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Speech Stress Analysis based Cheap Lie Detector for Loyalty Test

[1]Suraj Singh
[1]Department of Computer Science & Engineering RDEC,Ghaziabad
singh.suraj01@gmail.com

Abstract: When it comes to their thoughts, deeds, and behaviours, humans wear a variety of masks. It may deduce a person's allegiance from their facial expressions, vocal intonation, manner of expressing oneself, etc. For the world at large, it is not an innovative method. The hearings and judgement are coming to a close based on the questions and answers. Artificial Neural Networks are among the most effective tools for assessing speech stress in order to identify inexpensive lies in loyalty tests. Polygraph is a clearly demonstration focused method for presenting the findings. Insurance fraud investigations and law enforcement already employ this strategy. Loyalty may be discerned by an individual's vocal intonation and emotional expressions. Maintaining utmost secrecy and adaptability are essential for these methods. In this research, we use body language and vocal stress analysis to identify dishonest people.

Keywords: Voice Stress Analysis (VSA), Artificial Neural Network (ANN)

Introduction

The ability to learn the inner workings of a lie detector system requires ongoing training, making it a dynamic system. The con artists find these tasks quite easy. Therefore, the approaches should be able to be changed dynamically utilising ANN. Using the vitals (heart rate, respiration rate, eye blink rate, lip movement, and leg and hand motions), electrocardiogram (ECG), electroencephalogram (EEG), and blood pressure gauges activities that must be conducted in secret in order to gather all of the necessary parameters in order to ascertain the outcomes. This research paper will cover all of the aforementioned topics. The human brain and computer network both need heightened focus while using software applications. The physiological method in conjunction with an artificial neural network is fundamental to this study's idea.

There is a great deal of faith in the conviction that jurors in the United States put in the credibility of witnesses.Social and behavioural science, on the other hand, clarifiesthat people are excellent at fabricating lies but terrible at detecting them. As an example, it is quite simple for the typical person to spot deceit in a face-to-face contact when it involves another person (Ekman & O'Sullivan, 1991). A technology-based objective approach of lie detection or truth verification has long been sought for due to the importance of honest testimony and the limitations of human lie detectors (Grubin, 2010). For the better part of a century, the polygraph served as the principal technological tool for lie detection. It does this by measuring activity of the peripheral nerve system in an effort to gauge honesty.A deception task's story points in the direction of the made-up place where experimental deceit takes place. As an example, there are studies that put participants in a simulated crime scene and then ask them questions about it (Kozel, 2005). Some ask participants to provide very personal details about themselves, while others are more general (Abe, 2009). In the end, tests that targeted emotions like shame and autobiographical memory—which were considered confounds rather than variables of interest—used relatively "neutral" settings that required participants to hide a playing card that was meant for a monetary prize. How much of a

danger or gain the deception experiment is depends on the work setting as well.

The procedure for creating misleading replies and the corresponding controls are both referred to by the investigative deception model. The Comparison Question Test (CQT) and the Guilty Knowledge Task (GKT), also known as the Concealed Information Test (CIT), are the two primary models that generate deceit. These models have not been designed specifically for MRI study; they were originally intended for forensic investigative usage with the polygraph and, subsequently, with EEG (Rosenfeld, 1988). (Stern, 2003).

In this paper, we provide a novel approach to loyalty testing using lie detectors. A suggested technique, the Lie Detector utilising Artificial Neural Network Approach, aims to guarantee reliable results. A technique for detecting deceitaids in determining the veracity of a person's statements. A person's signals may be picked up by the lie detector. A person's signal may be picked up in a variety of settings.

