

Fuzzy Logic used in Textual Emotion Detection

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Abstract — In this paper we will highlighting of Fuzzy logic that used to detect emotion subjects from textual data. Fuzzy Logic was founded to handling non-value member and convert it to a value member. In this research we will review the history of fuzzy logic with the emotions detection and the techniques used. Emotions are basic part of human internal activity and execute a fateful role of making a decisions and cognitive relation processes such as (sadness, surprise, happiness, disgust, anger, and fear). Emotions can be expressed through deferent forms such as speech, facial expressions, gestures and text. Now the research is working in the field of emotion detection and sentiment analysis. The researchers are working to develop a system to classify emotions represented in text.

Keywords: Emotion Detection, Fuzzy Logic, Text Mining.

I. INTRODUCTION

Fuzzy logic based systems are convenient in real life situations where the decision to be taken are based on multiple criteria with complex interlink among them. It is quite true for a sentiment analysis process in which the system must be able to understand the sentiment expressed by a user in a review based on the statements about various features of the products or service. The previous works have figured that emotions detection can be done in different forms of data like facial expressions, speech, brain signals and in text. As text is still masterful the online communications, we trust that emotion detection in textual data or messages are essentially important. In this paper, we will review the usage of fuzzy logic in emotion detection.

A. Emotions Applications Area

Business area: Emotions and opinions have incredible effect on clients to settle on their decisions with respect to internet shopping, picking occasions, items and substances. These opinions additionally help the banks to configuration designs and plans for insurance sector.

Politics and Exit Polls: as known the opinions and feelings matter an incredible arrangement in politics issues, proposed work has high utility on understanding what voters are considering, what public support or not the government forecasting election results. Email Spams Detection: the application in this domain have high specification in email spam detection.

B Emotion Classification

Emotion can be classified as the below chart which define and show the emotion classes. Please see figure (1).

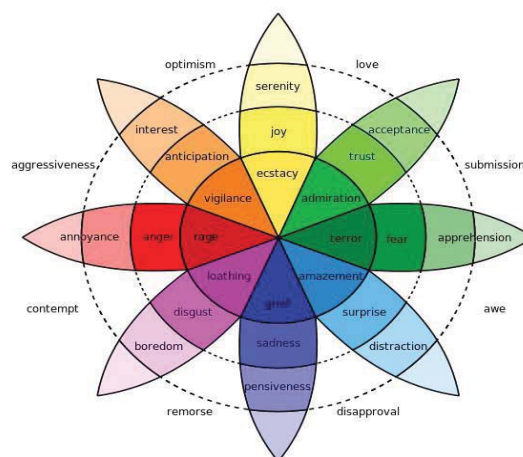


Fig. 1. Classification of Emotion

II. FUZZY SET THEORY

Fuzzy sets – admits gradation such as all tones between black and white. A fuzzy set has a graphical status that show how the transition from set to another set take place. Figure (2) describe a membership function [1].

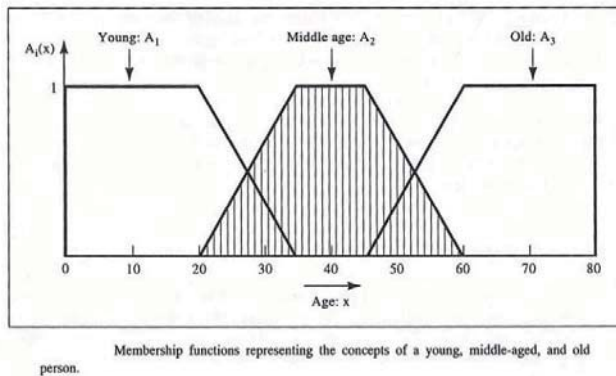


Fig. 2. Fuzzy Set Theory

A. FUZZY LOGIC & EMOTIONS

Fuzzy logic used to build an intelligent emotion extraction engine that able to recognize complex emotions from text contents. The engine is a general prototype based on keyword tagging and real-world dictionaries. The engine can classify the following groups: happiness, sadness, surprise, fear, disgust, and anger. For example in a case of reviewing a product, it's quite helping for decision making for this product. While the manual reading the large amount of reviews is highly difficult task. So we need an automatic system that able to extract the positive and negative features from the reviews and make the right decision.

B. PREVIOUS WORKS

The previous works have figured that emotions detection can be done in different forms of data like facial expressions, speech, brain signals and in text

Esau, Lisa, Bernd [1] introduced an adaptable emotion model for emotion detection. The model uses an n-dimensional fuzzy hypercube to describe emotional

states that consist of n basic emotions. In comparison to other approaches this allows not just the representation

and detection of a fixed set of basic emotions but also supports the handling of derived emotions. The primary stage they divided the unit hypercube to a same estimated sub-cubes to recognize essential emotions and related mixes. An intriguing point for facilitate examination is whether this subdivision relates to human recognition. This should for example be possible utilizing a learning approach that consequently finds such subdivisions and contrasts them with human knowledge of comparing emotional states.

In [2], a new architecture design for an emotional instructive agent. The operator models emotional state of an understudy

and tries to embrace his/her educating as needs be utilizing Neuro-Fuzzy systems and determined standards for choices. The information of the master was caught and communicated as fuzzy principles. The rules were utilized to introduce the neuro-fuzzy systems. The proposed design for the academic pedagogical was executed with the assistance of an enlivened character. Data mining algorithms memory were utilized for self-improvement.

Mohammad, Omayya [4] utilize Fuzzy operations to describe the knowledge about each factor. This will empower us to distinguish the feeling of a human using fuzzy input of different components. Example, we can utilize a fuzzy rule like "IF (Temperature is High) AND (Heart Rate is High) THEN (Person is Excited)." Although fuzzy sets and operations are helpful for describing the knowledge base, they neglect to show the individual behavior of each and every person. Clearly, a model that can adjust to different classifications of human reactions would be favored.

