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Detecting Human Emovere through Data Mining

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Abstract- *With* the growth of the Internet community, textual data has proven to be the main tool of communication in human-human interaction. This communication is constantly evolving towards the goal of making it as human and real as possible. One way of humanizing such interaction is to provide a framework that can recognize the emotions present in the communication or the emotions of the involved users in order to enrich user experience. The use of social networking sites is one of the approaches for putting views of user. Proposed emotion detector system takes a text document or audio and the emotion word ontology as inputs and produces the scores of six emotion classes (i.e. happy, sad, fear, surprise, anger and disgust) as the output; for twitter data as input the extracted tweets are categorized in to positive, negative and neutral tweets.

Key words- Human-Computer Interaction; Textual Emotion Recognition; speech analysis; twitter analysis; Emotion Word Ontology

I. INTRODUCTION

Human emotion recognition by analyzing written documents appear challenging but many times essential due to the fact that most of the times textual expressions are not only direct using emotion words but also result from the interpretation of the meaning of concepts and interaction of concepts which are described in the text document[6]. Emotion detection from text plays a key role in the human-computer interaction. Human emotions may be expressed in many ways like person's speech, face expression and written text known as speech, facial and text based emotion respectively. In human computer interaction, human emotion recognition from text is becoming increasingly important from an applicative point of view. Methods being used for text based emotion detection are classified into keyword spotting technique, lexical affinity method, learning based method and hybrid approach however each method has its own limitations. A proposed architecture which contains the emotion ontology and emotion detector algorithm. Emotion Detection is one of the most emerging issues in human machine interaction [7]. Detecting emotional state of a person from textual data is an active research field along with recognizing emotions from facial and audio information. Several methods were given to recognize emotion from text in previous years. This project proposed a new architecture (a keyword based approach) to recognize emotions from text. In case of recognizing emotion from a piece of text document or a blog, any human can do this better than a machine only problem is he/she takes time.

Proposed emotion detector system takes a text document and the emotion word ontology as inputs and produces one of the six emotion classes (i.e. love, sadness, joy, fear and surprise, anger) as the output. Every input text contains some short stories which are firstly read and assigned an emotion class manually and then that emotion class is compared to the output of the proposed system to check the accuracy of the Proposed Emotion Detector System. It is found that the Proposed Emotion Detector System produces output with the accuracy of more than 75%.

II. LITERATURE SURVEY

The process of emotion recognition involves the processing images and detecting the face then extracting the facial feature [9]. Facial Expression Recognition consists of three main steps. In first step face image is acquired and detect the face region from the images and pre-processed the input image to obtain image that have a normalized size or intensity. Next is expression features are extracted from the observed facial image or image sequence. Then extracted features are given to the classifier and classifier provides the recognized expression as output.Face Detection and Pre-processing.

The face detection is the process of extracting the face region from the background. It means to determine the position of the face in the image. This step is require because images having a different scales. Input image having a complex backgrounds and variety of lightning conditions can be also quite confusing in tracking. Face expression

recognition tends to fail if the test image has a different lighting condition than that of the training images. For that facial point can be detected inaccurately for that pre-processing step is required.

Feature Extraction and Classification Selecting a set of feature points which represent the important characteristics of the human face. After the face has been located in the image, it can be analyzed in terms of facial features. The features measure the certainparts of the face such as eyebrows or mouth corners. Various methods exist which can extract feature for expression based on motion of the feature such Active Appearance Model which is statistical model of shape and gray scale information.

The Features describe the change in face texture when particular action is performed such as wrinkles, bulges, forefront, regions surrounding the mouth and eyes. Image filters are used, applied to either the whole-face or specific regions in a face image to extract a feature vector. Principal Component Analysis, Local Binary Pattern.

Fisher's Linear Discriminator based approaches are the main categories of the approaches available.After the set of features are extracted from the face region are used in classification stage. The set of features are used to describe the facial expression. Classification requires supervised training, so the training set should consist of labeled data. Once the classifier is trained, it can recognize input images by assigning them a particular class label. The most commonly used facial expressions classification is done both in terms of Action Units, proposed in Facial Action Coding System (FACS) and in terms of six universal emotions: happy, sad, anger, surprise, disgust and fear base systems lie outside of our discussion here[10].

