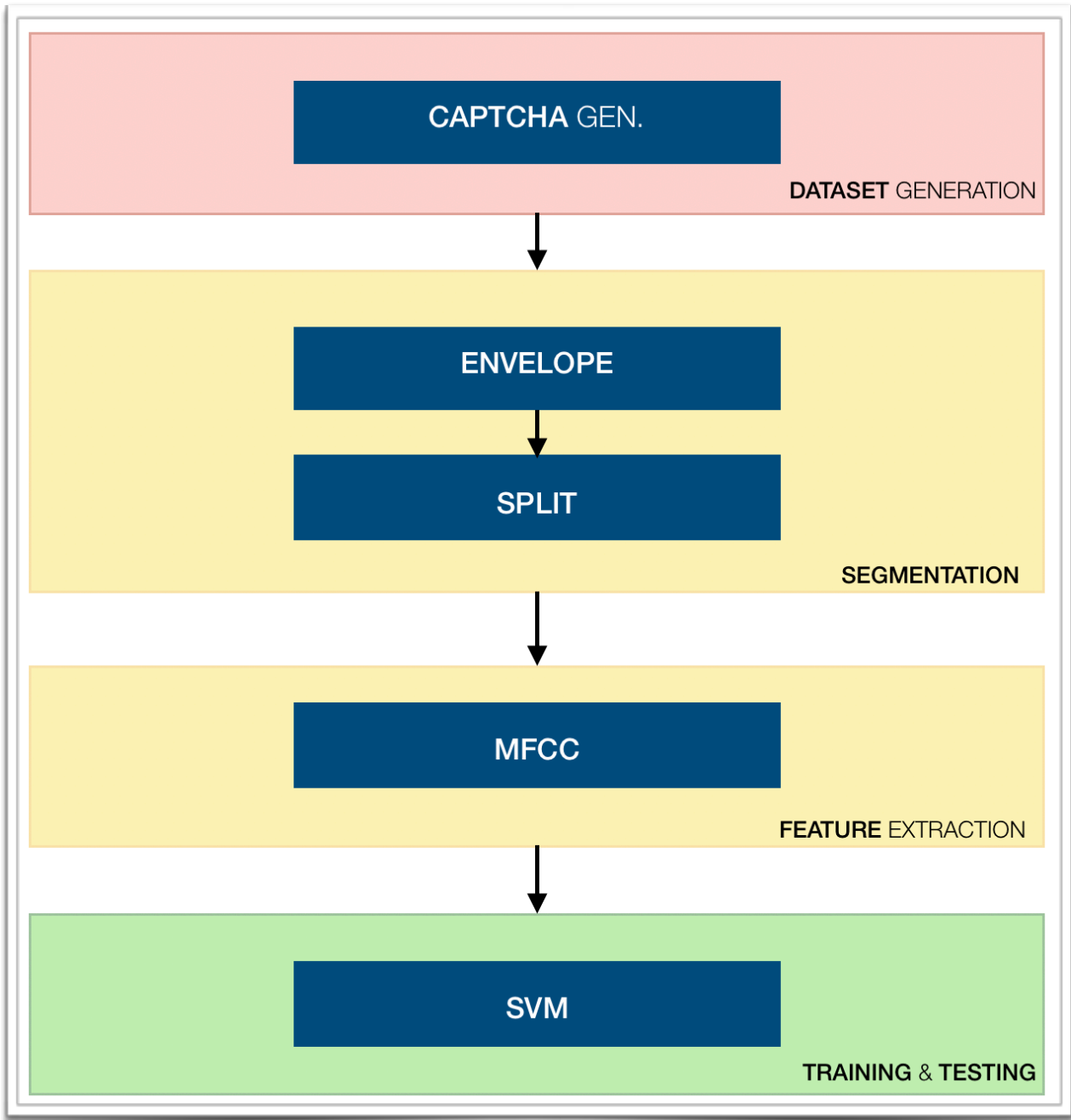


AUDIO CAPTCHA RECOGNITION

Flow Chart



Results & Conclusions

Confusion Matrix

Actual \ Pred.	0	1	2	3	4	5	6	7	8	9		
0	7.30	0.00	0.00	0.05	0.10	0.00	0.08	0.00	0.03	0.10	7.66	
1	0.00	9.01	0.05	0.03	0.15	0.03	0.00	0.05	0.03	0.10	9.45	
2	0.03	0.00	8.70	0.10	0.08	0.00	0.03	0.10	0.13	0.28	9.45	
3	0.15	0.00	0.00	9.85	0.03	0.05	0.05	0.00	0.05	0.28	10.46	
4	0.13	0.18	0.20	0.13	8.88	0.08	0.05	0.36	0.10	0.36	10.47	
5	0.13	0.15	0.13	0.15	0.08	9.52	0.03	0.08	0.03	0.18	10.48	
6	0.00	0.08	0.10	0.05	0.00	0.10	9.64	0.28	0.05	0.15	10.45	
7	0.00	0.08	0.08	0.00	0.00	0.08	0.10	9.95	0.13	0.05	10.47	
8	0.13	0.00	0.05	0.18	0.00	0.03	0.13	0.13	9.95	0.13	10.73	
9	0.05	0.05	0.08	0.10	0.00	0.08	0.08	0.05	0.05	9.92	10.46	
