Mobile Customers' Charter with Mood Meter

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EXECUTIVE SUMMARY

Many studies have shown that facial expressions are vital for human-to-human interaction, and they are considered one of the most important cues in the psychology of emotion. People express their feelings mostly through visual, facial, and bodily expressions. Consequently, facial expression recognition is the primary indicator of a human affective state. Thus, this research project aims to explore the usage of desktop devices to detect emotion from the face of the customers and determine their mood. The system will use the basic technique in seeing calm and annoyed faces in the pictures implemented as a desktop application. This research aims to monitor the services rendered by the organization's employees by determining the mood of customers if they are satisfied with their service. Simultaneously, the system will also help managers or owners know the current status of their business. With the help of OpenCV and emgucv, face detection can be implemented in the desktop application through webcam. Moreover, the haar cascade object detection helped the researchers train the system to detect two moods (calm and annoyed) by comparing the captured picture to the database's images. However, facial expression detection accuracy greatly depends on the clear images the camera captures. The lightings and distance of the person in the image should be considered. Therefore, training the system in comparing images to the database is really important to achieve accuracy in face and mood detection.

Keywords: *Mood, Emotion, Desktop Application, VB.Net, Opencv, Emgucv, Android, Eclipse*

INTRODUCTION

In the era of technological advances and globalization, mobile technology has highlighted information and communication. This has launched mobile applications for the convenience and benefits of the users. These mobile applications are specifically developed for different purposes such as entertainment, health, latest news, and information application. The mobile apps' explosive growth usage has opened up for innovative M-Commerce (Mobile Commerce) in terms of products and services. Thus, technological innovation helps in business development across the globe into a more convenient, reliable, and faster data transaction.

Nowadays, business organizations use these technologies to their competitive advantage in the economy. With that, customer service is one of its advantages, in which it maintains the on-going relationship between the company and customer through monitoring the customers' feedback. For this reason, companies have worked hard to improve the company's performance to increase the customer's satisfaction level. Furthermore, employees are usually working behind the scenes and primarily interact directly with the customers' perception of the company as a whole. And the company with excellent customer service will have a distinct advantage over other companies. (VHT Marketing, 2013)

Customers are vital to an organization, and making them wait for too long can change their mood. Waiting in line can't make the customers happy (Williams, 2013). Generally, some customers' patience has almost run out by the time called. Yet, their concerns and complaints about it can't be heard, and it will negatively impact a business if this continues. Customers complain that clients want to be treated fairly by the company when a service failure occurs. (Siu; Zhang & Yau, 2013) The right to complain is given to the customers through customer service to prevent it. That's why customer service is important to the company because it is the only communication between the customers and the company.

Moreover, the customer's emotion or mood is one of the important indications of whether they are satisfied with the service or not. Human emotions are non-verbal communication that signifies different meanings and interpretations. Through facial expressions, body gestures, and other non-verbal cues, humans can communicate with others. This is especially true in emotions' communications (Dynel Marta, 2011). The nature of non-verbal communication or facial expression is hard to hide or fake (Creative Commons 2012).

In overall impact, the proponents decided to create a mobile and desktop application that will benefit the business establishments and the customers. The customer can give their feedback through the use of the mobile application and send it directly to the manager. With mobile application, the transaction between the manager and owner to their customer will help increase the business' performance through their direct feedback. Meanwhile, the desktop application will detect faces and moods to monitor the customer's satisfaction level with the business' services.

PURPOSE AND DESCRIPTION

Facial expressions are used among people as the basic mode of non-verbal communication. Each facial expression has different meanings, interpretations, and messages. Therefore, facial expressions are one of the most important cues in psychology of emotion. People express their emotions through visual and body gestures.

Facial expression is a basic mode of nonverbal communication among people. Every facial expression denotes different types of meaning and messages. That's why facial expressions are among the most important cues in the psychology of emotion. People express their emotions mostly through visual, facial, and bodily expressions. Consequently, facial expression recognition is an important indicator of a human affective state.

Thus, this research project aims to explore the usage of a desktop application to detect emotion from the face of the customers and determine their mood through the use of the webcam. The system will use the basic technique in detecting calm, annoyed, happy, and sad in the pictures implemented as a desktop application. The purpose of this research is to monitor the services rendered by the organization's employees by determining the mood of customers if they are satisfied with their service or not. The system will also help the managers or owners know their customers' current situation and help the business increase its performance.

