FINAL-YEAR PROJECT REPORT WRITING GUIDELINES

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ABSTRACT

Large-scale content-based face image retrieval is an enabling technology for many emerging applications. Existing system ignore strong, face specific geometric constraints among different visual words in a face image. Recent works on face recognition have proposed various discriminative facial features. However, these features are typically high-dimensional and global, thus not suitable for quantization and inverted indexing. There are two orthogonal methods: attribute- enhanced sparse coding and attribute embedded inverted indexing. Attribute-enhanced sparse coding exploits the global structure of feature space and uses several important human attributes combined with low level features to construct semantic code words in the offline stage. On the other hand, attribute-embedded inverted indexing locally considers human attributes of the designated query image in a bi- nary signature and provides efficient retrieval in the online stage. The System may include modules like Content base image search, Attribute base search and Face image retrieval. The proposed System can achieve higher Scalability with Efficient Content Based Image retrieval.

Keywords: Content-Based Image Retrieval Face Image, Human Attributes, Inverted Indexing

List of Figures

List of Tables

Contents

Chapter 1

INTRODUCTION

1.1 Detailed Problem Definition

The recent procedure in issuing a passport document is by using the computer in fixing the passport photo. All the passport offices are connected through a network to exchange information to verify the correctness and authenticity of the passport. Passport images can also be transferred between offices to verify the authenticity of the passport holder. The main problem is how to confirm the authenticity of the passport photo with the holderâĂŹs details. The passport document contains holderâĂŹs signature in addition to the holderâĂŹs details. But there is no association between the passport photo and the passport owner details. So a passport photo can be replaced with other personâĂŹs photo.

1.2 Current Market Survey

Image processing is computer imaging where application involves a human being in the visual loop. In other words the image is to be examined and acted upon by people. Face recognition is not perfect and struggles to perform under certain conditions. Ralph Gross, a researcher at the Carnegie Mellon Robotics Institute, describes one obstacle related to the viewing angle of the face: âĂIJFace recognition has been getting pretty good at full frontal faces and 20 degrees off, but as soon as you go towards profile, there have been problems. Other conditions where face recognition does not work well include poor lighting, sunglasses, long hair, or other objects partially covering the subjects face, and low resolution images. Another serious disadvantage is that many systems are less effective if facial expressions vary. Even a big smile can render the system less effective. For in- stance: Canada now allows only neutral facial expressions in passport photos. The need to find a desired face from a collection is shared by many professional groups, including journalists, design engineers and art historians. While the requirements of image users can vary considerably, it can be useful to characterize image queries into three levels of abstraction: primitive features such as shape, logical features such as the identity of objects shown and abstract attributes such as the significance of the scenes depicted. While systems currently operate effectively only at the lowest of these levels, most users demand higher levels of retrieval.

1.3 Need of the System

Retrieving faces according their attributes from large database is an important task has a wide range of applications such as Crime Investigation, In Medical field, Face detection System. However, retrieving face images from database based on low level attribute is not easy but does not given perfect result. In other words, retrieving face images from database based on low level high level attribute is not easy but gives perfect result with great efficiency than existing system. Traditional methods for face image retrieval usually use low level features to represent faces but low-level features are lack of semantic meanings and face images usually have high intra-class variance (e.g., expression, posing), so the retrieval results are unsatisfactory. To tackle this problem, other proposes to use identity based quantization Chenetal.Propose to use identity-constrained sparse coding, but these methods might require clean training data and massive human annotations. Using fisher vectors with attributes for large-scale image retrieval, but they use early fusion to combine the attribute scores. Also, they do not take advantages of human attributes because their target is general image retrieval.

Major contributions of this work are summarized as follows: Although human attributes have been shown useful on applications related to face images, it is non-trivial to apply it in content-based face image retrieval task due to several reasons. First, human attributes only contain limited dimensions. When there are too many people in the dataset, it loses discriminability because certain people attributes. Second, human attributes are represented as a vector of floating points. It does not work well with developing large-scale indexing methods, and therefore it suffers from slow response and scalability issue when the data size is huge.

1.4 Advances to the previous system

Drawbacks of existing approaches System ignore strong, face specific geometric constraints among different visual words in a face image. Recent works on face recognition have proposed various discriminative facial features. How- ever, these features are typically high-dimensional and global, thus not suitable for quantization and inverted indexing. In other words, using such global features in a retrieval system requires essentially a linear scan of the whole database in order to process a query, which is prohibitive for a web-scale image database.

In this work the System proposes two orthogonal methods named attribute-enhanced sparse coding and attribute-embedded inverted indexing. Attribute enhanced sparse coding exploits the global structure of feature space and uses several important human attributes combined with low-level features to construct semantic code words in the off-line stage. On the other hand, attribute-embedded inverted indexing locally considers human attributes of the designated query image in a bi- nary signature and provides efficient retrieval in the on-line stage. By incorporating These two methods, we build a large-scale content-based face image retrieval system by taking advantages of both low-level (appearance) features and high-level (Facial) semantics.

1.5 Organization of the report

The rest of the report is organized as follows: chapter 2 will do the requirement analysis with product function, project plan and team structure, chapter 3 will does the methodologies used for implementation, chapter 4 will show the modeling and design.

Chapter 2

REQUIREMENT ANALYSIS

2.1 Requirement analysis

2.1.1 Product Functions

- Query Image
- Facial Attributes Detection
- Sparse Code Generator
- Binary Signature Generation
- Inverted Indexing
- Ranking of Resultant Images for Query Image
- Space complexity Reduces
- Better performance

2.1.2 User Classes and Characteristics

Crime investigation: The Propose System can be use effectively for Criminals identification. Attribute detection from Query Criminal image will retrieve the corresponding matches for Query Image.

