Face Expression Recognition

Report submitted for the partial fulfillment of the requirements for the degree of Masters of Computer Application

S. R. S. Report – I

Group No. -> 6

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Introduction:

“2018 is the year when machines learn to grasp human emotions” --Andrew Moore, the dean of computer science at Carnegie Mellon. With the advent of modern technology our desires went high and it binds no bounds. In the present era a huge research work is going on in the field of digital image and image processing.Facial recognition software is based on the ability to recognize a face and then measure the various features of the face. This project is aimed to identify the face of the person using various features like eyes, hair, lips, nose, etc. The details such as distance between the eyes or shape of the chin, are then converted into a mathematical representation and compared to data on other faces collected in a face recognition database. The objective of this project is to develop Automatic Facial Expression Recognition System which can take human facial images containing some expression as input and recognize and classify it into seven different expression class such as :

I. **Neutral**

II. Angry

III. Disgust

IV. Fear

V. Happy

VI. Sadness

VII. Surprise

1.1 Purpose

What is the purpose of this SRS and the (intended) audience for which it is written?

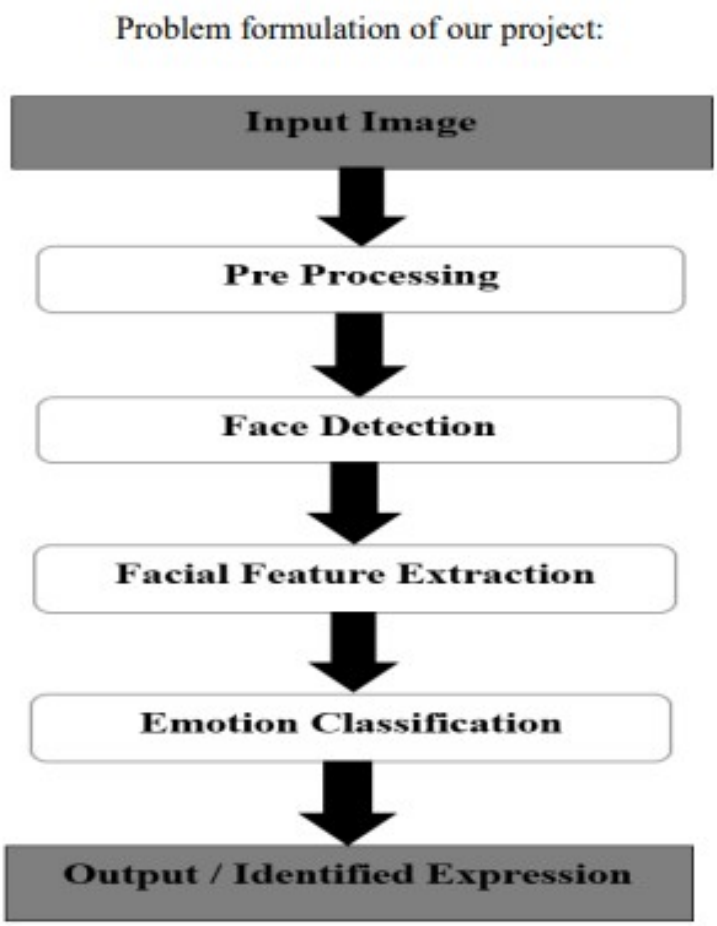
1.2 Scope

The scope of the project is confined to store the image and store in the database. When a person has to be identified the images stored in the database are compared with the existing details. Over the last ten years or so, face recognition has become a popular area of research in computer vision and one of the most successful applications of image analysis and understanding. Because of the nature of the problem, not only computer science researchers are interested in it, but neuroscientists and psychologists also. It is the general opinion that advances in computer vision research will provide useful insights to neuroscientists and psychologists into how human brain works, and vice versa.

