Maestría en Ingeniería en Sistemas y Cómputo Inteligente

Title

Support system for psychological evaluation using facial expressions and micro-expressions recognition

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Support system for psychological evaluation using facial expressions and micro-expressions recognition

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1. Introduction

Facial expressions and micro-expressions are a natural and immediate form of transmitting emotions in a non-verbal way. This kind of communication provides information that could be useful in psychological sessions. However, it is difficult to read and also to see these kinds of expressions because they are fast and with low intensity (Ekman,1971).

We propose to develop an automatic system for recognizing emotions, which uses Computer Vision techniques and Machine Learning algorithms.

2. Objectives

2.1. General

To develop a support computer system for psychological evaluation, using the facial expressions and micro expressions represented by deep learning.

2.2. Specifics

- To develop a method for recognizing facial expressions using training samples.
- To develop a method for recognizing facial micro-expressions using video segments.
- To develop a graphic interface for supporting a specialist searching for emotions in a video.

3. Methodology

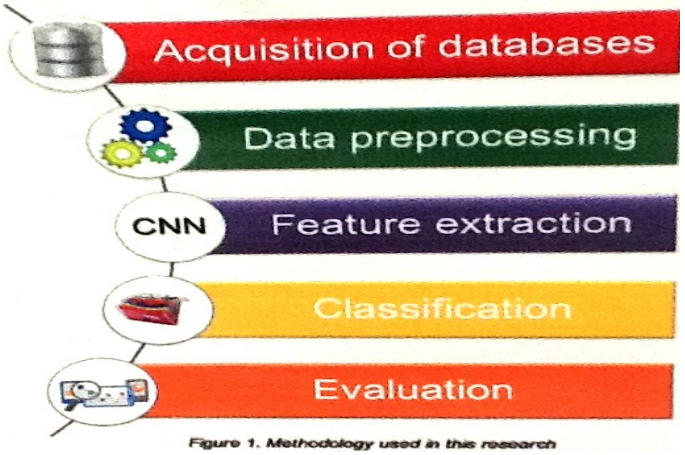

Figure 1. Methodology used in this research

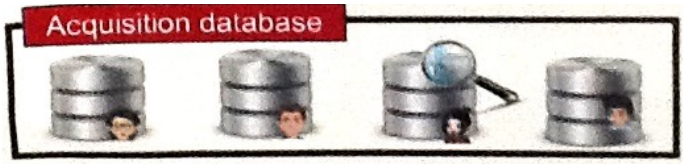

Figure 2. Methodology utilized in this research

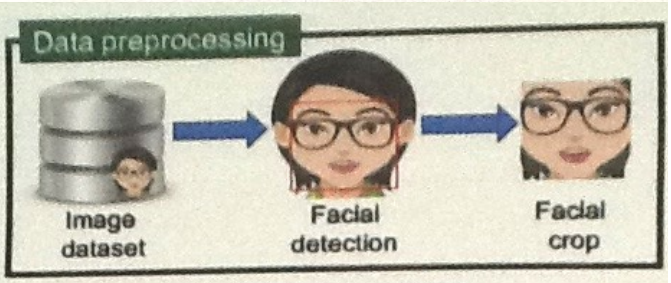

Figure 3. Data preprocessing steps

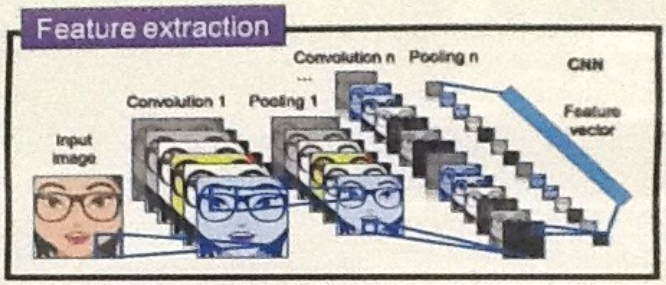

Figure 4. CNN Architecture (adapted from Parkhi et al, 2015)