Medical: Medical science can often make excellent use of technologies from other fields. For example, knowledge from automatic facial recognition can also be used for medical analysis of images of organs.

2.1.3 Operating Environment

Hardware Requirement:

- 2.80GHz Intel Pentium Processor (min)

Software Requirement:

- Microsoft Windows X P/7(OS)
- Microsoft V isual S tudio2010

Dataset:

- LFW
- PubFig

2.1.4 Design and Implementation Constraints

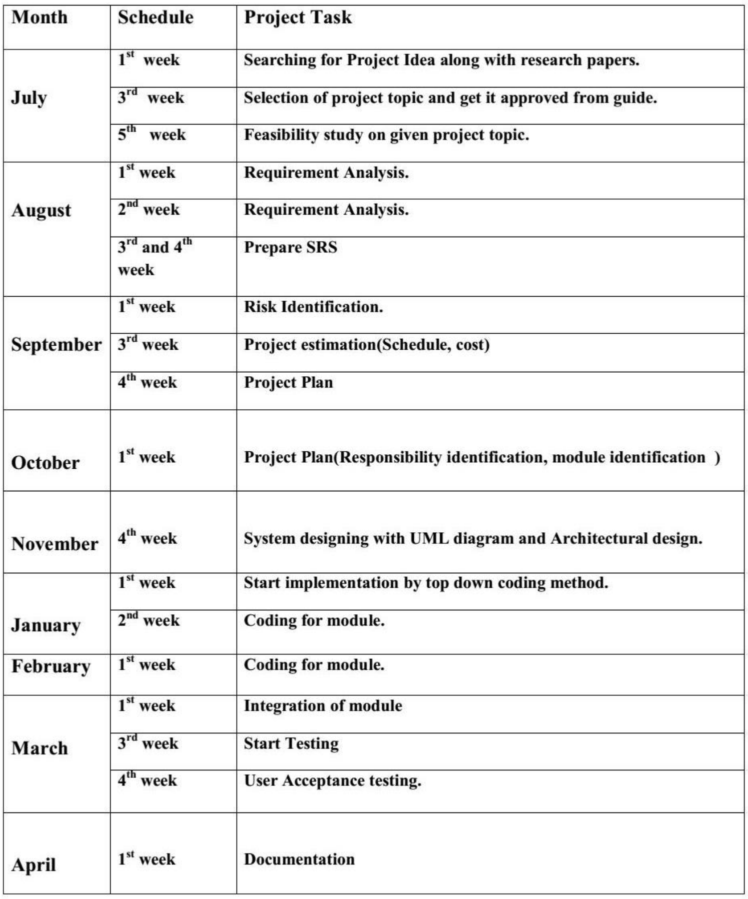
The Propose System will provide Ranking for Query Image with the use of Inverted Indexing but on the behalf of this constraint for Propose System is:

- Multiple Faces Image will be Rank According to Face Landmark Detection.
- Query Image should contain Face.

2.1.5 User Documentation

The product will be deploy along with the user manual for the proper guidance to install the software and the tutorials for effectively using various functions provided by the software.

2.2 Project plan



Month	Schedule	Project Task
July	1st week	Searching for Project Idea along with research papers.
	3rd week	Selection of project topic and get it approved from guide.
	5th week	Feasibility study on given project topic.
August	1st week	Requirement Analysis.
	2nd week	Requirement Analysis.
	3rd and 4th week	Prepare SRS
September	1st week	Risk Identification.
	3rd week	Project estimation(Schedule, cost)
	4th week	Project Plan
October	1st week	Project Plan(Responsibility identification, module identification)
November	4th week	System designing with UML diagram and Architectural design.
January	1st week	Start implementation by top down coding method.
	2nd week	Coding for module.
February	1st week	Coding for module.
March	1st week	Integration of module
	3rd week	Start Testing
	4th week	User Acceptance testing.
April	1st week	Documentation

Figure 2.1: Plan for Project

2.3 Team structure

Sr.No.	Name	Task
1	Amruta Kumbhakarn	Coding, Testing
2	Sana Mirza	Documentation, Testing
3	Nikhil Wagh	Coding, Testing
4	Sagar Katarnaware	GUI, Testing

Table 2.1: Team structures.

Chapter 3

METHODOLOGY

3.1 Softwares used

- Microsoft Visual Studio 2010
- Datasets: LFW and PubFig

3.2 Hardware specification

- Computer with 80GHz Intel Pentium D Processor (min)

3.3 Programming language

- C#.net

3.4 Platform

- .NET.
- Windows OS.

3.5 Components

There are four main components in our product given as follows:

- GUI.
- Image Files.

- Attribute Extractor.
- Sparse Code Generator.
- Image Raking.

3.6 Tools

Tools used in our product are:

- Microsoft Visual Studio 2008
- Microsoft Office 2007
- Mercury QuickTest Professional 9.2

3.7 Coding style followed

- Object Oriented Programming.

