Magnifying Spontaneous Facial Micro Expressions for Improved Recognition

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INTRODUCTION

Micro expressions

- Facial movements are almost invisible to the naked eyes.
- Easily missed using traditional observation methods.

Duration

- Facial muscle contractions last for a brief amount of time.
- Exceptionally short duration, approximately 0.04 to 0.2 seconds [19].

Intensity

• Remarkably low intensity muscle movements [7] [19].



Figure 1. Happy Expression[25] (©Xiaolan Fu)



METHODOLOGY



Fig 2. Micro expression recognition framework



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Fig 3. Happy Expression[25], before(left) and after(right) magnification. (©Xiaolan Fu)



LPQ-TOP METHOD & RESULTS

- LPQ-TOP method is used for extracting features from the magnified frames.
- Calculates four frequency points for each pixel.
- Determines phase information using binary quantizer.
- Builds histogram to represent the resulting codes.
- The final feature vector obtained is used to train a Support Vector Machine (SVM) [4].

TABLE I. ACCURACY % USING LPQ-TOP

	Our Accuracy % (LPQ-TOP)			
Dataset	No Magnification	With Magnification	% Increase	
CASME	83.45	88.2	4.75	
CASME2	61.16 [18]	74.5	13.34	
$CAS(ME)^2$	63.6	68.5	4.9	
SAMM	70.4	72.07	1.67	
SMIC-VIS	65.6	73.8	8.2	
SMIC-NIR	63.3	70.42	7.12	
SMIC-HS	62.8	65.8	3	



TABLE II. ACCURACY % COMPARISON FOR CASME, CASME2,
CAS(ME)2, SAMM & SMIC

Dataset	Our Work	Other Authors	
	LPQ-TOP + mag	Accuracy %	Method
CASME	88.2	80.2	MMPTR [26]
		78.14	HIGO + mag [27]
CASME2	74.5	63.97	HOG + mag [27]
		60.73	LBP-TOP + mag [27]
$CAS(ME)^2$	68.5	64.07	NMP [31]
SAMM	72.07	70.18	CNN [32]
		81.69	HIGO + mag [27]
		77.46	HOG + mag [27]
SMIC-VIS	73.8	78.87	LBP-TOP $+ mag [27]$
		67.61	HIGO + mag [27]
		64.79	HOG + mag [27]
SMIC-NIR	70.42	67.61	LBP-TOP $+ mag [27]$
		68.29	HIGO + mag [27]
		61.59	HOG + mag [27]
SMIC-HS	65.8	60.37	LBP-TOP + mag [27]

CONCLUSION

- Presents comprehensive performance analysis using LPQ-TOP and EVM for seven datasets.
- Shows an impressive performance boost on some datasets.
- Lacks an orderly increase of recognition accuracy.
- The results obtained have achieved an impressive average increase of ~6.14% considering all seven ME datasets.
- Evidently LPQ-TOP technique is as competent as other hand-crafted methods.
- The goal of performing this work is to provide a novel pipeline for solving three class MER problem.



THANK YOU !!



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