	7.92	9.55	9.39	10.64	9.32	9.97	10.19	11.00	10.55	11.55	100.08	
												92.72

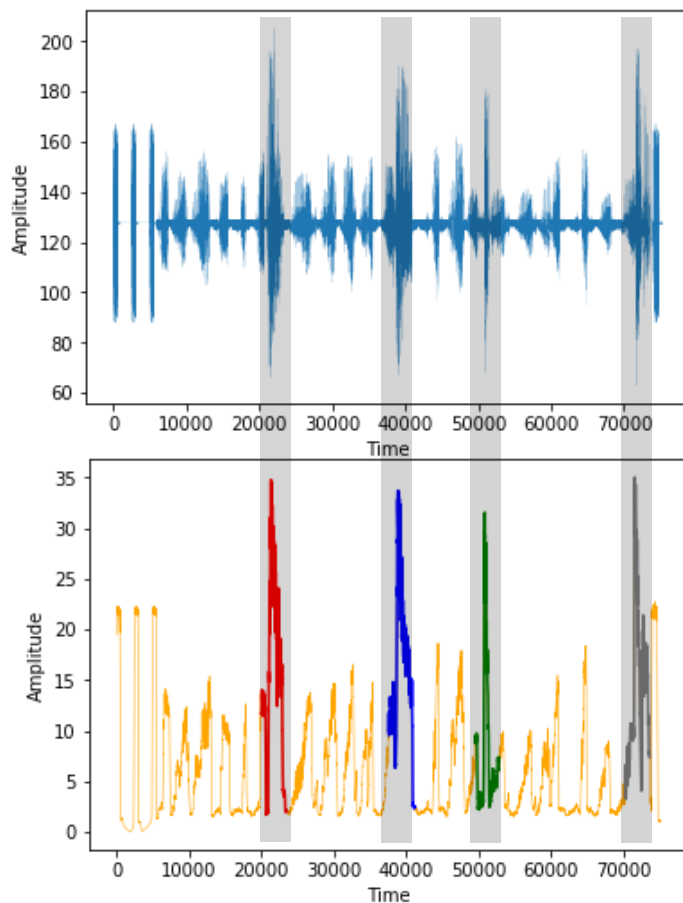
Table Showing Results For Different **Regularization Parameter** Values

		OVERALL		
param	ACC	f1		
0.00	92.00	92.10		
0.01	92.70	92.70	best f1	best Acc
0.50	88.20	88.20		
1.00	86.90	87.00		
5.00	84.40	84.50		
10.00	83.60	83.70		
20.00	83.30	83.40		

$$F_1 = 2 \frac{\text{precision} \cdot \text{recall}}{\text{precision} + \text{recall}}$$

$$\text{precision} = \frac{\text{true positives}}{\text{true positives} + \text{false positives}}$$

$$\text{recall} = \frac{\text{true positives}}{\text{true positives} + \text{false negatives}}$$



ACTUAL CAPTCHA

ENVELOPE & SEGMENT

SEGMENTED CAPTCHA