Chapter 4

MODELING AND DESIGN

4.1 UML diagrams and DFDs

4.1.1 Data Flow Diagrams

- **DFD Level 0**

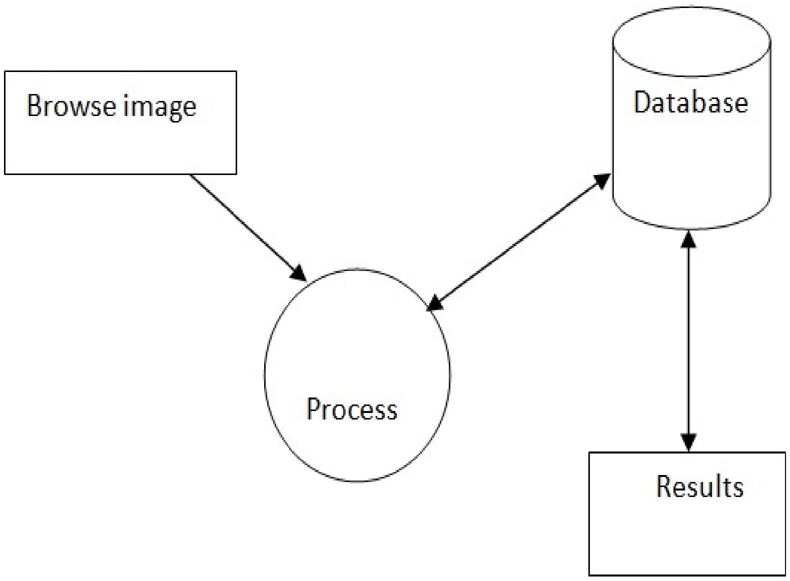


Figure 4.1: DFD Level-0

- **DFD Level 1**

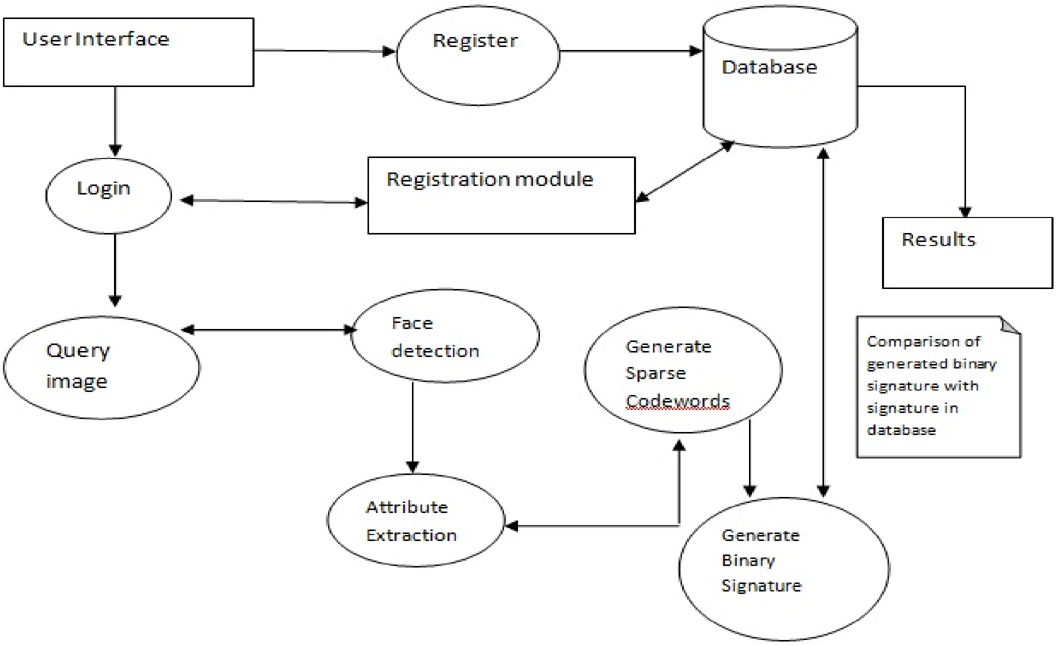

User Interface
Register
Database
Login
Registration module
Results
Query image
Face detection
Generate Sparse Codewords
Comparison of generated binary signature with signature in database
Attribute Extraction
Generate Binary Signature