The researchers created a simple yet unique customer service concept designed for mobile devices. They can send their feedback even without load that applies to any android smartphone or tablet only. However, the study's main concept is to detect faces and moods through the use of the webcam that will be placed in the frontline. The desktop application is used for monitoring purposes only, and therefore, it is on the server-side.

OBJECTIVE OF THE STUDY

The researcher's objectives are listed below:

1. To develop a module that detects the four moods of the customers, such as: calm, annoyed, happy, and sad, that will display the result based on the webcam snapshot.
2. To use desktop application testing techniques that will fit in the study.
3. To create a website in which the target users can download the mobile application.

TECHNICAL BACKGROUND

The technicality of the Project

Testing Approach

The researchers plan to test the system using black-box testing. Black Box testing is a testing method that tests and examines the system application's functionality without looking into the internal structures. So, specific knowledge of the code, programming, and structure is unnecessary. This can be applied to every software testing level, such as system, acceptance, integration, and unit testing.

Deployment

The researchers will develop the system using extreme programming, one of several popular Agile Processes. Extreme Programming is usually used to respond to changing customer requirements, even if the customer has changes in the later part. Extreme programming improves the software in five essential ways: feedback, courage, simplicity, communication, and respect. (Turner, 2014). It's like a jigsaw puzzle, in which many small pieces make no sense, but when combined, a complete picture can be seen.

Project Technology

Smartphones and tablets

Nowadays, smartphones and tablets are everywhere and are usually used now and then because of their major benefits. These mobile devices greatly benefit users in terms of communication, entertainment, etc., and so, mobile applications are created. Smartphones and tablets will be used as the primary medium in installing the system and will run as a mobile application. Without this, the project will not be implemented.

MySQL
MySQL is an open-source database used mainly by programmers to develop systems and applications with database structures. It is reliable with high-performance and scalable web-based in which anyone can benefit from the advanced features and management tools.

PHP
It is a scripting language designed for the Web environment, and its primary application is the implementation of Web pages having dynamic content. It has gained somewhat a following in current times, and it is the one that excels in the Open Source software movement. For instance, PHP allows a stagnant webpage to become vibrant. PHP will be used in the server.

Eclipse
In creating the system, the proponents will use the eclipse to make the mobile android application. Java is the primary programming language of the eclipse. It contains an extensible plug-in system for creating the system's user interface. Furthermore, it is an Integrated Development Environment.

OpenCV
OpenCV (*Open Source Computer Vision*) is mainly used in real-time computer vision, which helps the programmers create computer vision applications such as facial recognition, gender recognition, object detection, tracking, etc. OpenCV library is free under the BSD license and can be customized by anyone. Achieve accuracy in computer vision recognition requires training the database, and OpenCV can help improve the recognition accuracy.

Emgu CV

This software can be used in several different languages, such as VB.net, C++, -CLI, and C#. EmguCv originates from the OpenCV; with that, emgucv supports many advantages regarding image class with generic color and depth. EmguCv supports face, eyes, and mouth recognition.

Visual Basic .NET (VB.NET)
VB.net is a programming language implemented on the .NET framework and uses the common language runtime. VB.net will create the desktop application that supports C#, C++, and visual basic syntax code.

METHODOLOGY

Cost and Benefits Analysis

Hardware

Tables 1 and 2 show that those hardware devices are valuable in developing the project.

Table 1 Hardware devices of the Cost and Benefit Analysis

Device	Quantity	Price	Amount
Smart Phone	1	1900	1900
Router	1	1350	1350
Computer	1 set	24000	24000
Webcam	1	833	833

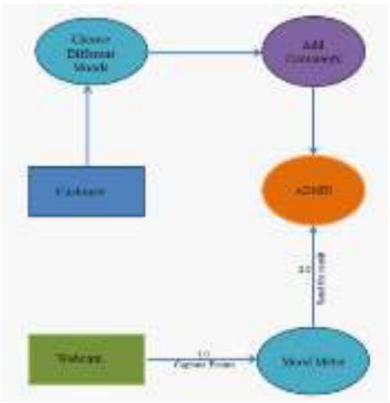
Software

Table 2 Software devices of the Cost and Benefits Analysis

Device	Price	Amount
Eclipse	Free	Free
Notepad++	Free	Free
PhpMy Admin	Free	Free
OpenCV	Free	Free
Adobe Photoshop	Free	Free