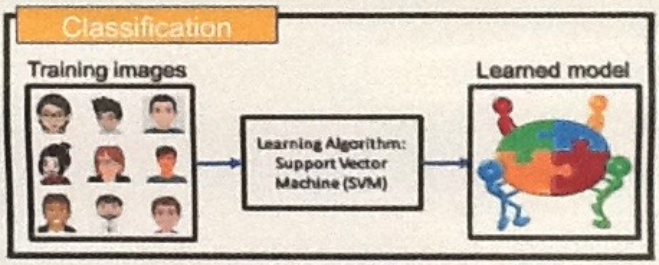

Figure 5. Learning process

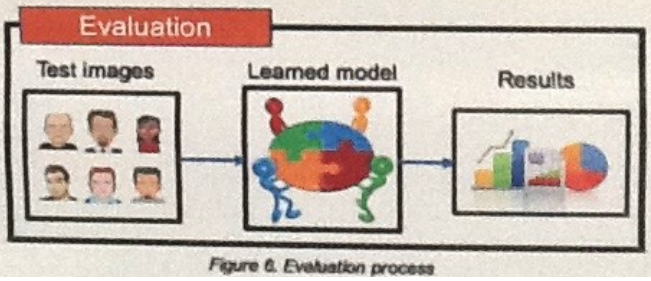

Figure 6. Evaluation process

4. Results

Table 1. Number of instance by facial expression datasets

Expression	CK+ (Lucey et al., 2010)	JAFFE (Lyons et al., 1998)	MUG (Aifanti et al., 2010)	ISED (Patrsaik et al., 2016)	MMI (Pantic et al., 2005)	WEB	Total
Angry	45	30	242	0	151	104	572
Disgust	59	29	242	78	164	101	673
Fear	25	32	183	0	142	99	481
Happy	69	31	259	226	164	103	852
Sad	28	30	202	48	154	103	565
Surprise	83	30	244	73	181	106	717
Neutral	123	30	60	0	0	100	313

Table 2. Number of instance by micro-expression datasets

Micro-Expression	CASME II (Yan et al., 2014)	SMIC-HS (Li et al., 2013)	Total
Negative	66	70	136
Positive	34	51	85
Surprise	26	43	69
Non - Micro	101	164	265

The settings for these experiments are as follows:

Experiment 1: 25% instances as positive and 75% as negative from the training set

Experiment 2: 50% instances as positive and 50% as negative from the training set

Experiment 3: 75% instances as positive and 25% as negative from the training set

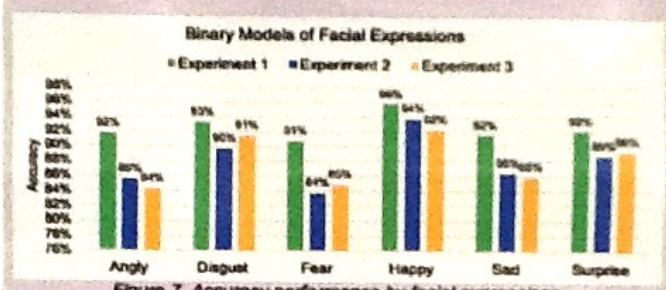

Figure 7. Accuracy performance by facial expressions using binary classification.

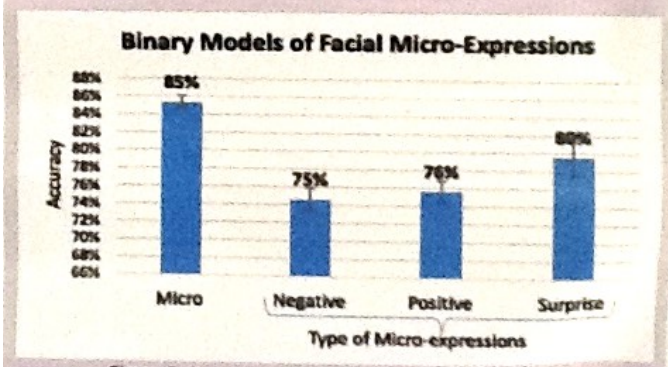

Figure 8. Accuracy performance by micro-expressions using binary classification.

Figure 9. Interface screenshot

5. Conclusion

Experimental results show that using learned models for representing expression images through deep learning can build a robust and effective system for recognizing facial expressions.

Our different scenarios for settings allow us to reach a performance accuracy of 92% on average for facial expression recognition. Up until this point, our results for micro-expressions have been 77% accurate on average.

Acknowledgements

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6. References

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