Figure 4.2: DFD Level-1

4.1.2 UML Diagrams

- **UseCase Diagram**

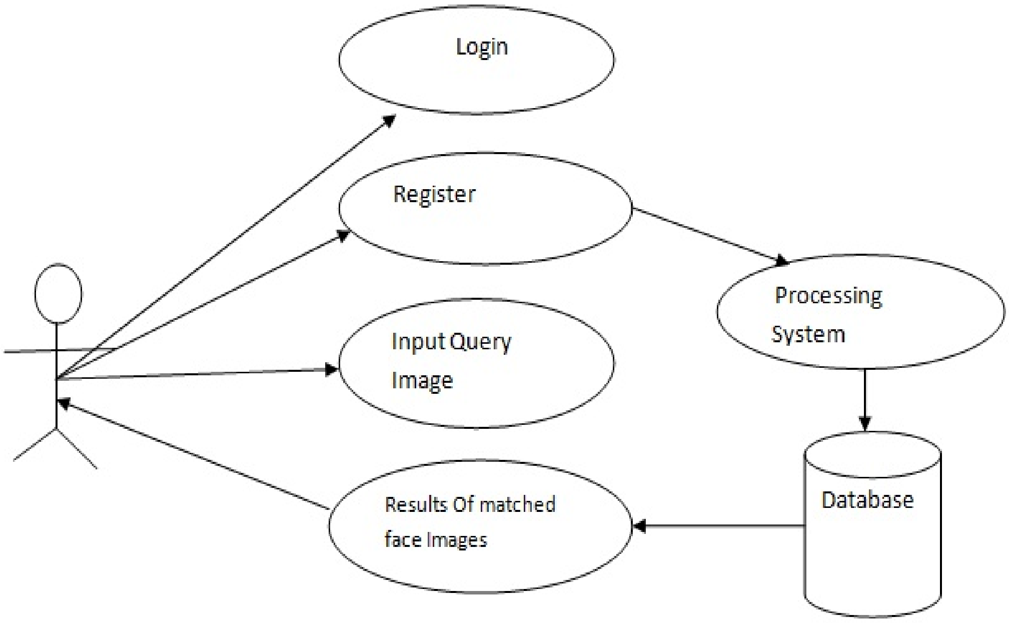


Figure 4.3: UseCase Diagram

- **Class Diagram**

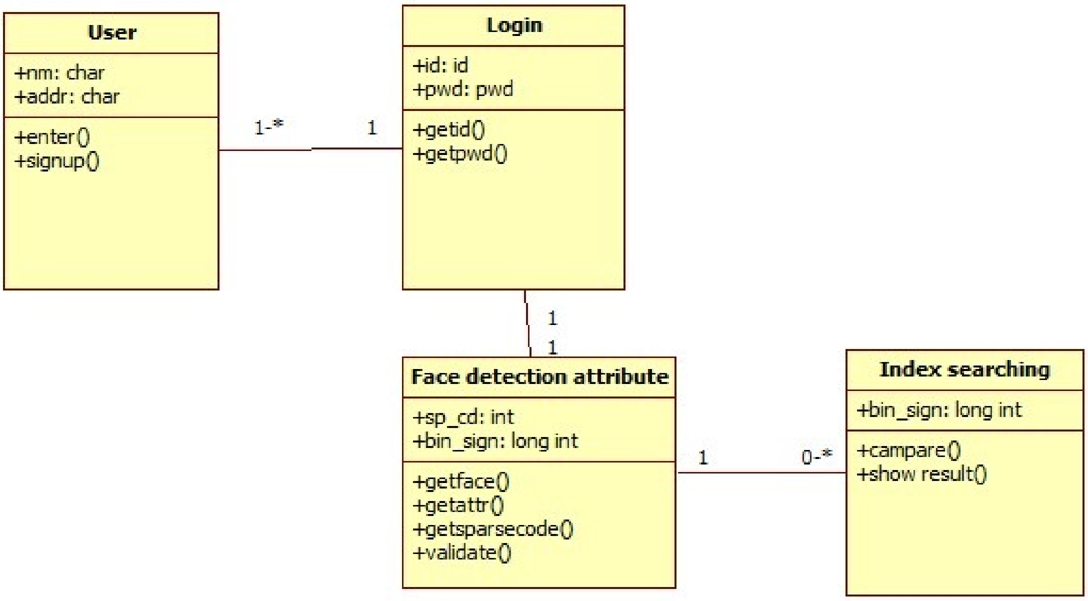


Figure 4.4: Class Diagram

- **Activity Diagram**

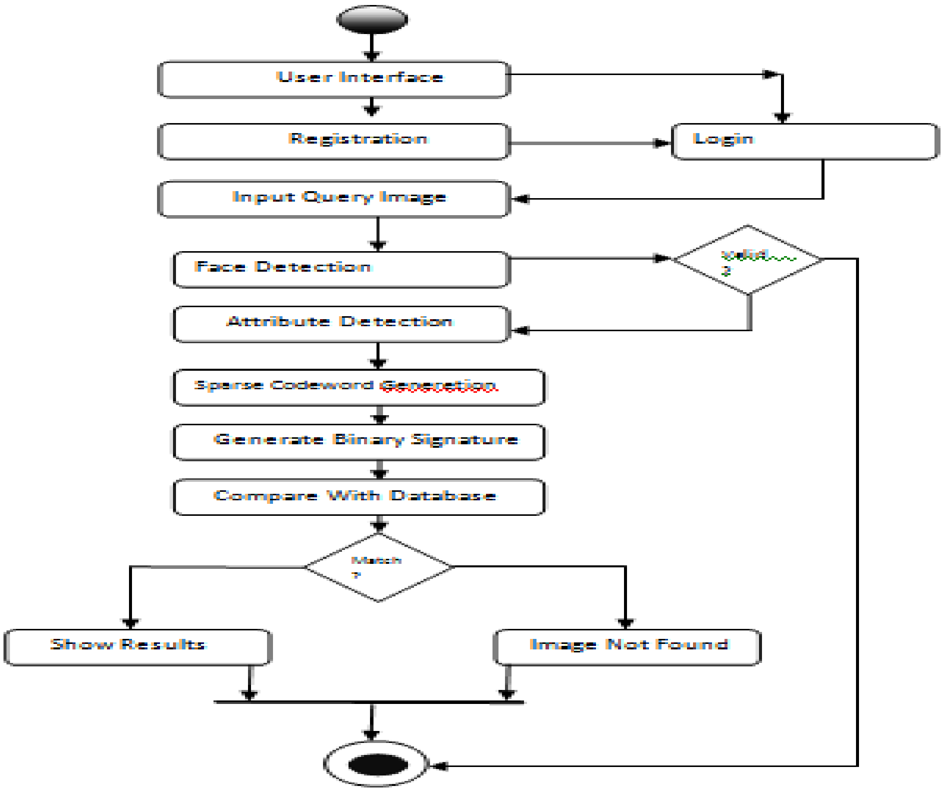


Figure 4.5: Activity Diagram

- **Component Diagram**

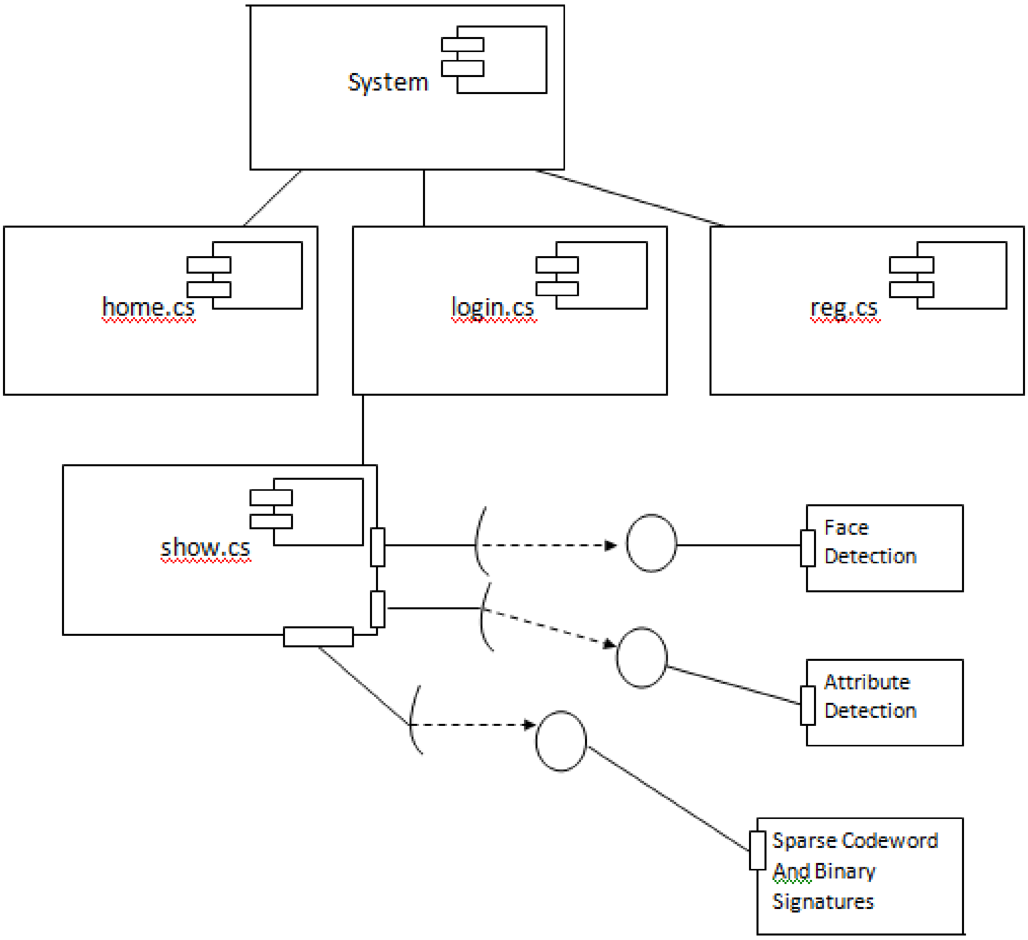


Figure 4.6: Component Diagram