III. SYSTEM DESIGN

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. System design is one of the most important phases of software development process [3]. The purpose of the design is to plan the solution of a problem specified by the requirement documentation. In other words the first step in the solution to the problem is the design of the project.The design of the system is perhaps the most critical factor affecting the quality of the software. The objective of the design phase is to produce overall design of the software. It aims to figure out the modules that should be in the system to fulfill all the system requirements in an efficient manner. The design will contain the specification of all these modules, their interaction with other modules and the desired output from each module. The output of the design process is a description of the software architecture. The design phase is followed by two sub phases high level design and detailed level design.

Emotion Ontology

Ontology is an explicit specification of conceptualization. Ontologies have definitional aspects like high level schemas and aspects like entities and attributes interrelationship is between entities, domain vocabulary [4]. Ontology allows a programmer to specify, in an open, meaningful way the concepts and relationships that collectively characterize some domain. Emotion can be expressed as joy, surprise, sadness, hate, fear, anger and so on. Since various emotion hierarchies are developed by researchers and there is not any standard emotion word hierarchy, focus is on the related research about emotion in cognitive psychology domain. In 2001, W. Jerrod Parrot [2], published a book named "Emotions in Social Psychology".

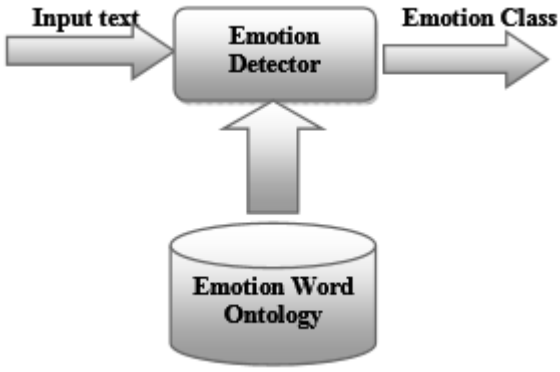

Fig 1: Emovere detecting System Design

In this book author explained the emotion system and formally classified the human emotions through an emotion hierarchy in six classes. Primary level contains classes i.e. Love, Joy, Anger, Sadness, Fear and Surprise. Certain other classes of emotion words fall in secondary and tertiary levels. Emotion word hierarchy is then converted into emotion word ontology showing class and subclassrelationship format. Primary level emotion classes are shown at top in the emotion word ontology and emotion classes at the tertiary level are at the bottom of ontology. Emotion ontology is developed by Protégé (an open source ontology editor and knowledge-base framework).

Emotion ontology is an ontology representing "emotion" domain. Emotion ontology is displayed in left to right order. Only two levels (primary and secondary) are displayed in the image of emotion ontology while the tertiary level is hidden. Every emotion word in the ontology is an emotion class. "Thing" is the root and the super most class of the ontology. Every child class is related to its parent class by "is-a" relationship (child is-a parent) e.g. "anger" is a "thing" and "pride" is a "joy". Protégé is a free, open source ontology editor and a knowledge acquisition system. Like Eclipse, Protégé is a framework for which various other projects suggest plug-in[8].

Protégé application is written in Java and heavily uses Swing to create the rather complex user interfaceProtégé provides a growing user community with a suite of tools to construct domain models and knowledge-based applications based on ontologies.Protégé presents a rich set of knowledge base structures and actions that create, visualize, and manipulate ontologies in various representation formats. Protégé can be customized to provide domain-friendly support for creating knowledge models and entering data. Protégé is being extended and used by way of a plug-in architecture and a Java-based Application Programming Interface (API) for building knowledge-based tools and applications.