The research paper of Dzemydiene, Beilskis et.al [3] deals with the analysis of the different ways of integrating the various technological and knowledge representation techniques in developing a framework for the remote control of multiple agents like robots.

The emotional situations of disabled people are described using k-based model of Petri Nets with fuzzy reasoning and neural networks. They developed a multilayered framework architecture and integrated it

with artificial agents for diagnosis recognition and control of actions.

Joseph, Stephen, John [5] produce another fuzzy based classification algorithm of positive and negative feeling from EEG is introduced. In past commitments both the fuzzy rule and fuzzy membership functions were created from the data. In this work, however, fuzzy rules are characterized in view of research demonstrating that there is a connection of negative and positive emotion with enactment of the privilege and left sides of the equator of the human head. The algorithm has three fundamental points of interest: (1) coordinate utilization of instinctive guidelines that can be gotten from the writing or from aptitude and also, new principles can be included as required, (2) the arrangement yield gives two sorts of data: kind of feeling and the quality of that feeling, and (3) it has low calculation times and subsequently is reasonable for convenient gadgets and for continuous applications.

Sheeba and Vivekanandan [6] introduce a new framework that identify both Implicit and Explicit

emotions available in the meeting transcripts. It will classify the Positive, Negative, Neutral words and furthermore detect the point of the specific meeting transcripts by utilizing fuzzy logic. This paper expects to include some extra components for enhancing the arrangement strategy. The nature of the estimation arrangement is enhanced utilizing proposed fuzzy rationale structure. In this fuzzy rationale it incorporates the components like Fuzzy logic and Fuzzy C-means algorithms. The quality is measured by using some techniques like accuracy, review, and f-measure. Here Fuzzy C-means Clustering procedure measured as far as Purity and Entropy. The dataset approved utilizing 10-overlap cross approval strategy and watched 95% confidence interval between the accuracy values. Finally, the proposed fuzzy logic technique created

more than 85 % accurate outcomes and error rate is less contrasted with existing classification systems.

Ahmed, Saqib [7] propose to utilize fuzzy logic in identifying Emotions substance from text content. the moving from one emotion to another one is step by step and slow and could undoubtedly be demonstrated by fuzzy logic approach, despite the fact that insufficient time has gone to have set up measures in the field, there is some consistency between the methodologies, and the algorithms are proceeding to increment in precision. Albeit different principles and algorithms connected in the emotions extraction engine, the engine still can't deal with the trouble of English language.

Vibha, Gangwar, Marwaha [8] introduced new strategy sentiment analysis of huge data will be done utilizing fuzzy logic SVM. Detecting emotional stats of a human by analyzing the textual document that he/she written. this process will show challenging but most of times the human not only using emotional word but he maybe its result from semantic analysis of concept in the document. Adequate amount of work has been done has relation to speech and facial emotion recognition but text based emotion recognition system still needs attention of researchers. In computational linguistics, the identification of human emotion in content is ending up progressively critical from a practical perspective.

Neeraj and Gourav [9] proposed strategy in this work will use the common dialect handling techniques like fuzzy logic and neural system to separate emotions from text present in different sites. Fuzzy logic is easy to apply and understand mathematically. Scientifically,

ideas of fuzzy logic are likewise exceptionally straightforward. It depends on the natural language. Additionally neural network is utilized on the basis of connections of different neurons. It changes its output according to input and the weight granted.

III. FUZZY LOGIC PERFORMANCE

The effectiveness of a fuzzy logic controller can be enhanced by utilizing strategies in view of neural systems and genetic algorithms. The enhancement can be accomplished by optimizing the parameters of fuzzy sets and rule base. Three different ways were utilized to outline the fuzzy rationale i.e., Expert Knowledge, Genetic-Fuzzy approach and Neuro-Fuzzy approach. It was reasoned that Neuro-Fuzzy approach could convey the framework to the last position in slightest measure of time and would do well to union than the other two methodologies.

| Ref | Year | Used Model | Application |
|-----|------|---|---|
| [1] | 2005 | n- Dimensional fuzzy hypercube | Speech Signals |
| [2] | 2008 | Neuro-Fuzzy systems and determined standards for choices | Self-report, Motivation diagnosis by rules ,Speech analysis ,Image processing |
| [3] | 2010 | neural networks, fuzzy logic Petri nets, and evaluation of fuzzy neural control | the ECG (Electrocardiogram), the SCR (Skin Conductance Response), the STH (Skin Temperature of Head), and the STF (Skin Temperature of Finger) |
| [4] | 2013 | Fuzzy operations and ANFIS editor in MATLAB is used to build the models. | The internal factors come from different parts of the body in several forms such as electroencephalography (EEG), heart rate (HR), heart rate variability (HRV), preejection period (PEP), stroke volume (SV), systolic blood pressure (SBP), diastolic blood pressure (DBP), skin conductance response (SCR), tidal volume (Vt), oscillatory resistance (Ros), respiration rate (RR), nonspecific skin conductance response rate (nSRR), skin conductance level (SCL), finger temperature (FT), and others (Kreibitz 2010) |
| [5] | 2014 | LIBSVM | EEG dataset |
| [6] | 2014 | Fuzzy logic and Fuzzy C-means algorithms | new framework that identify both Implicit and Explicit emotions available in the meeting transcripts |
| [7] | 2015 | fuzzy logic approach | Textual Messages |
| [8] | 2017 | fuzzy logic SVM | Text Data |
| [9] | 2017 | Neural Network and Fuzzy Logic | Text Data |

Fig. 2. Quick Survey

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