Analyzing Magnitude and Functional Measures using Deep Learning

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Abstract. Everyone must interact with other people daily and it can be hard to read people's emotions or facial expressions. Deciphering facial expression is a useful tool to understand what other people are feeling. This paper classifies facial expressions demonstrating the emotion anger as 'True' or 'Fake' using Deep Learning. The deep learning method plan to be used was Convolutional Neural Networks (CNN). In addition, analysis of magnitude and functional measures are applied. Since this experiment is an extension of a previous study, the results will be compared to the results of the previous study and the study; Data Mining of Inputs: Analyzing Magnitude and Functional Measures by Tamás D. Gedeon.

Keywords: Deep Learning, Functional Measures, Emotion, Anger Facial Expression, Convolutional Neural Network (CNN), Neural Network

1 Introduction

In modern times, humans generally prefer digital forms of communication over physical communication. This is evident in the rise of the popularity of social media platforms such as Snapchat and Instagram. In addition, there is also a widespread concern of fake news. It would be beneficial to be able to tell the difference between posed and genuine expression of anger to prevent being manipulated (Chen, Gedeon, Hossain and Caldwell, 2017). In this study, genuine and posed anger emotions are characterized based on the source of stimuli (Chen, Gedeon, Hossain and Caldwell, 2017).

The aim of the research is to prove that using deep learning methods to differentiate between 'True' and 'Fake' anger expressions. Dataset used for this is data from videos of participants whose facial expressions are analysed. The data has been pre-processed before added to the model. A Convolutional Neural Network is used as the deep learning model for this study. Deep Learning is implemented as it generates its own features through representational learning from the raw data. Convolutional Neural Network was chosen for it generally used for videos. The technique added to model is based on the paper; Data Mining of Inputs: Analyzing Magnitude and Functional Measures by Tamás D. Gedeon (Gedeon, 1997).

2 Method

First pre-processing of the data was done to generate the MeanPD dataset. During this stage, interpolation was applied to remove zeros from blink eyes, then normalised 0-1 for each participant (across all the participants' data), then averaged. Thus, mean PD for each participant on each video (T1-T20, F1-F20). Then those are averaged for each video to produce the LeftPD and RightPD sheets in the MeanPD file.

For the deep learning model, Convolution Neural Network (CNN) which takes on grid type data where equivariance (detecting the same feature in multiple locations in the input). For the CNN the arguments used are:

Input batch size for training: 64

Input batch size for testing: 1000

Number of epochs to train: 10

Learning rate: 0.01

SGD momentum: 0.5

Disables CUDA training: False

Random seed: 1

How many batches to wait before logging training status: 100

The arguments used are the default values as it works well for the dataset.

3 Results and Discussion

In the previous work, the neural network was tested with the test data and performance was measured. First tensors were created to hold inputs and outputs of the test data. Then the neural network was applied on the test data. It performed a forward pass computation. The prediction accuracy of the test is then calculated. The experiment has a 37.8% test accuracy. For this study, results have unfortunately not have been able to be generated. The model was build unsuccessfully resulting in no results.

The published paper; Data Mining of Inputs: Analyzing Magnitude and Functional Measures by Tamás D. Gedeon has some interesting results. It confirmed the hypothesis; as we move from the techniques based on static properties (magnitude techniques) through semi-dynamic properties (pattern perturbation for sensitivity analysis) to dynamic properties (functional behaviour over pattern presentations) we increase the reliability of the determination of significance of inputs.

4 Conclusion and Future Work

In this paper, a deep learning method; Convolution Neural Network is used to differentiate between 'True' and 'Fake' anger expressions of participants. The experiment may not be successful but the attempt shows that with some improvements a model can be generated.

References

1. Gedeon, T., 1997. DATA MINING OF INPUTS: ANALYSING MAGNITUDE AND FUNCTIONAL MEASURES. [online] International Journal of Neural Systems. Available at: https://doi.org/10.1142/S0129065797000227
2. Chen, L., Gedeon, T., Hossain, M. and Caldwell, S., 2017. Are You Really Angry? Detecting Emotion Veracity As A Proposed Tool For Interaction. [online] Brisbane, Australian: OZCHI '17: Proceedings of the 29th Australian Conference on Computer-Human Interaction. Available at: https://dl.acm.org/doi/abs/10.1145/3152771.3156147
3. COMP 4660 Lab 4