Emotion Recognition Algorithm

This component is implemented as a core Java application which will contain the specification of the emotion word ontology along with various helper and utility classes for processing the inputted text and analyzing the emotion contained within it. In a nutshell, we can say the input for this component is the text data and output from this component will be the emotion classes weight (a total of 100%)

STEP 1: Split the paragraph into sentences

STEP 2: If the sentence contains? Then it is considered under surprise

STEP 3: Else split the sentences into words and search the emotion words

STEP 4: check for exclamation coefficient

For example: check for CAPS check for emoticons

For example: check for emoticon coefficient, for example: check for modifiers check for negation

STEP 5: Emotion words are considered as affect word with scores of 6 classes

Text Processing

This is implemented as a Java application where the text input is given through the windows builder interface provided to the end users. This component invokes the core Emotion Recognition Algorithm developed above and displays the result back to the user on the same windows builder interface. There are three ways of giving an input for this component. In the first method, the text data will be provided through a textarea field provided. In the second method, the file containing the text data will be uploaded. In the third method, the folder containing the list of all files will be provided.

Twitter Analysis

This application is also implemented as a java application and its user interface is built using windows builder plugin for eclipse. This application accepts the twitter handler as an input and makes use of Twitter 4J libraries for communicating with twitter and pulls the data (posts) from that twitter account and executes the core Emotion Recognition Algorithm against each of the posts. It later invokes an utility function to decide the category of this emotion. Possible emotion categories are positive, negative, and neutral. It displays the result back on the windows builder interface using JFreeChart libraries for rendering a pi-chart.

- In this module the user id is given as the input.
- Service component uses Twitter 4J APIs to pull the twitter data (ie tweets).
- We use access token from twitter.com to access the tweets.
- Service component sends the received tweets to the algorithm.
- Grouping component classifies the analysed data into positive, negative and neutral data.
- Jfree chart library is used to display the classified output in pie chart

IV. SYSTEM ARCHITECTURE AND MPLEMENTATION

The entire architecture has been implemented in nine modules which we will see in high level design and low level design.

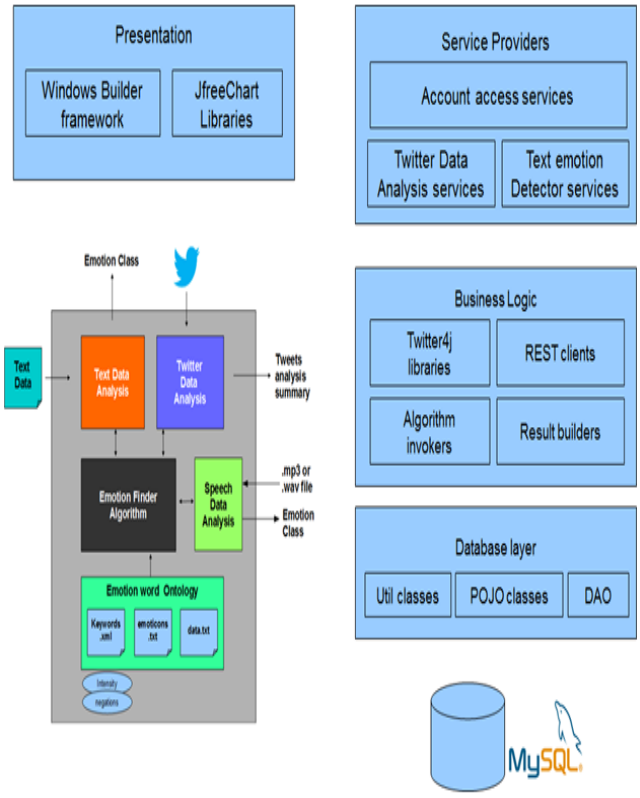

Fig 2: System Architecture

This paper is implemented considering the following aspects:

1. Usability Aspect.
2. Technical Aspect.

4.2 Usability Aspect

The usability aspect of implementation of the project is realized using two principles:

a) The project is implemented as a Java application

There could be many ways of implementing the RTSP protocol [1]. We have chosen JAVA to come up with the required reader. The reason being many:

- Java provides wonderful RTSP librarieswhich simplifies the implementation part of it.
- Java is platform independent, meaning the project can run on literally any platform which has JVM installed within it.
- Oracle Corporation claims more than 70 billion devices run on JAVA which makes the end users used to it.
- It can be readily portable to any devices like mobile phones, iPods, PDA, and any hand held devices that are capable of running Java.

b) The user-friendly interface using Java's view architecture

The interface provided by this application is very user friendly and is developed using Java Swings.