Face Recognition systems use computer algorithms to pick out specific, distinctive details about a person's face. These details, such as distance between the eyes or shape of the chin, are then converted into a mathematical representation and compared to data on other faces collected in a face recognition database. The data about a particular face is often called a face template and is distinct from a photograph because it's designed to only include certain details that can be used to distinguish one face from another. It is important to note that there is no specific formula to build a neural network that would guarantee to work well. Different problems would require different network architecture and a lot of trail and errors to produce desirable validation accuracy.

1.3 Definitions, Acronyms, and Abbreviations

Human facial expressions can be easily classified into 7 basic emotions: happy, sad, surprise, fear, anger, disgust, and neutral. Our facial emotions are expressed through activation of specific sets of facial muscles. These sometimes subtle, yet complex, signals in an expression often contain an abundant amount of information about our state of mind. Through facial emotion recognition, we are able to measure the effects that content and services have on the audience/users through an easy and low-cost procedure. For example, retailers may use these metrics to evaluate customer interest. Healthcare providers can provide better service by using additional information about patients' emotional state during treatment. Entertainment producers can monitor audience engagement in events to consistently create desired content. Humans are well-trained in reading the emotions of others, in fact, at just 14 months old, babies can already tell the difference between happy and sad. But can computers do a better job than us in accessing emotional states? To answer the question, We designed a deep learning neural network that gives machines the ability to make inferences about our emotional states. In other words, we give them eyes to see what we can see.



1.4 References

- **A literature survey on Facial Expression Recognition using Global Features**byVaibhavkumar J. Mistry and Mahesh M. Goyani,International Journal of Engineering and Advanced-Technology(IJEAT),April,2013 [http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.645.5162&rep=rep1&type=pdf]
- **Recognizing Facial Expressions Using Deep Learning** by Alexandru Savoiu Stanford University and James Wong Stanford University [http://cs231n.stanford.edu/reports/2017/pdfs/224.pdf]
- **Convolutional Neural Networks (CNN) With TensorFlow** by Sourav from Edureka [https://www.youtube.com/watch?v=umGJ30-15_A]
- **Journal on Convoluted Neural Network** by IIIT,Hyderabad.
- **Journal on Artificial Intellegence** by Prof. M.K. Anand, 2014.
- Wikipedia- **Artificial Neural Netwok & Convoluted Neural Netwok.**

2. General Description

By conducting the requirements analysis, we listed out the requirements that are useful to restate the problem definition.

♣Insert the image into database

♣ Split the image into no of parts.

♣ Merge the parts.

♣ Identify the image.

♣ Draw image manually.

♣ Maintain information about each person

2.1 Product Functions

A newly-emerging trend in facial recognition software uses a 3D model, which claims to provide more accuracy. Capturing a real-time 3D image of a person's facial surface, 3D facial recognition uses distinctive features of the face -- where rigid tissue and bone is most apparent, such as the curves of the eye socket, nose and chin -- to identify the subject. These areas are all unique and don't change over time.

2.2 Assumptions and Dependencies

This subsection of the SRS should list each of the factors that affect the requirements stated in the SRS. These factors are not design constraints on the software but are, rather, any changes to them that can affect the requirements in the SRS. For example, an assumption might be that a specific operating system will be available on the hardware designated for

the software product. If, in fact, the operating system is not available, the SRS would then have to change accordingly.

3. Specific Requirements

3.1 External Interface Requirements

3.1.1 Hardware Requirements

- Processor: Pentium III – 900 MHz
- Hard Disk: 20 GB
- RAM: 4 GB

3.1.2 Software Interfaces

As the project is developed in python, we have used Anaconda for Python 3.6.5 and Spyder.

- **Anaconda:** It is a free and open source distribution of the Python and R programming languages for data science and machine learning related applications (large-scale data processing, predictive analytics, scientific computing), that aims to simplify package management and deployment.