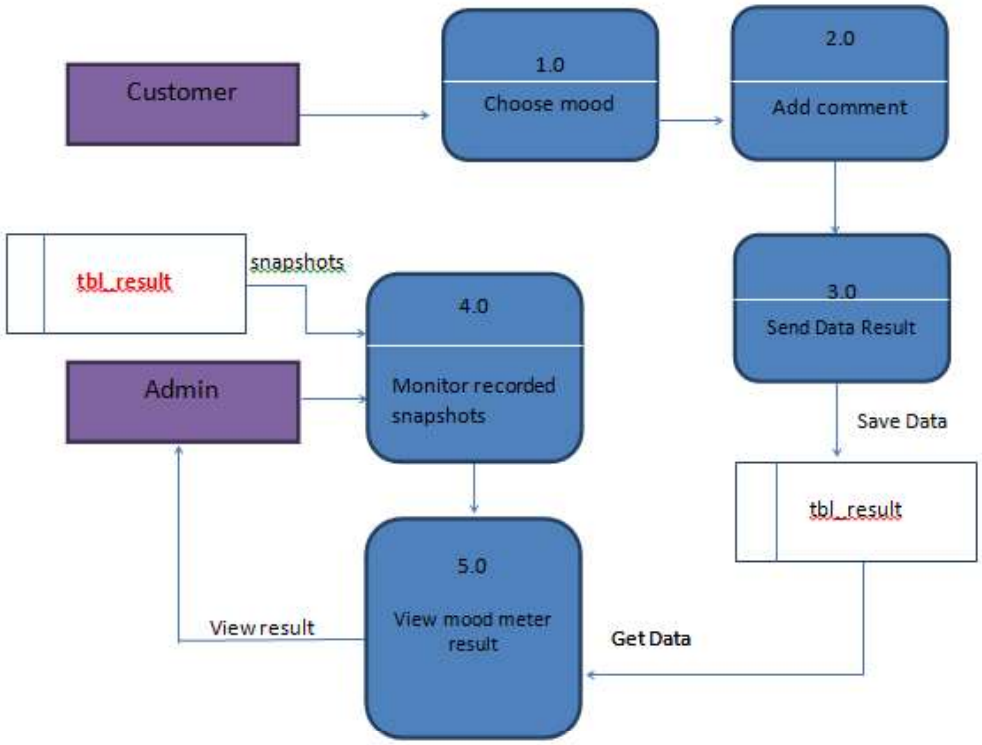
Data and Process Modelling

Figure 1 Context Diagram



The above figure shows the context diagram of the application, in which the customers choose moods of the current situation and can add a comment that will be sent to the admin. The admin will take snapshots, and the snapshot will detect the faces in the photo and determine the moods. Then, it will send the result to the admin.

Figure 2 Data Flow Diagram



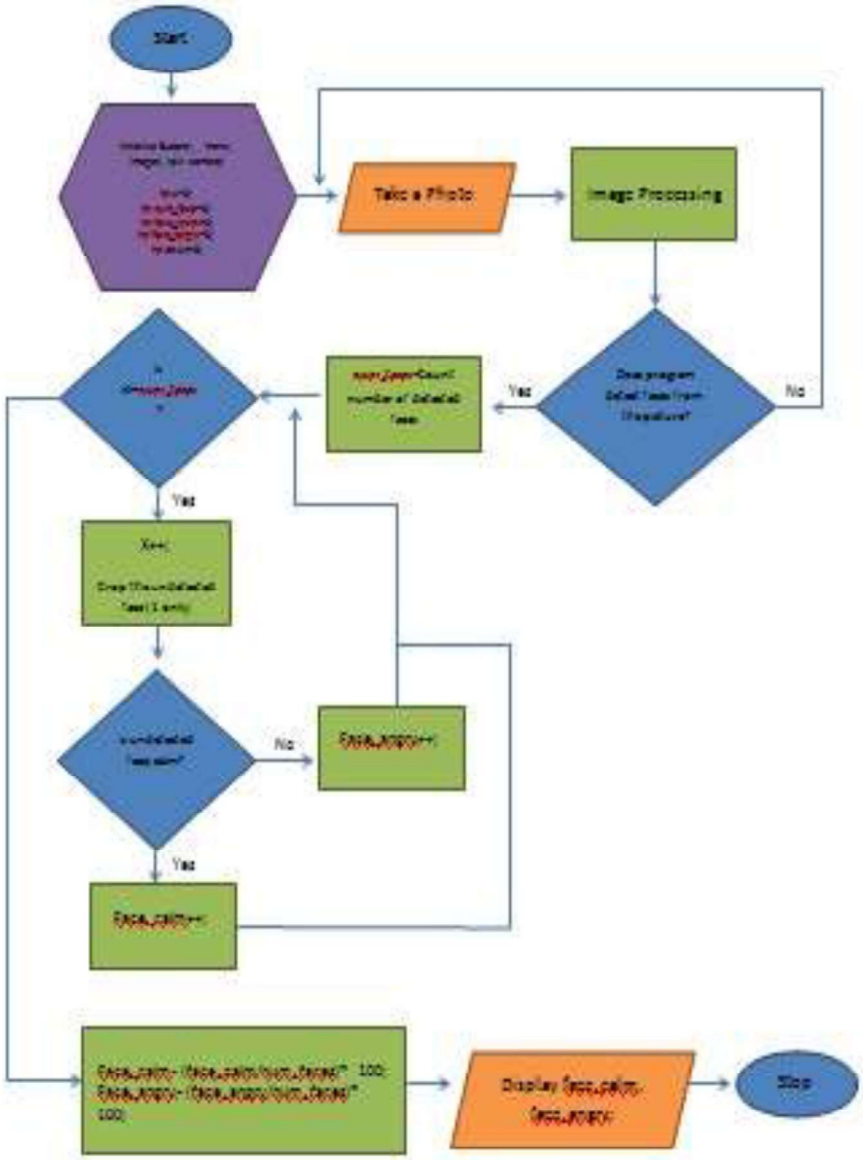
The figure above shows the flow of the data and the system's functions. It illustrates how a system regarding inputs and outputs processes data.