4.3 Technical Aspect

The technical aspect of implementation of the project is realized as explained below:

4.3.1 Windows Builder

A graphical user interface builder (or GUI builder), also known as GUI designer, is a software development tool that simplifies the creation of GUIs by allowing the designer to arrange graphical control elements (often called widgets) using a drag-and-drop WYSIWYG editor. Without a GUI builder, a GUI must be built by manually specifying each widget's parameters in source-code, with no visual feedback until the program is run.

User interfaces are commonly programmed using an event-driven architecture, so GUI builders also simplify creating event-driven code. This supporting code connects widgets with the outgoing and incoming events that trigger the functions providing the application logic.

Some graphical user interface builders, such as e.g. Glade Interface Designer, automatically generate all the source code for a graphical control element. Others, like Interface Builder, generate serialized object instances that are then loaded by the application.

4.3.2 Database

MySQL officially, but also called /maɪ ˈsiːkwəl/ "My Sequel") is (as of 2008) the world's most widely used open source relational database management system (RDBMS) that runs as a server providing multi-user access to a number of databases. It is named after co-founder Michael Widenius' daughter, my. The SQL phrase stands for Structured Query Language.The MySQL development project have made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements. MySQL was owned and sponsored by a single for-profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation [3].

MySQL is a popular choice of database for use in web applications, and is a central component of the widely used LAMP open source web application software stack (and other 'AMP' stacks). LAMP is an acronym for "Linux, Apache, MySQL, Perl/PHP/Python." Free-software-open source projects that require a full-featured database management system often use MySQL.For commercial use, several paid editions are available, and offer additional functionality. Applications which use MySQL databases include: TYPO3, Joomla, Word Press, phpBB, MyBB, Drupal and other software. MySQL is also used in many high-profile, large-scale World Wide Web products, including Wikipedia, Google (though not for searches), Facebook, Twitter, Flickr, Nokia.com, and YouTube.