- **Sequence Diagram**

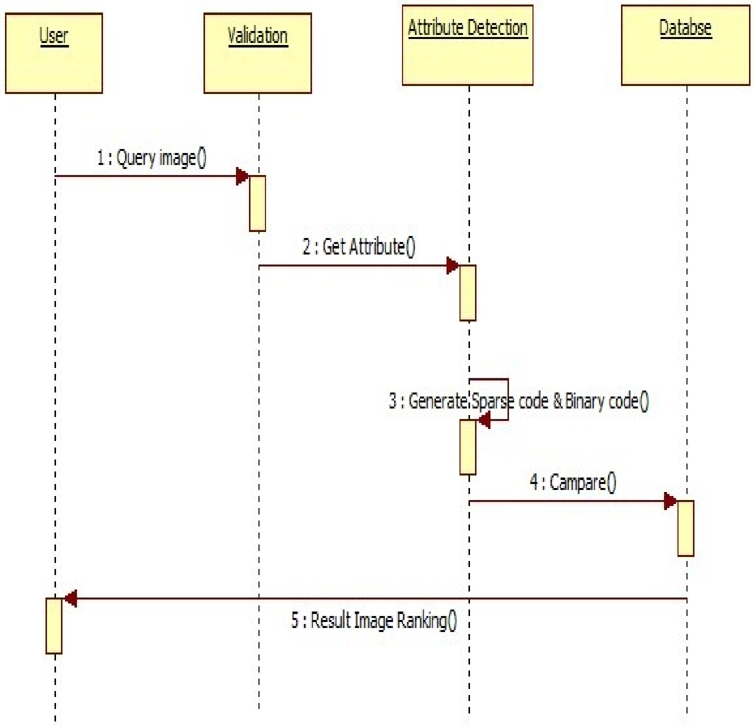


Figure 4.7: Sequence Diagram

- **Deployment Diagram**

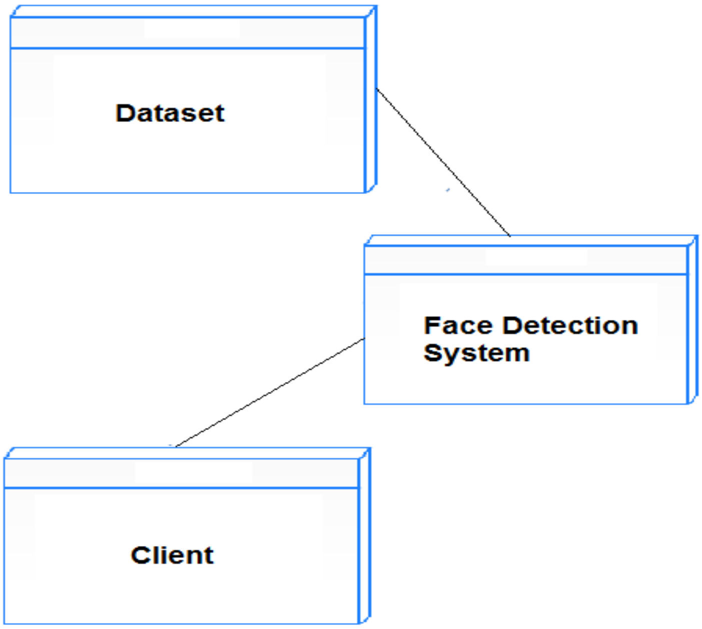


Figure 4.8: Deployment Diagram

4.2 Methods and Procedures

4.2.1 Modules of the Project

- **Face Detection and Attribute Detection:**

  This module detects Face from query image by applying Face detection algorithm. We apply another algorithm for attribute detection.

