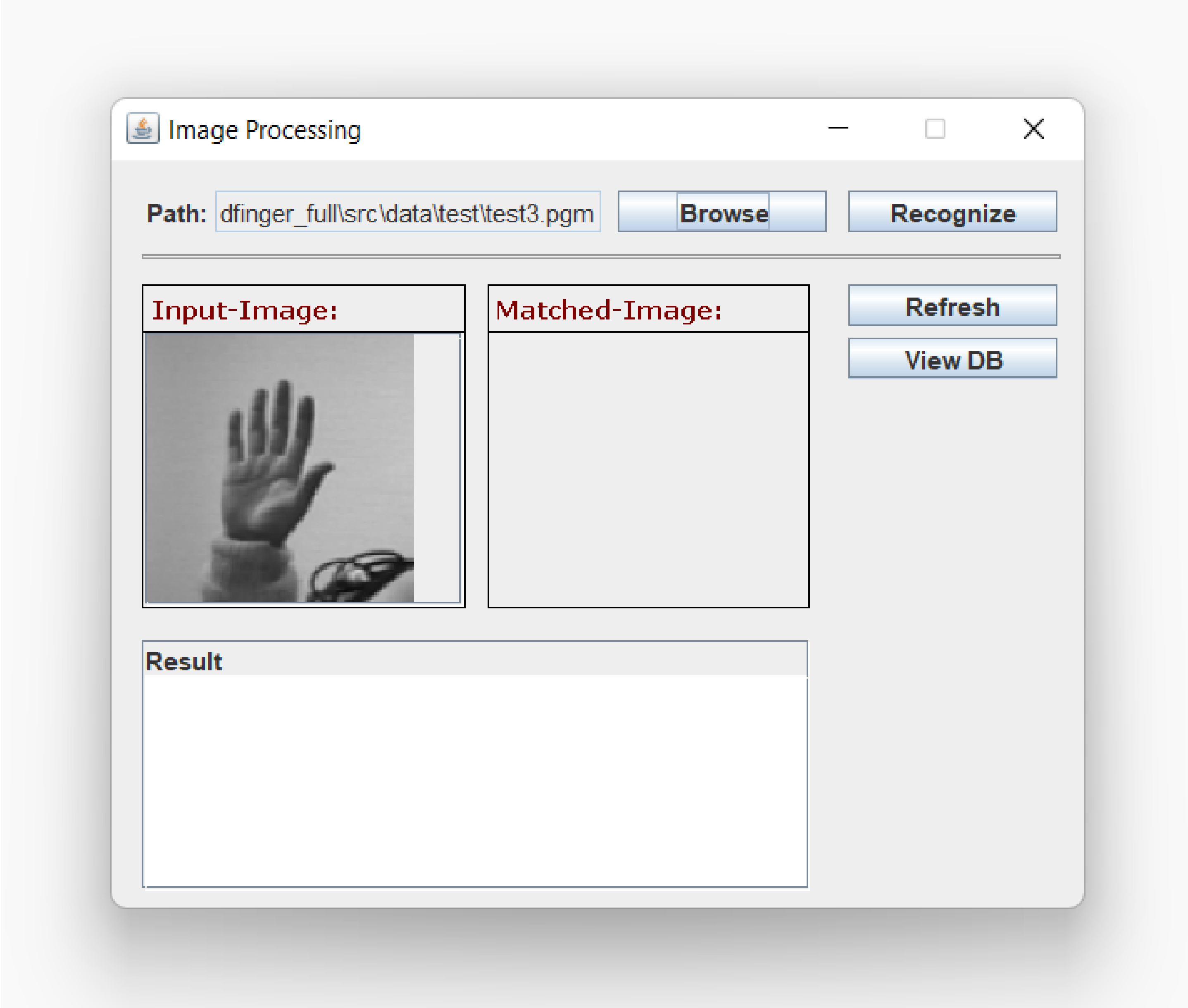
