Detecting the Subjective Beliefs Using Neural Networks

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Abstract. Through research and analysis of the speaker's reaction to the stimulus video, I found that neural networks can be used for subjective data, including the observer's perception of the suspicion felt by the information presenter. Our ability to discover this suspicion effect is due to our observer's potential emotional response to what they see is reflected in their physiological signals through neural network learning[6]. This technology that uses a real-time collection of observer physiological signals can be used in news media to increase the credibility of the content.

Keywords: Neural networks · subjective belief · Authenticity of information

1 Introduction

In society, communication is very important, and the exchange of information between people is what happens all the time. Especially in the age of advanced internet, we obtain daily news and knowledge and other information from various social media and news websites. Therefore, the generation of false information will bring people a lot of unnecessary misunderstandings and troubles, especially fake news, and even affect our lives and work. It is found that people's quick and direct judgments of dishonesty are more accurate than people's cautious judgments made after conscious reasoning. The reason for this phenomenon may be that unconscious dishonesty detection that leads to intuitive judgment occurs in the early stage of consciousness that has not yet reached [5]. Therefore, physiological signals could be very effective indirect authenticity detectors. Van't Veer [5] found in the study that when the observer's answer is dishonest, their pupil response is greater, and the pupil response first increases and then decreases. Besides, another document also showed that people have greater eye response to the operable image area, including the fixation of the line of sight and the increase of the duration of the line of sight[3].

Therefore, we will analyze the results of the pupil response of the observer to videos with different authenticity to prove that the neural network classifier trained in the pupil response should have better authenticity results than the conscious judgment of human beings.

2 Method

2.1 Experiment

The dataset I use comes from the experiment of Detecting the Doubt Effect and Subjective Beliefs Using Neural Networks and Observers' Pupillary Responses. First, some speakers will read some information and record it. In half of these cases, the presenter was told that the content they wanted to show was false, but they could not let it out. Later, some observers will come to watch these recorded videos, allowing observers to guess whether the beliefs of the speakers have been manipulated. When observers watch the video presentation, their blood volume pulse (BVP), galvanic skin response (GSR), skin temperature (ST) and pupil dilation (PD) data will be recorded. The goal of the experiment is to control the speaker's beliefs and the observer's guess response data to determine whether the physiological response data is more accurate than the observer's deliberate verbal judgment.

2.2 Data

All data are in "Subjective_belief_observers_features_labels.csv".
The structure of the table is as follows.

-The string in the first column [pid_vid] represents the id of the participant and the id of the video watched by the participant.

-[0_bvp to 33_bvp] contains 34 features extracted from the BVP of the participant watching the video

-[0_gsr to 22_gsr] contains 23 features extracted from GSR when participants watch the video

-[0_temp to 22_temp] contains 23 functions extracted from participants who watched the video in ST

-[0_eye to 38_eye] contains 39 features extracted from PD when participants watch the video

-The last column contains a label indicating whether the anchor in the video doubts their trust in the video. 1 means that the speaker is not manipulated with subjective beliefs, and 0 means that when their beliefs are manipulated, they will doubt what they are showing.

2.3 Method

Leave-one-out cross-validation is a method for training and testing classifiers. All data in the image data set will be used. Assuming that the data set has N samples (N1, N2,...Nn), take this sample Divide into two parts, the first N-1 sample is used to train the classifier, the other 1 sample is used to test, so iterate N times from N1 to Nn, all objects in all samples have undergone testing and training. One advantage of the leave-one-out method is that the maximum possible number of samples is used for training in each iteration. Another advantage is that the method is deterministic. The disadvantage of this method is that it takes too long.[2]

3 Results and discussion

Figure1 shows the pupil diameter of the observer watching the suspicion and trust demonstration. It can be seen from this figure that the pupil diameter of the observer presents an overall wave-like change.[6]

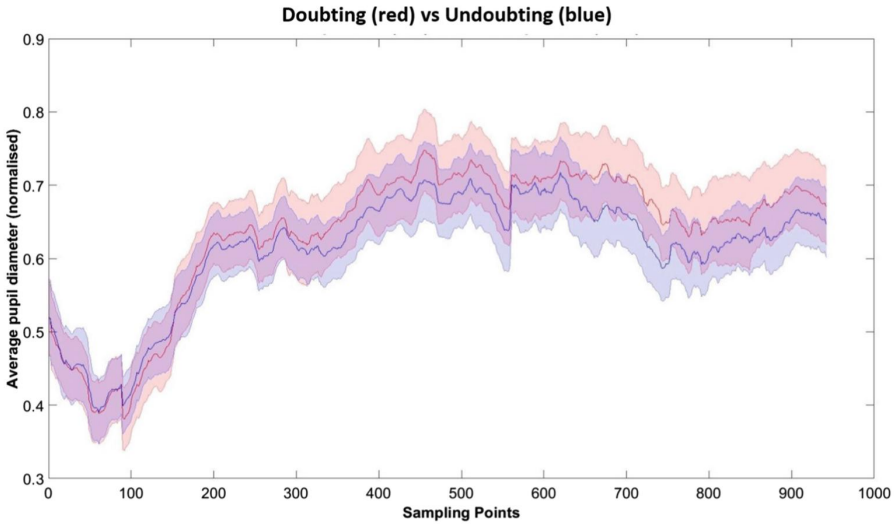

Fig. 1. Average pupillary response to doubting and trusting presentations over the time[6]

The red line in the figure represents doubt, and the blue line represents no doubt. We can see that the two lines start to separate near the 100th frame and start to overlap near the 180th frame. After that, the doubting red line started to be higher than the blue line until the overlap occurred around frame 570. Therefore, it shows that the Average pupillary of observers with doubting beliefs will shrink more first, and then increase more later. This is in line with the point of view of the paper we cited earlier.

4 Conclusion and Future Work

Since my code is not working properly, I cannot get accurate results. I could only write a conclusion based on the expected results. According to the conclusion of the cited literature[6], it can be seen that the curve of the observer's subconscious pupil response is more accurate than the verbal response of the observer after careful consideration.

In the future, code debugging needs to be completed to get accurate results. Because the experiment period is not long, there are not many experimenters, and the amount

of pupil response data is not large. In addition to gender and age, uncertain factors such as the personality of the speaker and the observer may cause bias. Therefore, the test results are not completely convincing. In the future, more experimenters will be required to participate and collect more data.

References

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