Program Flowchart

The figure illustrates the program flowchart of the system. These are just the highlights of the program in which it shows how to get the result. Also, it can make programming tasks very easy and orderly. The proponents will know the

system's flaws and easily figured out if the flow charts are created before the process has been executed.

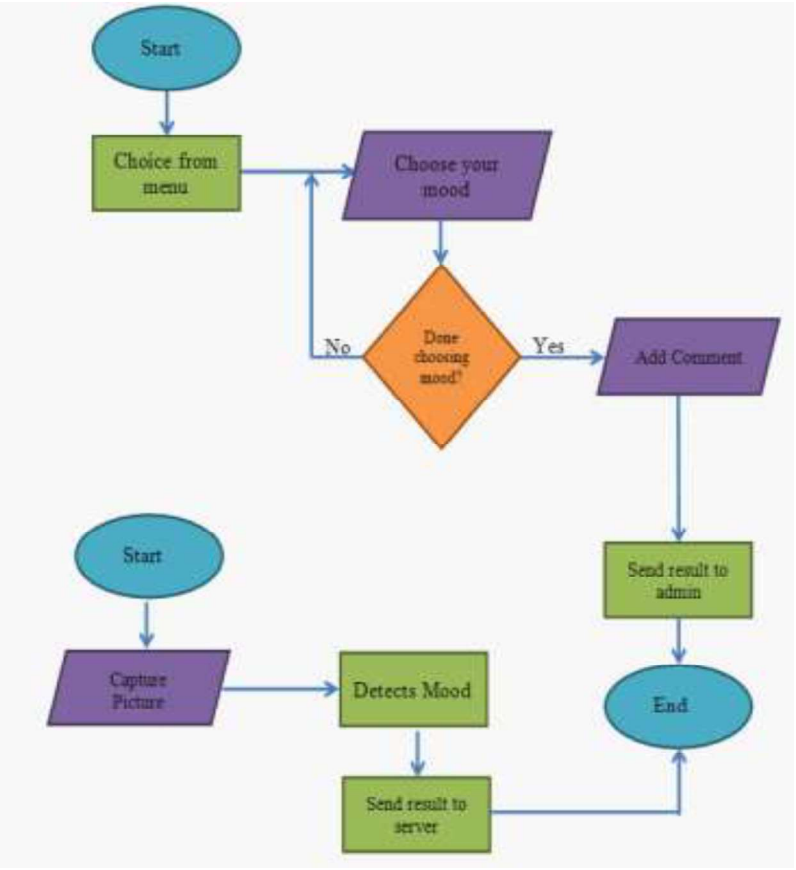
Figure 3 Program Flowchart



System Flowchart

The figure shows the application's system flowchart that explains how the users use the application and illustrate how the application will work. For instance, it is a support for the users to manage the application to make it easy for the customer if they will use the application.