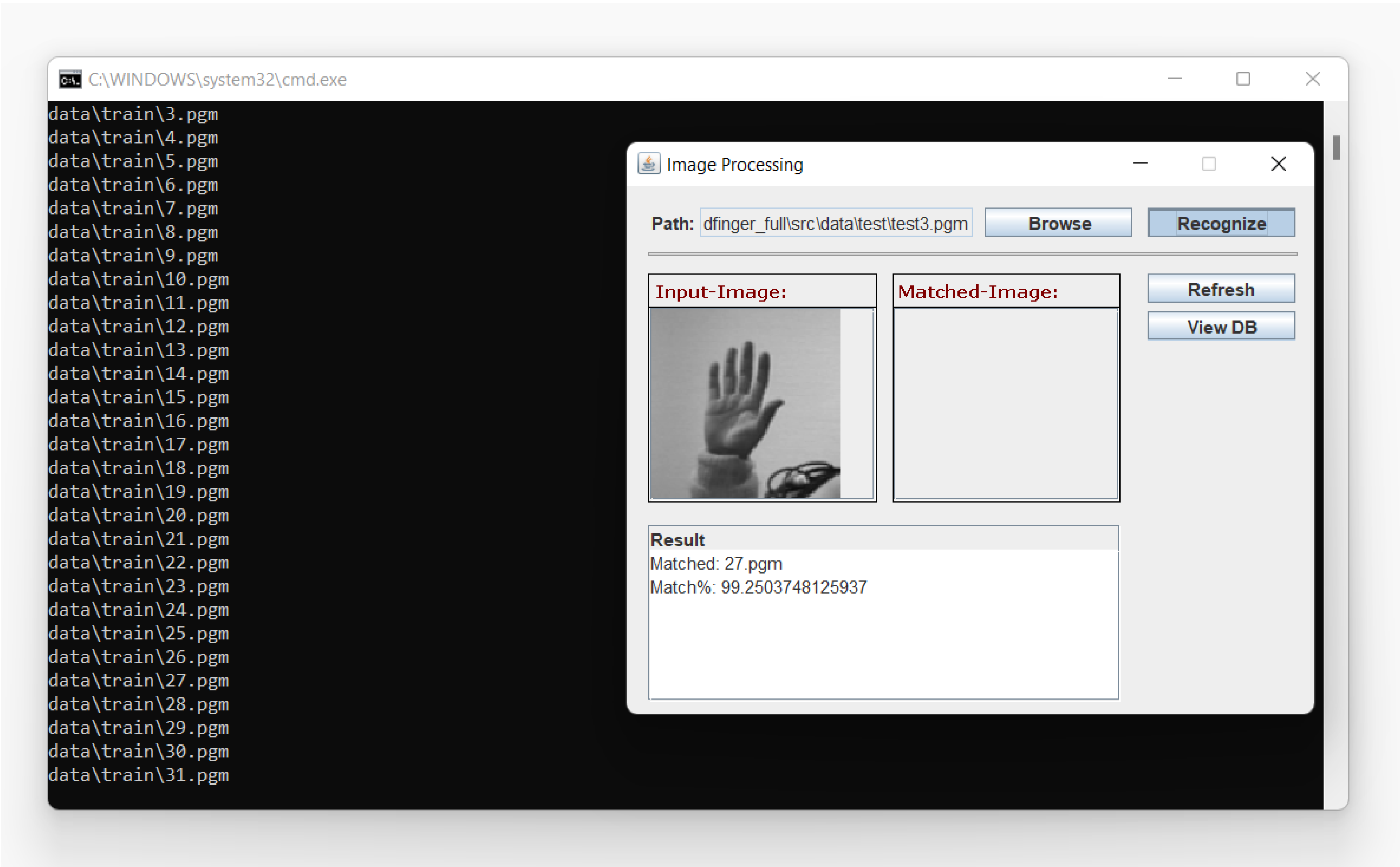
