

Title: TEMPORAL AND INTENSITY ANALYSIS OF ACTION UNITS IN MICROEXPRESSIONS

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Abstract: Microexpressions have immense applications in the area of security, medical, psychological research, and forensic domains. The review of the literature indicates the availability of very few databases for the study of microexpressions. Further, there is no Indian database till date. This study attempted to extract microexpressions that are likely to occur between two macroexpressions at the transition time using dynamic stimuli. An expression can be studied in terms of action units. We elicited expressions on participants' face and recorded video with higher resolution (240 fps) and used proper illumination to remove the flickering of light then analyzed the temporal and intensity variation of Action units for basic and complex emotions.



Combination of basic emotions	Resultant complex emotion
Happy (H) + Fear (M)	Guilt
Fear (M) + Disgust (D)	Shame
Disgust (D) + Anger (A)	Contempt
Happy (M) + Fear (M)	Guilt
Fear (M) + Surprise (S)	Alarm
Disgust (M) + Happy (H)	Morbidness
Happy (M) + Sad (M)	Conflict
Fear (M) + Sad (M)	Despair
Anger (M) + Happy (M)	Pride
Happy (M) + surprise (M)	Delight

Table 2.5: Dyads

HAPPY (M3.7) to FEAR (M2.5)					
	process	peak	slow	transition peak	slow
	10 to 10.2	10.2 to 14	14 to 15	16 to 16.5	16.5 to 20
AU01	11.95333	118.14	22.56667	4.8	45.71333
AU02	9.55	60.89667	14.25667	1.116667	30.21
AU04	1.333333	8.363333	3.94	0	24.88667
AU05	6.953333	72.78	9.176667	4.07	12.97333
AU06	0	0	0	0	0.06
AU07	0	0.786667	0.22	0.59	2.413333
AU45	0	81.66333	39.88333	29.76667	230.9967
AU09	0	11.7	9.016667	2.716667	19.57
AU10	0	0	0	0	0
AU12	0.01	0	0	0	0.616667
AU14	1.59	89.12667	57.16	8.746667	132.68
AU15	34.01	122.7667	22.75333	7.83	105.52
AU17	6.076667	194.35	109.58	90.75333	279.04
AU20	0.44	22.53	32.7	10.77667	15.77333
AU23	2.153333	86.38333	21.36667	10.29	82.71
AU25	8.956667	217.9187	116.3	32.25667	202.8033
AU26	4.87	190.09	143.21	47.67333	265.8867

Table 3.4: First instance of happy

HAPPY (M3.3) to FEAR (M2.7)					
	process	peak	slow	transition peak	slow
	10 to 10.2	10.2 to 14	14 to 16	16 to 16.5	16.5 to 20
AU01	2.336667	32.34	39.81667	6.27	50.32
AU02	2.786667	18.80333	11.96667	6.633333	35.56667
AU04	2.626667	24.13333	1.596667	0.14	4.816667
AU05	1.683333	86.80333	16.88333	7.85	87.29667
AU06	0	1.406667	4.32	0.546667	1.833333
AU07	0.023333	3.223333	17.61333	6.01	19.66
AU45	0	23.01	15.53333	3.936667	87.85333
AU09	1.17	14.61667	44.22667	9.2	61.75333
AU10	0	0	0	0	0
AU12	0	34.80333	85.77	21.61	24.31667
AU14	10.93333	296.2433	159.9567	53.83333	264.7833
AU15	10.10333	108.3133	31.55333	1.483333	37.26
AU17	14.85333	350.6787	133.6	24.99	207.32
AU20	0.606667	79.74667	43.67333	13.95333	99.52333
AU23	6.936667	152.3933	85.45	32.80333	102.1067
AU25	10.77667	149.3133	95.7	22.19333	211.5867
AU26	23.95333	296.4333	148.84	48.25	309.2767

Table 3.5: Second instance of happy

Figure 3.1: Location of facial AUs

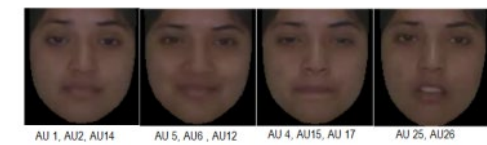


Figure 3.2: AUs in happy

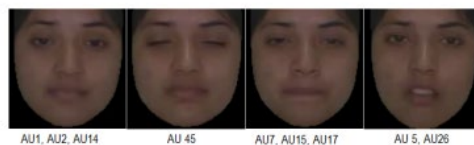


Figure 3.3: AUs in fear



Figure 3.4: AUs in disgust



Figure 3.5: AUs in angry

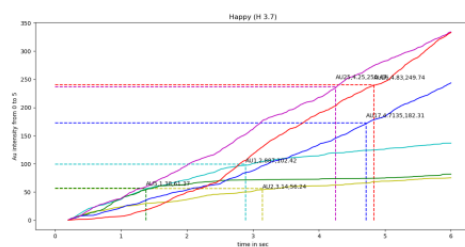


Figure 3.6: First instance of happy

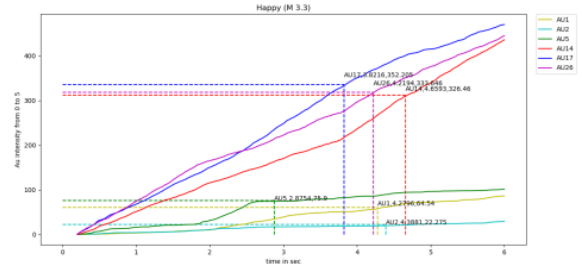


Figure 3.7: Second instance of happy