Figure 4 System Flowchart



Use Case Diagram

The figure shows the use case diagram of the application. The figure also shows the sequences of interactions between the admin and user to the application. The use case diagram organizes the application requirements. It is also used for analysis to identify, clarify, and organize the system requirements in the system.

Figure 5 Use Case Diagram

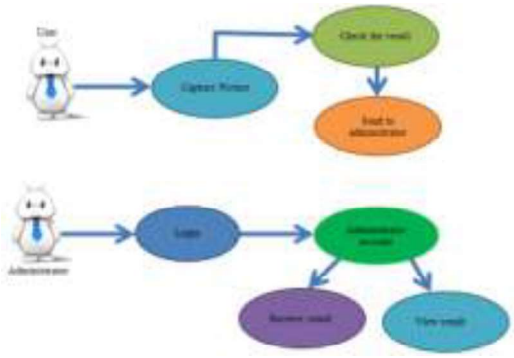
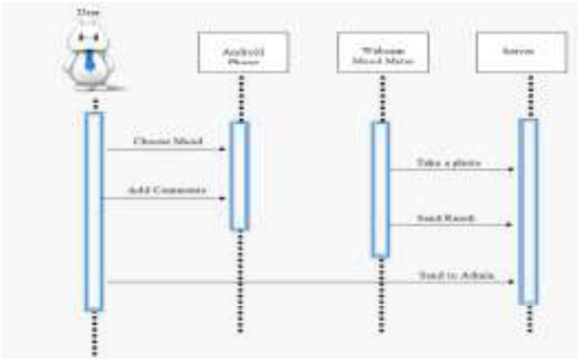


Figure 6 Sequence Flowchart



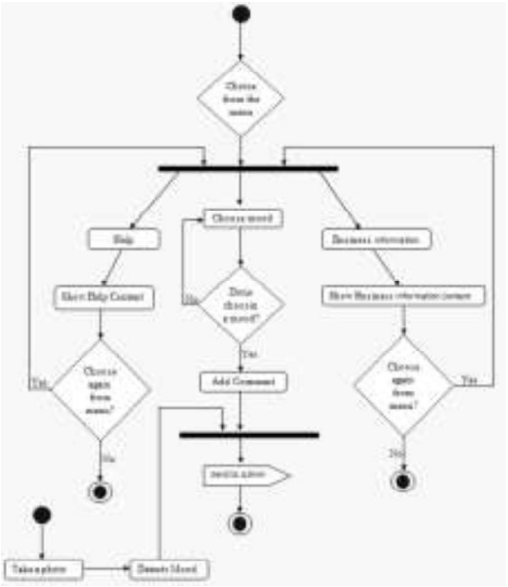
The figure above is the sequence diagram of the system, and it shows the sequence scenario of the users to the system and to the admin and how the object interacts with each other.

The figure is the system's activity diagram, and it explains how the activity will run from one to another.

Test Plan

Waiting has never been so easy, especially for impatient customers when the service or transaction is slower beyond the expected processing time. However, their concerns and complaints about it can't be heard immediately, and it might

Figure 7 Activity Diagram



negatively impact the business if this continues. The proponents develop a mobile customers' charter with a mood meter that can determine the mood and send it to the business manager.

The purpose of the test plan show process testing of the customer charter with a mood meter. The system has a test plan to guide describing how the application will be tested using the methods to have proper verification and validation. The testing is done in the following phases:

- Unit Testing - is software development in which the smallest testable parts of an application.
- Acceptance Testing - conducted to determine if the requirements of a specification or contract are met

Test Data

The test data is used to test the system software. The system has only two data that need testing. The system, first, is the static images from the internet. These are first use to test if facial expression detection is working. The second data is the picture of the camera.

Conclusion

With the help of OpenCV and emgucv, face detection can be implemented in the desktop application through a webcam, in which the researchers use the visual studio 2010 in making the system. The haar cascade object detection helped the researchers train the system to detect two moods (calm and annoyed) by comparing the captured picture to the images stored in the database. The researchers first tested the haar cascade with static images instead of the camera images and later on tested the images from the camera. This project's limitation is notoriously reflected in the accuracy of the haar cascade on facial expression detection.

Another problem that plays a huge role in image processing is lighting. We use image pre-processing to mitigate the lighting problem, but this application is still sensible to lighting. Furthermore, the distance in detecting faces also is an important thing to consider. Therefore, training the system in comparing images in the database is really important to achieve accuracy in face and mood detection.

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