V. RESULTS

The outcome of this Human Detection Emovere is as follows

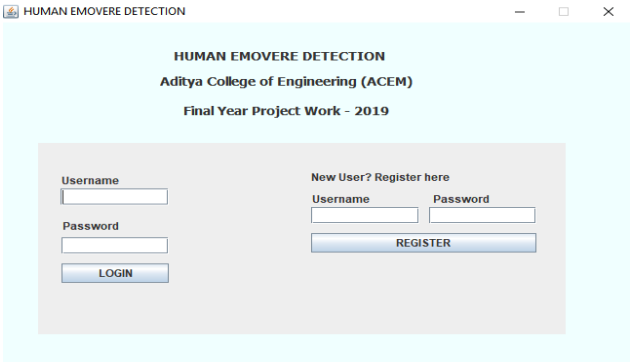

Fig 3: registration and login page

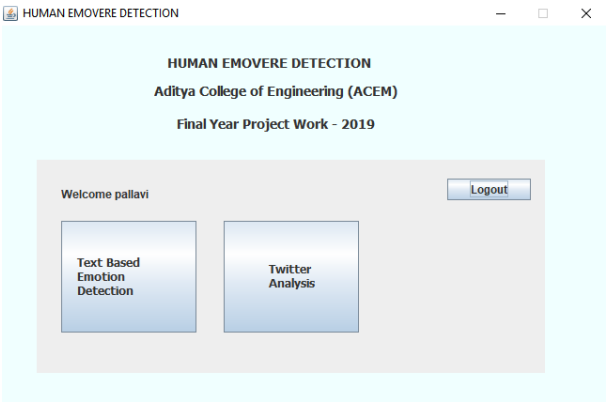

Fig 4: Content to be selected

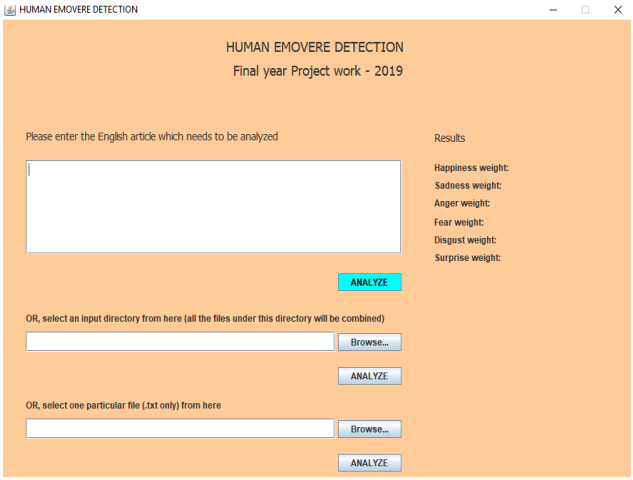

Fig 5: Text Based analysis Page

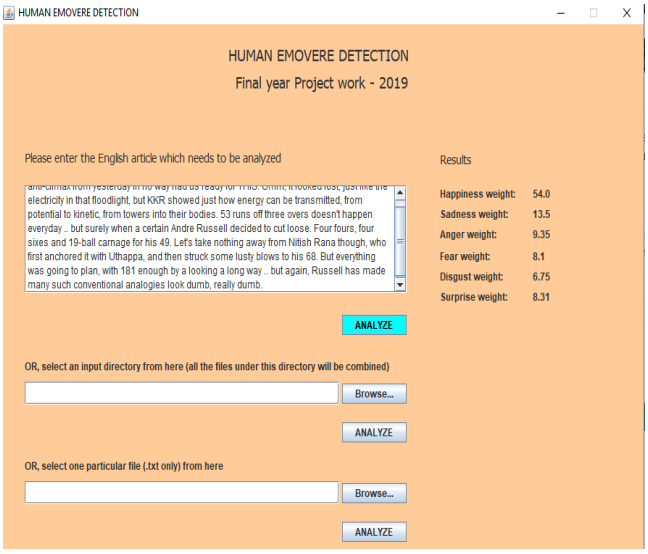

Fig 6: analysis of text

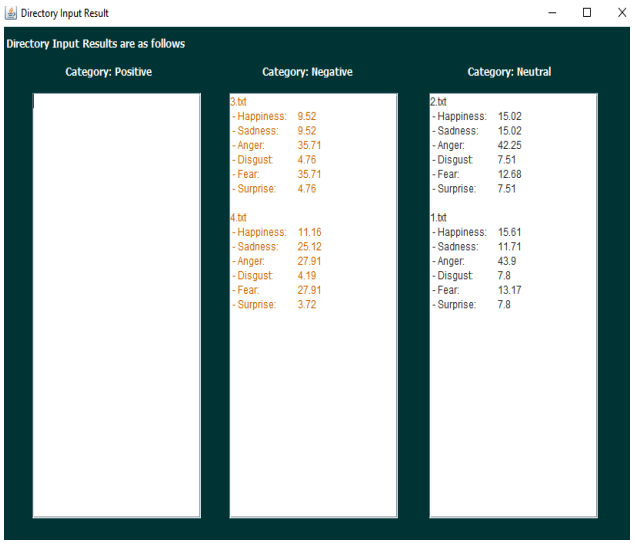

Fig 7: Analysis of directory consists text documents

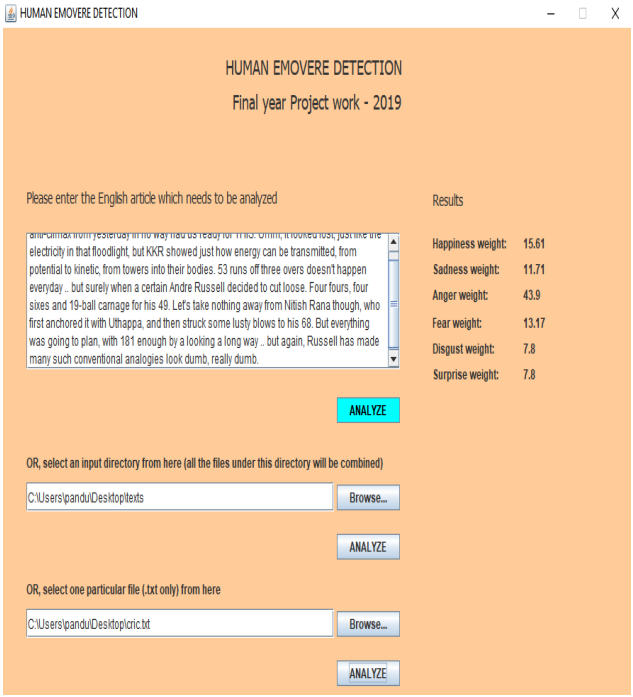

Fig 8:Analysis of single Text Document

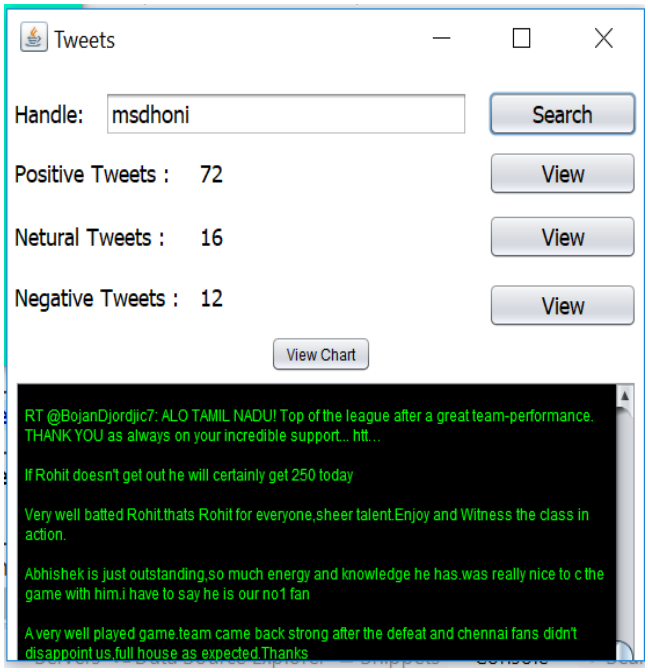

Fig 9: Analysis of twitter data

The above figure shows the analysis of twitter data of any twitter id and it will also show the tweets that are analysed the green colored tweets indicates the **positive tweets** and red colored tweets indicate the **negative tweets** and blue colored tweets indicates the **neutral tweets.**

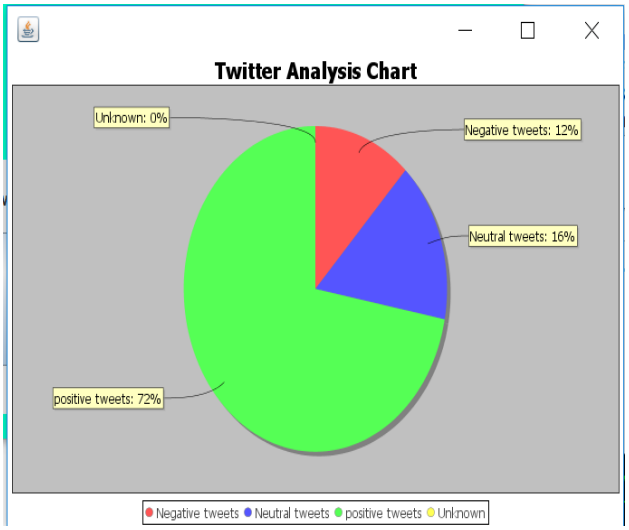

Fig 10: pi-chart of analyzed twitter data

VI. FUTURE SCOPE

The future scope of this paper i.e., Human Emovere Detection is that analyzing the emotions using voice based data and images, multimedia data and the algorithms should also be improved for better analyzing the Human Attitude. The future directions in Emotion Detection is to study how emotional expression changes over time or between genders or between ethnic groups. Search technique based on emotions is to be improved.

VII. CONCLUSION

Text-based input is the most common way for humans to interact with computers while writing letters or giving feedback to any product in the era of web 2.0. Thus emotion detection from text focuses as an important research issue in affective computing. In this paper, existing research of emotion recognition based on textual data is surveyed and limitations of existing methods are reviewed. Emotion recognition system architecture is proposed to improve detection capabilities in an efficient manner. Proposed system is based on keyword spotting technique that is having rich features of ontology. Not all the limitations of existing methods are overcome by this architecture but use of ontology improves the detection capability by applying semantic approach.

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