- **Attribute Enhanced sparse coding:**

  This module creates sparse codeword for every Database Image and query image and store for every image in database.

- **Face Image Retrieval Using Embedded Inverted Indexing:**

  This module is used for retrieving images form Database using binary Signature that are generated for every Image in database and Query image using sparse code words. So Indexing is used for Images in database which improves retrieval time and performance of software.

4.2.2 Detailed Flow of the Project

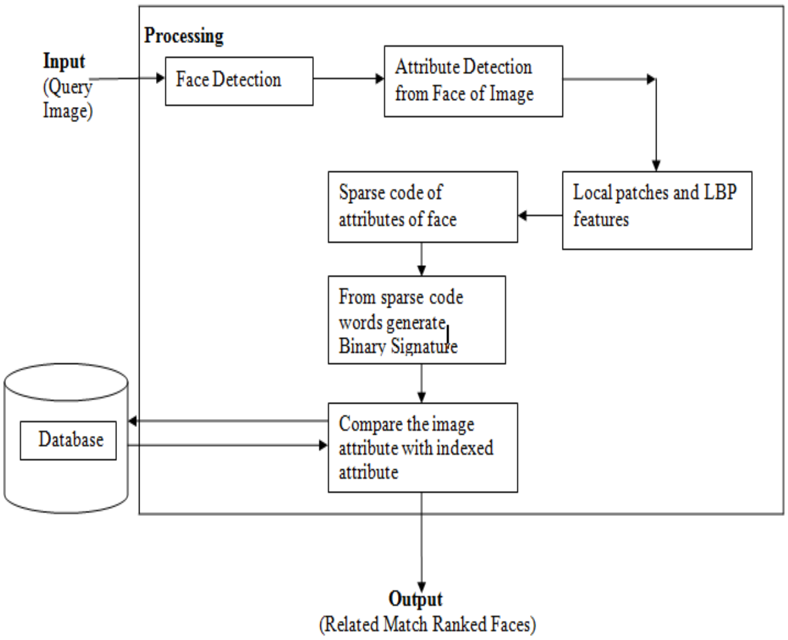


Figure 4.9: Block Diagram

4.3 Screen shots

(decide in consultation with guide)

Chapter 5

RESULTS

Results and findings based on the method described in Chapter 4

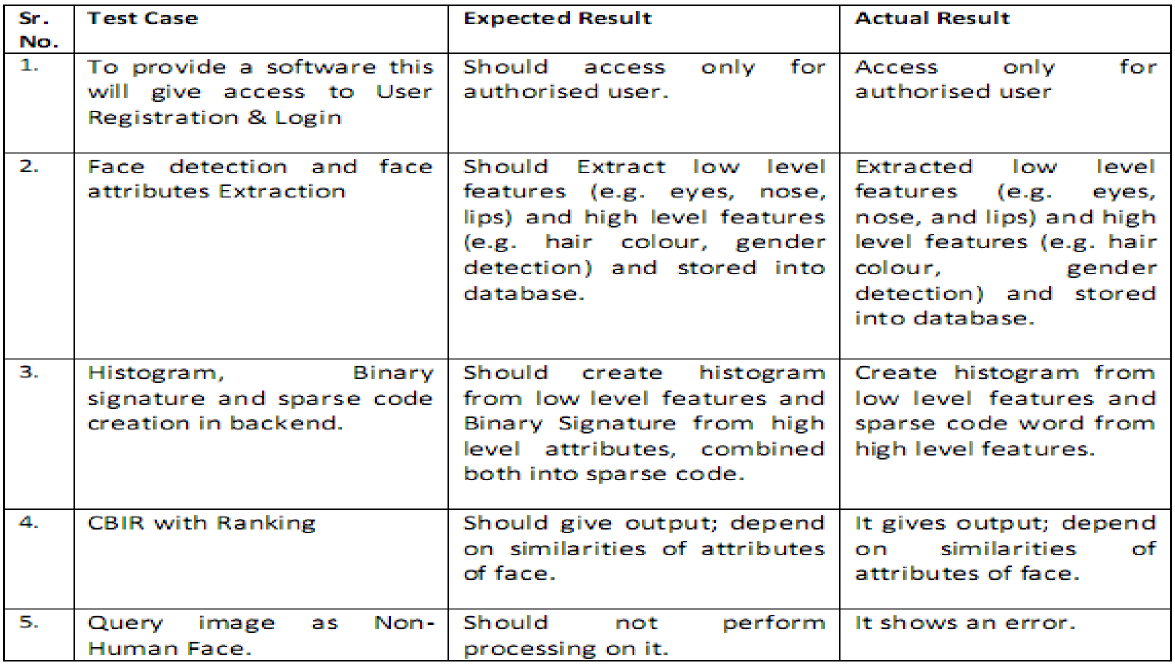
Table 5.1: Word only result

Clustering Method	No. of pages	No. of cluster	Precision	Recall	F-Measures
Word only	5	3	0.6666	0.4000	49.80
	10	3	0.6666	0.4000	49.80
	15	3	0.4444.	0.2600	32.60
	15	4	0.5555	0.3333	42.04

Chapter 6

TESTING

- **Test Cases (Manual Testing):**



Sr. No.	Test Case	Expected Result	Actual Result
1.	To provide a software this will give access to User Registration & Login	Should access only for authorised user.	Access only for authorised user
2.	Face detection and face attributes Extraction	Should Extract low level features (e.g. eyes, nose, lips) and high level features (e.g. hair colour, gender detection) and stored into database.	Extracted low level features (e.g. eyes, nose, and lips) and high level features (e.g. hair colour, gender detection) and stored into database.
3.	Histogram, Binary signature and sparse code creation in backend.	Should create histogram from low level features and Binary Signature from high level attributes, combined both into sparse code.	Create histogram from low level features and sparse code word from high level features.
4.	CBIR with Ranking	Should give output; depend on similarities of attributes of face.	It gives output; depend on similarities of attributes of face.
5.	Query image as Non-Human Face.	Should not perform processing on it.	It shows an error.