An artificial neural network forms the basis of the suggested system. The artificial neural network (ANN) makes use of the signal received from the subject as well as the output from the camera (changes in eye movement) to determine whether the subject is lying or not. To train our system, we need a massive dataset for the ANN. The data set is used to make predictions by the system. The dataset that is currently available may be used to do the training.Model (the model that was stored during training). Computerised analysis of the subject's electrocardiogram (ECG), heart rate, and respiration rate is performed. Preprocessing, architecture development, feature extraction, training, and testing are some of the phases that the acquired dataset might go through. The three primary processes in our system are data gathering, training, and testing. Various human signals (such as "lying" and "not lying") are included in the dataset collection.The data is transformed into a format that the system can interpret by means of the preprocessing procedures. In order to train our system, we must first develop an architecture. With the aid of the architecture, the dataset may be learned. Features may be extracted from the dataset with the aid of the training technique. Once the training is complete, a model file may be generated. The exam is useful for determining whether the subject is being truthful or not by analysing their eye movement and the filled.

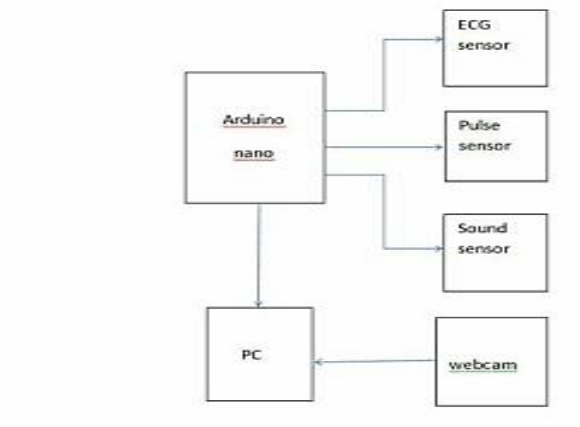

Fig Block Diagram

1.Proposed System

The ECG sensor, which is linked to the Arduino'sadc connector, is one of three sensors that are affixed to the controller.A microcontroller, The Arduino board has a digital pin for the pulse sensor and an adc port for the sound sensor. After processing the sensor data, digital values are stored and sent serially to the PC. With the camera's output and the python programme running on the computer, we may process the values so collected. How the suggested system would function We have incredible skin! Our skin not only acts as a barrier to keep harmful substances out and our

own bodily fluids in, but it also changes conductivity in response to a wide range of environmental factors, including our emotional state. The term for it is EDA, or electro dermal activity. At its most fundamental level, our skin's conductivity varies in response to our emotional state. We begin by attaching the Arduino to the object of study. Then, we link the Arduino to a computer running graphing software; I'll explain this in more depth later. Asking the subject basic questions like "what is your name" and "where do you live" establishes a baseline that we can use to gauge whether or not they are being truthful when we ask them more challenging questions. If they are nervous, they are more likely to lie, and we can tell if they are lying by looking at how the baseline we established earlier changed.

Measurements of Brain Function

The peripheral manifestations of the extraordinarily complex cognitive and emotional activities that occur when individuals offer deceitful or nondeceitful responses to questions may be captured by polygraph and other measurements of autonomic and somatic activity. Because of their inherent limitations, polygraph tests provide only a partial and imprecise picture of the intricate mental operations under investigation. Examining how the brain works is a plausible theory deeper understanding and, eventually, the ability to discern deceit, may be within reach. A person may learn their polygraph measurement right there in their EEG report. Using electrodes positioned on the scalp, electroencephalography (EEG) records the electrical activity emanating from the brain.

Antisocial and impulsive conduct is psychopathic qualities seen by many criminal criminals. On top of that, some people who have psychopathic tendencies do not really carry out the crimes for which they are found guilty. The neurobiology of psychopathic conduct is the same as that of any other activity.

Conclusion

A lie detector is a device that can determine whether someone is being dishonest. Among lie detector's fundamental assumptions is the idea that When someone intentionally tries to conceal the truth or facts, their body reacts differently, which reflects in their physiological or neurological reactions. Using a computer running a machine learning algorithm, the device continually monitors a person's electrocardiogram (ECG), heart rate (HR), and audio levels. It also streams video of the data being analysed.

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