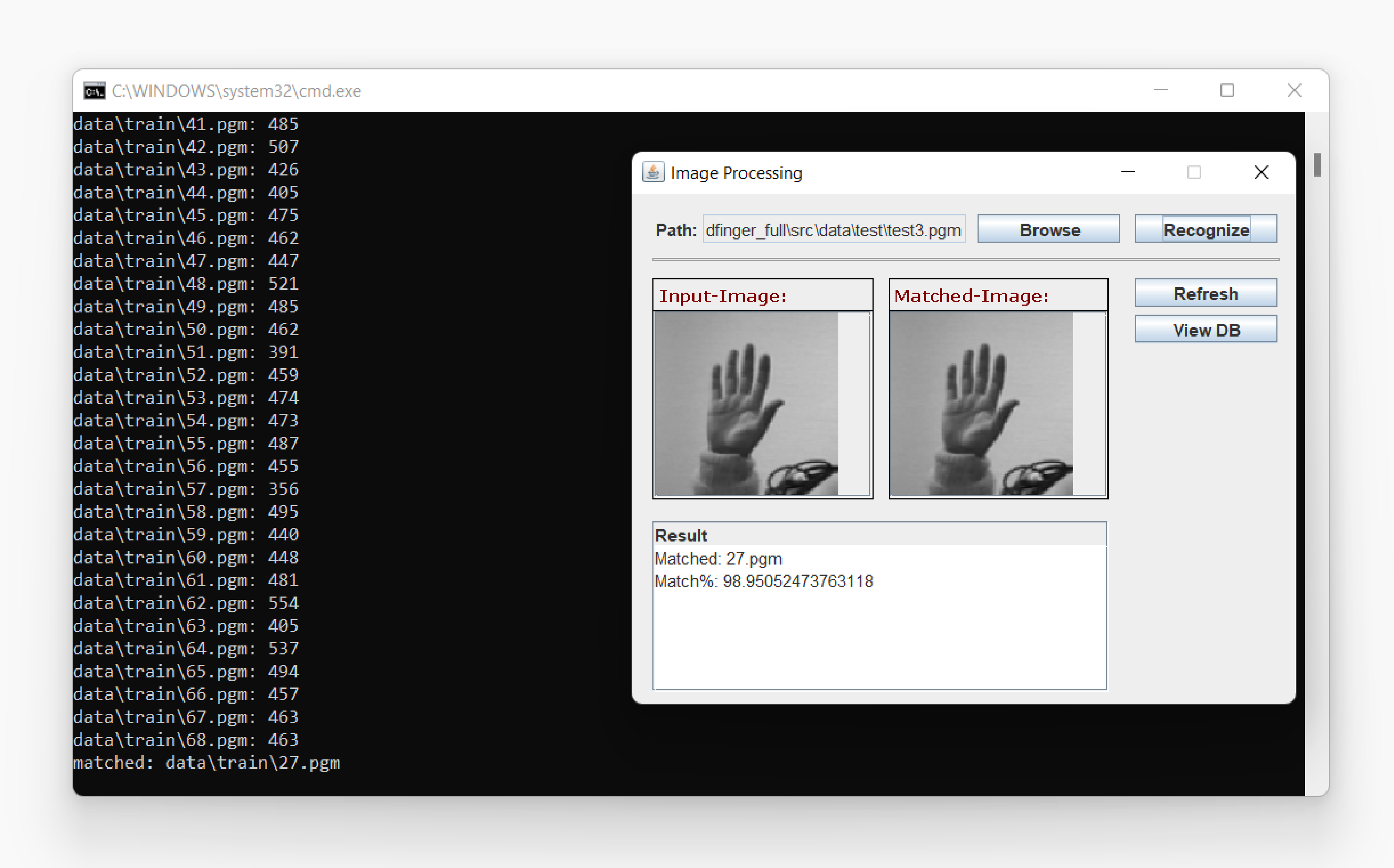