- **Spyder** Spyder (formerly Pydee) is an open source cross-platform integrated development environment (IDE) for scientific programming in the Python language. Spyder integrates NumPy, SciPy, Matplotlib and Python, as well as other open source software. It is released under the MIT license.

3.2 Functional Requirements

By conducting the requirements analysis, we listed out the requirements that are useful to restate the problem definition.

- **Insert the image into database**
- **Split the image into no of parts.**
- **Merge the parts.**
- **Identify the image.**
- **Draw image manually.**
- **Maintain information about each person**

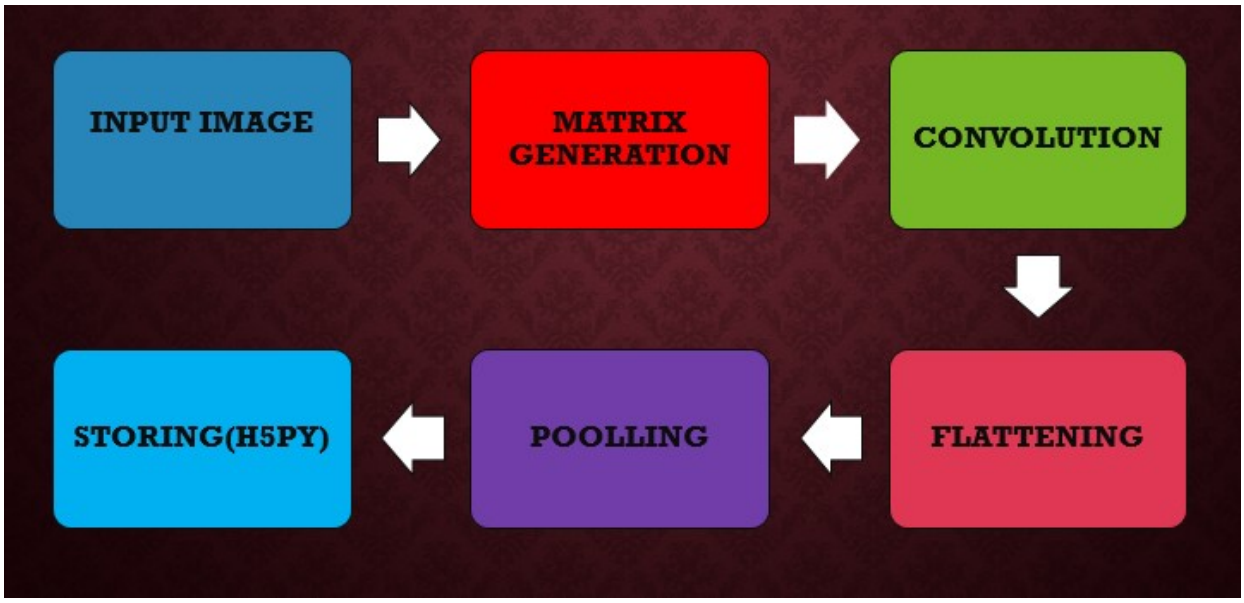
3.3 Use Cases

A use case diagram is a dynamic or behavior diagram in UML. Use case diagrams model the functionality of a system using actors and use cases. Use cases are a set of actions, services, and

functions that the system needs to perform. In this context, a "system" is something being developed or operated, such as a web site. The "actors" are people or entities operating under defined roles within the system. The “scenario” is a specific sequence of actions and interactions between actors and the system. "Use case” is a collection of related success and failure scenarios, describing actors using the system to support a goal