Figure 6.1: Test Cases

- **Testing by Automation Tool:**

We used MERCURYś Quick Test Professional 9.2 automation tool for testing our project, we choose this tool because itĂŹs very efficient for testing and worldwide accepted for testing. QTP can perform following types of testing:

1. GUI Testing.

2. Data Driven Testing

3. Accessibility Testing

4. Text and Text Area Testing

Reasons for choosing QTP for test Automation:

1.Test Automation framework: From a test framework perspective QTP is one tool that can be used in any type of framework Modular (Record and Playback) driven framework, Data driven (Data tables) Framework (Wow! I love the built in data driver functions and the data driving capabilities of QTP, simply amazing!!!),Keyword driven (Keyword view, function libraries etc.) framework or any other custom framework.

2. Record and Playback: It is pretty easy even for a non-programmer to record scripts / test cases, customize / modify and play back the tests. Also the tool lets the user record the scripts in three different recording modes as per the requirement: Normal, Analog and Low level. Unlike other tools that records every mouse / keyboard events / any java script event on the application, QTP Normal recording mode knows what to record and what not to. The best part is, if you want to record the above said events it can be achieved through the other two recording modes in QTP.

3. Object repository and Object identification process: The Object repository again available in two modes (Shared-For common application objects and Local-For script specific application objects) is personally the best thing I like about QTP. Unlike Test Complete (where a complex object mapping concept is followed), QTP stores the standard and nonstandard properties of the various objects of the AUT (Application under test). At the time of execution, QTP knows exactly where the objects are and how to reach those in a jiffy which increases the efficiency of test execution. The smart processing QTP is definitely a feather on the hat. There is also an âĂŸobject spyâĂŹ tool that help you chose the property of an object you can use to automate.

4. In-built function libraries: Quick test professional comes with a huge list of inbuilt functions (VBScript/QTP) for data manipulation, math, date and time, conversion, string, join and many more functions are available. This ensures that we donâĂŹt have to re-invent the wheel, just use it.

5. Error-Root cause analysis and Recovery: As a tester, I would look for 2 primary things in any application 1: Proper and appropriate error messages 2: Good log reports. Fortunately, Quick Test professional comes with both. Apart from the logs and error

messages, we can set break points and find out the values stored in variables at run-time through the full featured Script editor and script debugging features. The recovery scenario manager helps you to recover from any unforeseen events like object state not identified, pop-ups, a statement failure, application crash etc.

6. Maintenance and Reusability: The idea behind any test automation framework is either Maintainability or Reusability or both. Quick Test professional makes it even easier to maintain the Test Scripts, Functions, objects and everything else built using QTP.

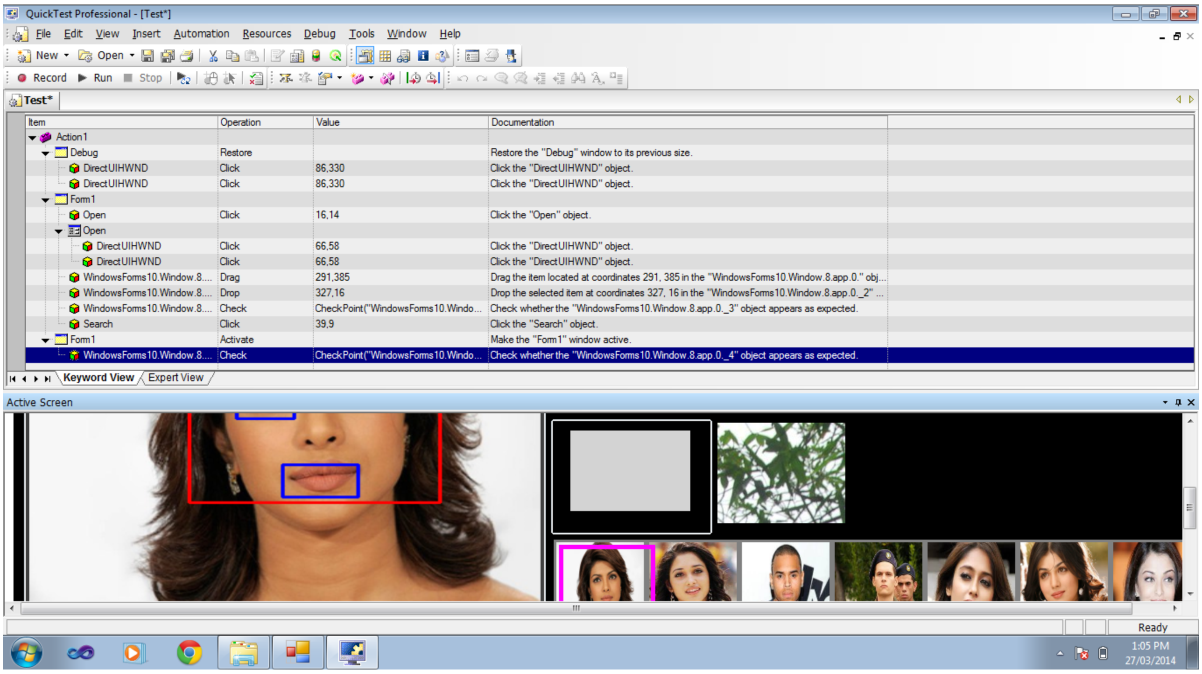
7. Supported environments: Though the tool supports only Windows platform, it can be used for automation in a big list of application platforms but not limited to Java, Oracle, SAP, .NET, Web Forms, Siebel, PeopleSoft, Web services, Main frame (Terminal Emulator), Stingray, Delphi, WPF, Flex, Windows mobiles and not to forget the support for most popular browsers like Internet explorer and fire fox. From the forums, I understand that they are working on support for Google chrome browser. It also supports Rich Internet Applications (RIA) like Ajax, Flex, Silverlight, etc.

