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Neural Network System for Finding Depression by Mining Social Media Interactions

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Abstract: *Emotions are key component of human communication. Due to increasing amount of textual information such as blogs, discussion forums, review sites, chatting data available on the web. Now a days most of the research is focusing on the area of emotion detection and sentiment analysis. Now a days researchers are intended to develop a system that can classify emotion as represented in text. This paper proposes an emotion recognition system of depressed persons. Human emotion can be expressed through many kinds of medium such as speech, image, facial expression, emojis. This paper focuses on the textual data of them.*

I. INTRODUCTION

The ability which recognizes emotions is very useful to human-machine communication. Many kinds of the communication system, such as dialogue system, automatic answering system and human-like robot, can apply the emotion recognition techniques so that a user feel as if the system is like human. In addition, the systems can react properly for the human's emotional actions. The recognition of emotion has been implemented in many kinds of media. Some examples are speech, image, signal, facial expressions, textual data, and so on. Among this, the textual data is very popular medium, consisting of books, newspapers, and letters. And due to its small storage requirements textual data is the most appropriate medium for network transmissions. In addition to the variety and complexity of textual data makes it possible for people to exchange ideas, opinions, and emotions using text only. For these reasons the research for recognizing from textual data is valuable. In order to recognize emotions from the given text,the system studies the input text very carefully. It has wide applications in several fields.

II.NEURAL NETWORK CONCEPT

A major recent development in statistical machine translation is the adoption of neural networks.Neural network models promise better sharing of statistical evidence between similar words and inclusion of rich context. A neural network is a machine learning technique that takes a number of inputs and predicts outputs. In many ways, they are not very different from other machine learning methods but have distinct strengths[1].Linear models are a core element of statistical machine translation. Graphically, a linear model can be illustrated by a network, where feature values are input nodes, arrows are weights, and the score is an output node.

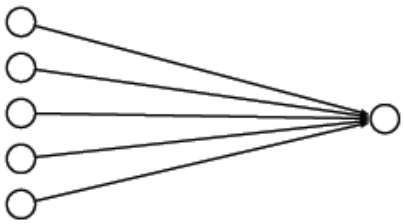

Figure: Graphical illustration of a linear model as a network: feature values are input nodes, arrows are weights, and the score is an output node.

Neural networks modify linear models into another important way. The first is the use of multiple layers. Instead of computing the output value directly from the input values, a hidden layer is introduced[2].

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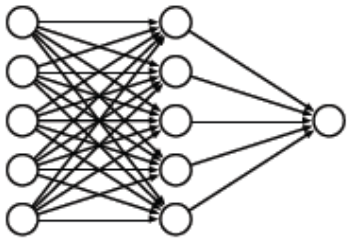

Figure: A neural network with a hidden layer

APPLICATIONS OF NEURAL NETWORKS

A. Speech Recognition

Speech occupies a prominent role in human-human interaction. Therefore, it is natural for people to expect speech interfaces with computers. In the present era, for communication with machines, humans still need sophisticated languages which are difficult to learn and use. To ease this communication barrier, a simple solution could be, communication in a spoken language that is possible for the machine to understand.

B. Character Recognition

It is an interesting problem which falls under the general area of Pattern Recognition. Many neural networks have been developed for automatic recognition of handwritten characters, either letters or digits.

C. Signature Verification Application

Signatures are one of the most useful ways to authorize and authenticate a person in legal transactions. Signature verification technique is a non-vision-based technique.

D. Human Face Recognition

It is one of the biometric methods to identify the given face. It is a typical task because of the characterization of "non-face" images. However, if a neural network is well trained, then it can be divided into two classes namely images having faces and images that do not have faces.

III. LITERATURE REVIEW

According to Jeffrey et al [3], Our ability to express and accurately assess emotional states is central to human life. The present study examines how people express and detect emotions during text-based communication, an environment that eliminates the nonverbal cues typically associated with emotion. The results from 40 dyadic interactions suggest that users relied on four strategies to express happiness versus sadness, including disagreement, negative affect terms, punctuation, and verbosity. Contrary to conventional wisdom, communication partners readily distinguished between positive and negative valence emotional communicators in this text-based context. The results are discussed with respect to the Social Information Processing model of strategic relational adaptation in mediated communication.

Shashidhar et al [4], Emotion recognition from speech has emerged as an important research area in the recent past. In this regard, review of existing work on emotional speech processing is useful for carrying out further research. In this paper, the re-cent literature on speech emotion recognition has been presented considering the issues related to emotional speech corpora, different types of speech features and models used for recognition of emotions from speech. Thirty-two representative speech databases are reviewed in this work from point of view of their language, number of speakers, number of emotions, and purpose of collection. The issues related to emotional speech databases used in emotional speech recognition are also briefly discussed. Literature on different features used in the task of emotion recognition from speech is presented. The importance of choosing different classification models has been discussed along with the review.

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Arti et al [5], Automatic emotion of detection in speech is a latest research area in the field of human machine interaction and speech processing. The aim of this paper is to enable a very natural interaction among human and machine. This dissertation proposes an approach to recognize the user's emotional state by analyzing signal of human speech. To achieve the good extraction of the feature from the signal the propose technique uses the high pass filter before the feature extraction process. High pass filter uses to reduce the noise. High pass filter passes only high frequency and attenuates the lower frequency. This paper uses the Neural Network as a classifier to classify the different emotional states such as happy, sad, anger etc from emotional speech database. The result shows that the Neural Network used as a classifier is a feasible technique for the emotional classification. By using the high pass filter performance should be increase.