3.4 Design

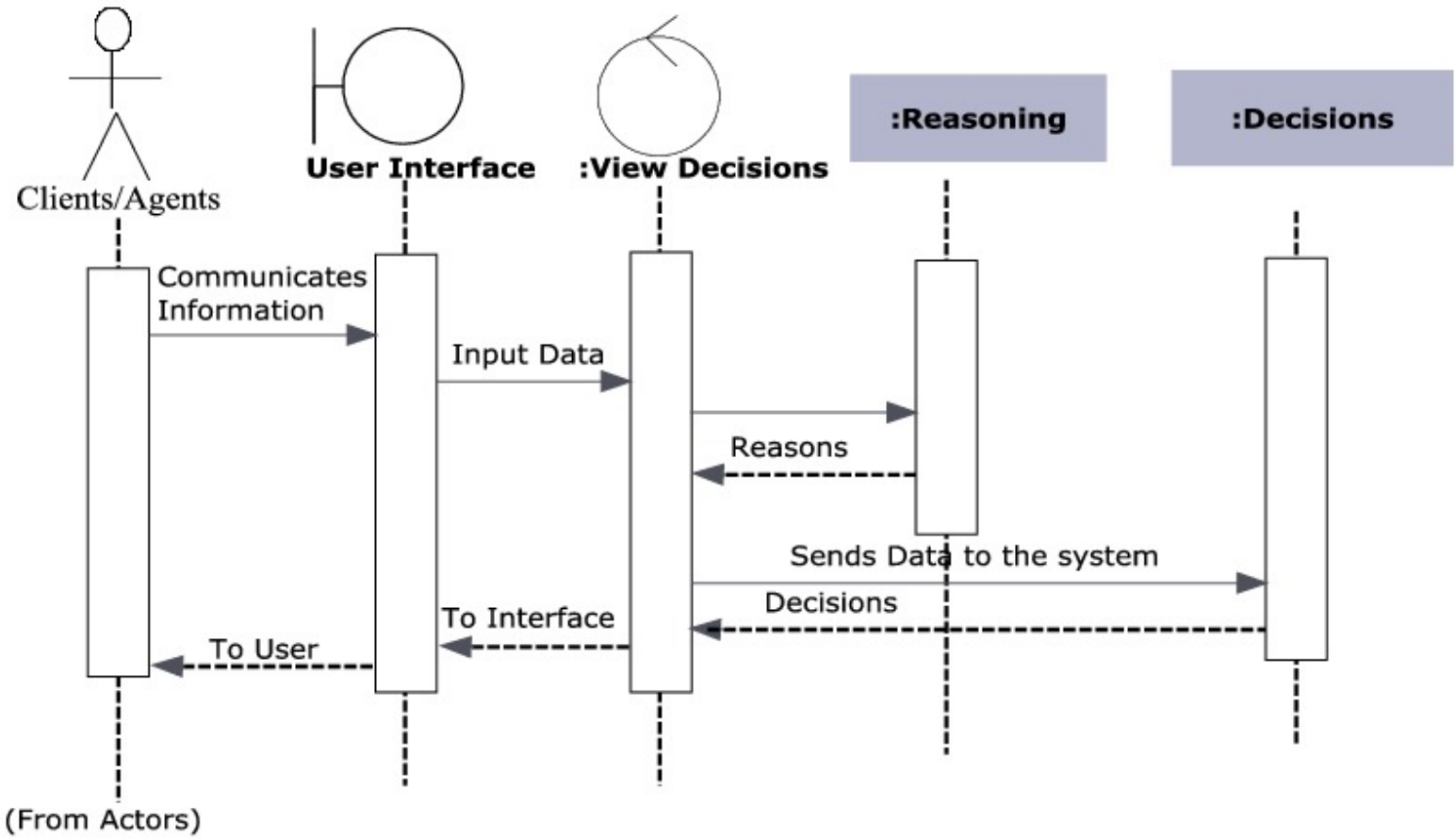
3.5 Logical Database Requirements :



This layer comprises of the Database Components such as DB Files, Tables, Views, etc. The Actual database could be created using SQL Server, Oracle, Flat files, etc. In an n-tier application, the entire application can be implemented in such a way that it is independent of the actual Database. For instance, you could change the Database Location with minimal changes to Database Access.

4. Analysis Models

4.1 Sequence Diagrams



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4.2 Flow Chart