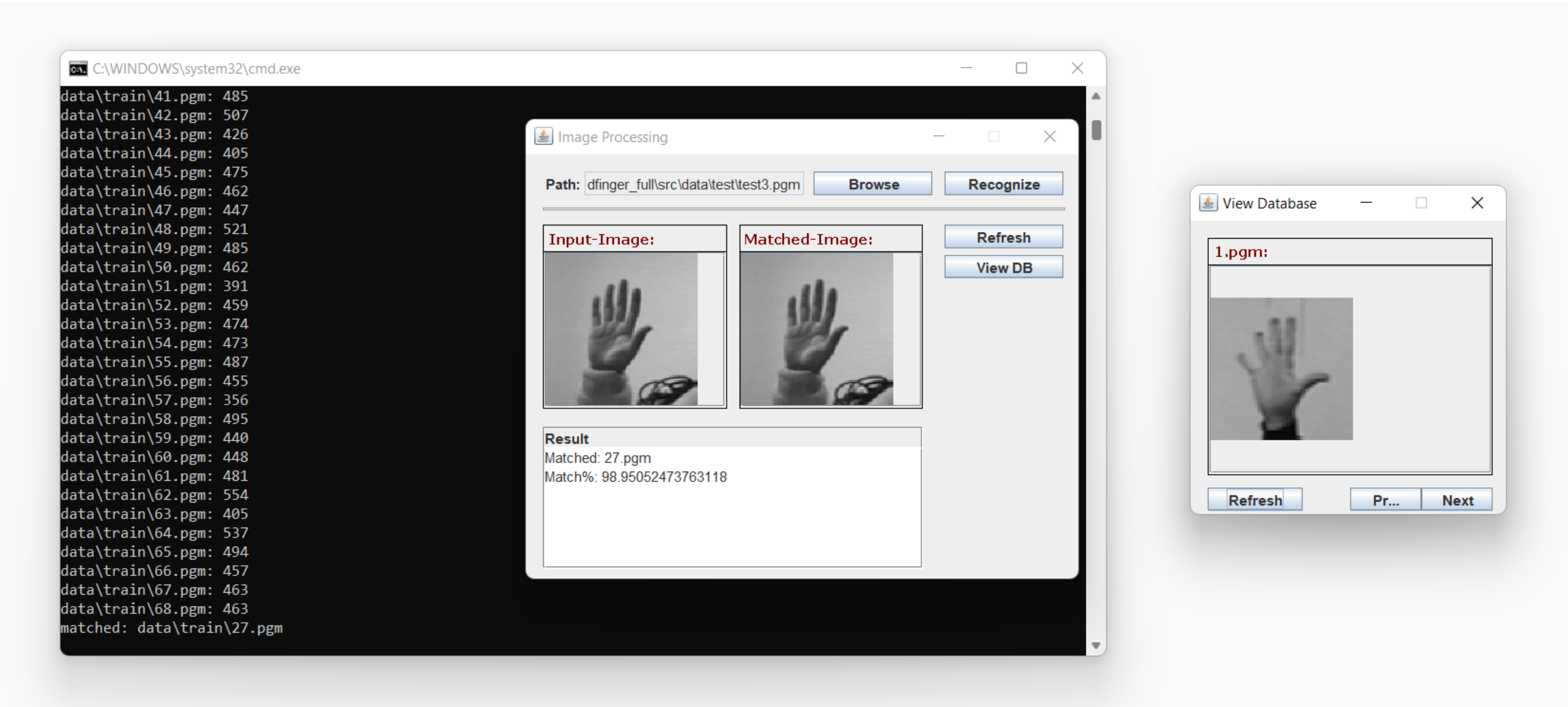
Image Recognition



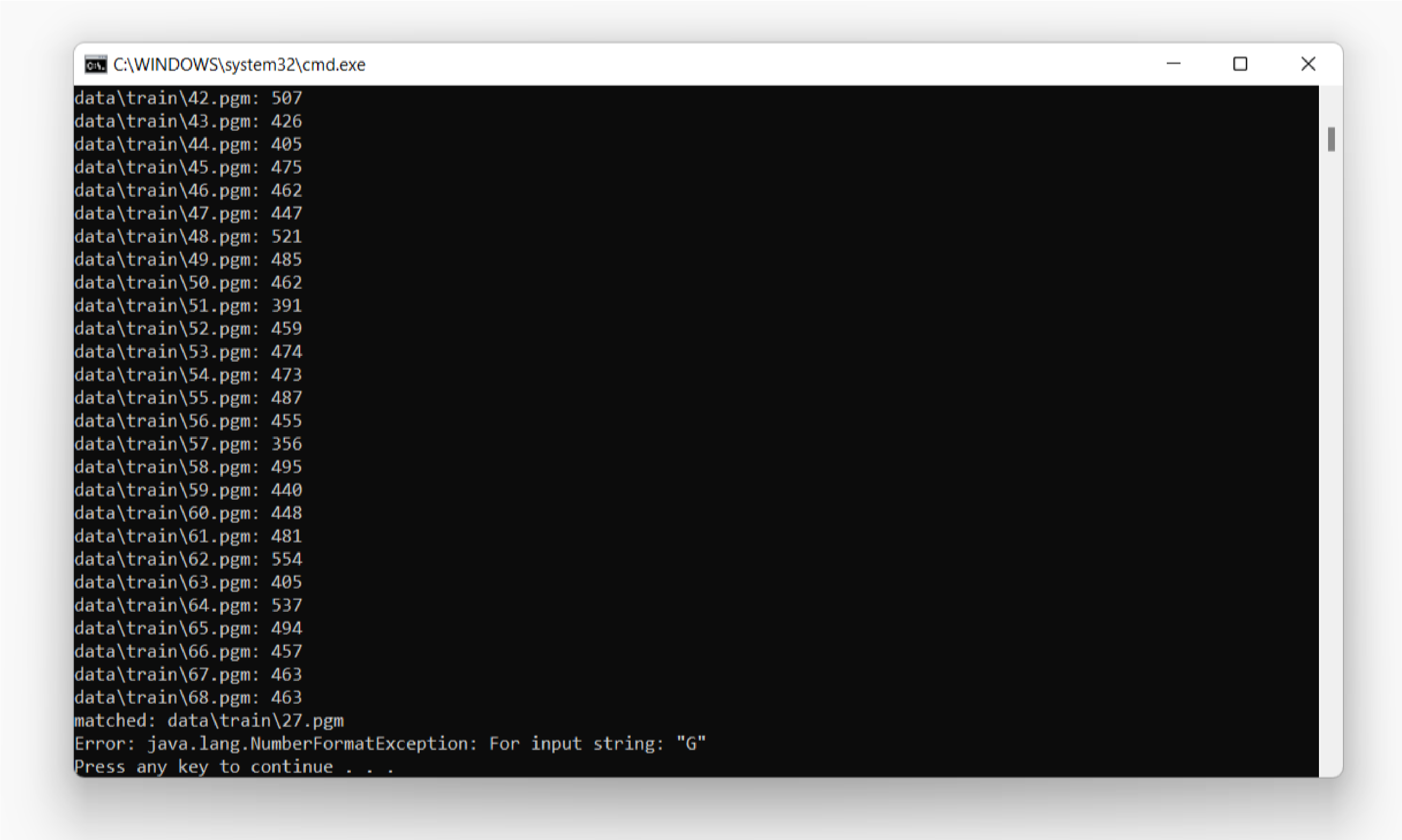
Best Match Image



View Database



Match Not Found



Future Enhancement

- Working towards proper functioning of refresh button.
- As this project accepts only PGM image type in future all other types of files can be accepted.
- On processing of image during hand recognition user's information can be displayed.

CONCLUSION

Our system is proposed to use Biometrics concept in "Personal Authentication Using 3-D Finger Geometry" which eliminates the flaws in the existing system. This system makes use of user's behavior characteristic as tool for recognition. The application is developed successfully as mentioned above.

In this project, we have presented an efficient algorithm for finger print recognition which is invariant.

In this paper, we have proposed a new approach for biometric authentication that is based on measurements of the 3-D hand geometry using a real-time low-cost 3-D sensor. We have demonstrated the ability of the proposed algorithms to work

robustly in relatively unconstrained conditions, while the results obtained on a relatively large database indicate that performance is not sacrificed. Although the error rates achieved are higher than those required in security applications, there are several other emerging applications such as personalization of services and attendance control that may benefit from the unobtrusive user authentication achieved by the proposed system.

Furthermore, if the proposed system is combined with other authentication modalities such as face recognition, the overall performance of the multimodal system is expected to be superior since 3-D hand geometry is not affected by variations in illumination, age, obstructions, etc. In particular the same 3-D sensor may be used to capture face and hand images and therefore the proposed technique is ideal for fusion with 3-D face biometrics.

This is expected to lead to a low-cost solution offering highly reliable authentication without sacrificing user convenience. This system seems to be working fine and successfully. This system can able to provide the user to give input as Human eye and it is verified with our application then says whether the authorized user or not. This application results in accuracy result of comparison.

Bibliography

- YouTube
- IEEE
- www.Javatpoint.com
- Image Processing Techniques(Wikipedia)