In this paper Samarth et al [6], Emotion recognition has become an important field of research in Human Computer Interactions and there is a growing need for automatic emotion recognition systems. One of the directions the research is heading is the use of Neural Networks which are adept at estimating complex functions that depend on a large number and diverse source of input data. In this paper they attempt to exploit this effectiveness of Neural networks to enable us to perform multimodal Emotion recognition on IEMOCAP dataset using data from Speech, Text, and Motions captured from face expressions, rotation and hand movements. Prior research has concentrated on Emotion detection from Speech on the IEMOCAP dataset, but our approach uses the multiple modes of data offered by IEMOCAP for a more robust and accurate emotion detection.

According to Johnny[7], This paper addresses the problem of automatic recognition of emotions in text-only conversational datasets for the EmotionX challenge. Emotion is a human characteristic expressed through several modalities (e.g., auditory, visual, tactile), therefore, trying to detect emotions only from the text becomes a difficult task even for humans. This paper evaluates several neural architectures based on Attention Models, which allow extracting relevant parts of the context within a conversation to identify the emotion associated with each utterance. Empirical results the effectiveness of the attention model for the EmotionPush dataset compared to the baseline models, and other cases show better results with simpler models.

IV THEORETICAL BACKGROUND

To recognize someone's emotional state, according to Lazarus' psychological theory, we have to know both the situation that emotional subject is placed in and how to be interpreted the situation by emotional subject. Like other domain researches, it might be tried to imitate the human's thinking patterns. Until now, however, because of its difficulty there is no research using such approach.Emotion is a mental state variously associated with thoughts, feelings, behavioral responses, and a degree of pleasure or displeasure. There is currently no scientific consensus on a definition. Emotion is often intertwined with mood, temperament, personality, disposition, and motivation. In some theories, cognition is an important aspect of emotion. Those acting primarily on the emotions they are feeling may seem as if they are not thinking, but mental processes are still essential, particularly in the interpretation of events.

IDENTIFICATION OF STRESS OR DEPRESSION

Adolescence is the transition period in which a human being in which adolescence move to depression.Teenage depression is serious mental health problem that causes continuing feeling of sadness and loss of interest in activities. The causes of depression it can be of peer pressure, highly expectations on academic and changing in the growth of the body can lead to depression and carry a lot of disappointed for teens or it can be a relationship issue. Some of these symptoms may not always be signs of depression.

Following sentence show depression:"if a person says that she is depressed, it is extremely likely that she is depressed.

In the above sentence "depressed" in the phase means that, she like to solve his problem. Here she sees no other way to solve his pains and suffocations.

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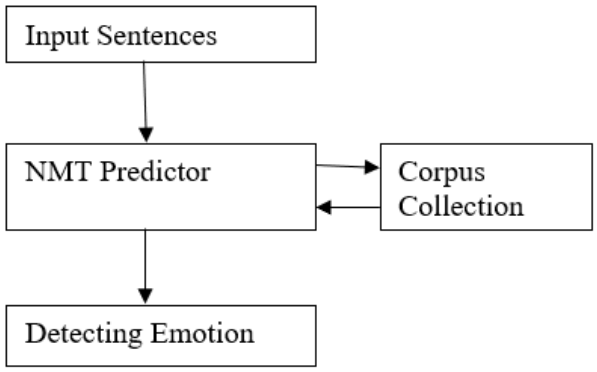

Figure: NMT Emotion Detection

V. DATA COLLECTION

This is a list of words and phrases related to stress. While some of them are slang, others euphemize the unpleasantnessof the subject, or are used in formal contexts. Some of the phrases may carry the meaning of 'stress', or simply contain words related to depression.

Expression	Definition
Assume room temperature	To die
hopeless	In stress
At rest	Not interested in a thing
lonely	Depression
suicide	To die
Beyond the veil	The mysterious place after death
strain.	Mental pressure
anxiety.	Strain
burden.	Stress
pressure.	Stress
tension.	Stress
trauma.	Depression

VI. DISCUSSIONS AND CONCLUSION

After scraping Tweets, the data were combined into a single dataset. The Tweets were manually cleaned. The next step is to find a suitable classifier. It is impossible to quantify the degree to which one might be depressed based on a Tweet, do an individual exhibiting linguistic markers to show depression? Depending upon the nature of mental state, a binary classification model is made. A LSTM is capable of learning long-term dependencies and work incredibly well on a large variety of problems. While RNNs have difficulty with long-term dependencies, LSTMs are explicitly designed to avoid the long-term dependency problem. It also made sense to add a convolutional layer. Convolutional neural networks (CNNs) are well suited for learning spatial structure from data and learns structure from the sequential data which it passes into the LSTM layer.The LSTM + CNN model takes in an input and then outputs a single number representing the probability that the tweet indicates depression. The model takes in each input sentence, replaces it with its embeddings, and then runs the new embedding vector through a convolutional layer. The convolutional layer passes the structure that it learns from

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the sequential data into a LSTM layer. The output of the LSTM layer is then fed into a Dense model for prediction.

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