8. Support for different testing requirements: Quick Test professional supports any level of testing (Unit, Integration, System, and UAT), regression testing, web application testing, windows application testing, mobile application testing, database, load testing etc. Please read the complete article on QTP supported testing types by clicking on the link.

9. Results viewer: The test run Results viewer furnishes with an executive summary page with data specific to the test , pie charts and statistics for both the current and previous runs, a quick link to the previous run results, and more. It is pretty easy to customize or the set of panes that we can show, hide, move, dock. The best part is the Run results viewer can be installed as a standalone application. This enables us to share the results of the tests with business analysts and developers who do not work with Quick Test professional.

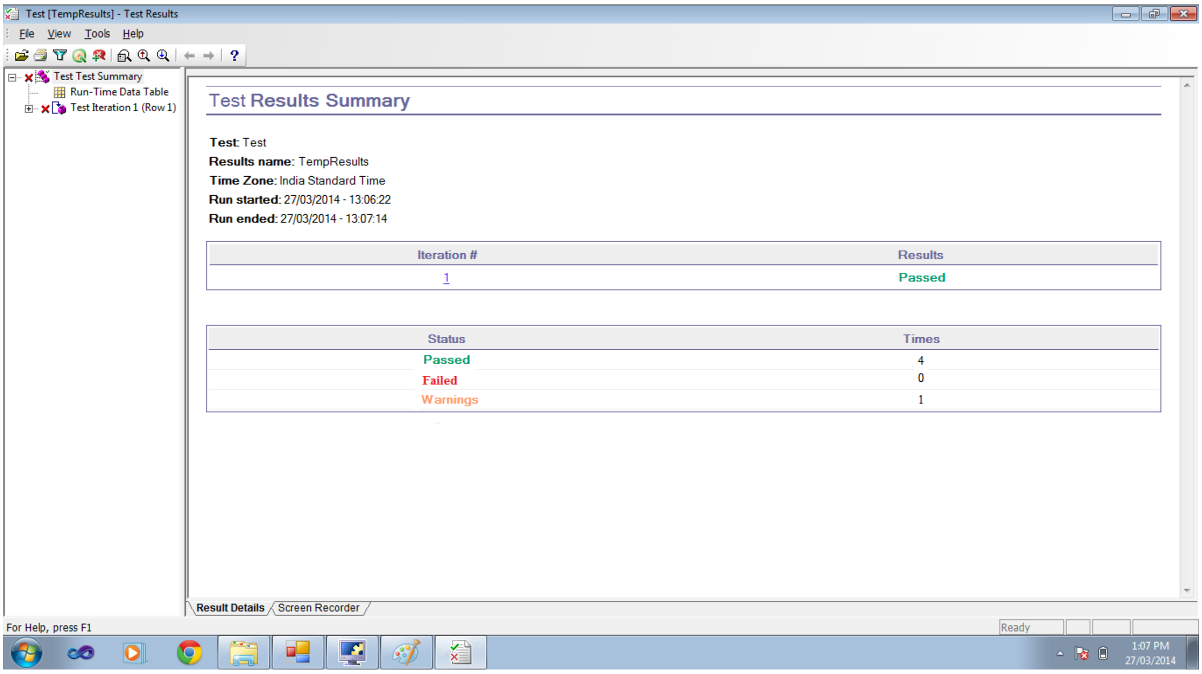
We used QTP 9.2 for GUI and Accessibility Testing

Snapshot of QTP Testing:


QuickTest Professional - [Test*]
File Edit View Insert Automation Resources Debug Tools Window Help
New Open
Record Run Stop
Test*
Keyword View
Expert View
Active Screen
Ready
1:05 PM
27/03/2014

Item	Operation	Value	Documentation
Action1			
Debug	Restore		Restore the "Debug" window to its previous size.
DirectUIHWND	Click	86,330	Click the "DirectUIHWND" object.
DirectUIHWND	Click	86,330	Click the "DirectUIHWND" object.
Form1			
Open	Click	16,14	Click the "Open" object.
Open			
DirectUIHWND	Click	66,58	Click the "DirectUIHWND" object.
DirectUIHWND	Click	66,58	Click the "DirectUIHWND" object.
WindowsForms10.Window.8....	Drag	291,385	Drag the item located at coordinates 291, 385 in the "WindowsForms10.Window.8.app.0." obj...
WindowsForms10.Window.8....	Drop	327,16	Drop the selected item at coordinates 327, 16 in the "WindowsForms10.Window.8.app.0._2" ...
WindowsForms10.Window.8....	Check	CheckPoint("WindowsForms10.Windo...	Check whether the "WindowsForms10.Window.8.app.0._3" object appears as expected.
Search	Click	39,9	Click the "Search" object.
Form1	Activate		Make the "Form1" window active.
WindowsForms10.Window.8....	Check	CheckPoint("WindowsForms10.Windo...	Check whether the "WindowsForms10.Window.8.app.0._4" object appears as expected.

Figure 6.2: BitMap Checkpoints in QTP



Test Results Summary

Test: Test
Results name: TempResults
Time Zone: India Standard Time
Run started: 27/03/2014 - 13:06:22
Run ended: 27/03/2014 - 13:07:14

Iteration #	Results
1	Passed

Status	Times
Passed	4
Failed	0
Warnings	1

Figure 6.3: Test Result

Appendix A

Appendix A

Appendix B

Appendix B

Bibliography

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