1 Supplementary materials

In Table S-1 is reported a comparison between the fuzzy adaptive binarizations of A_2 - $CF_{1,2}$,$A_3 - Hamacher$ and $A_4 - Choquet$ and the *Bradley* algorithm on the toy dataset.

Table S-1: Fuzzy adaptive binarizations - compatrisons between *Bradley* and out algorithms.

			Image **a** with γ_0, γ_3.				
	n_a	t	SSIM	MSE	P_m	R_m	F_m
$\mathbf{I^*_{FA_2}}$	4	0.42	1.0	0.0	100	100	100
I_B			0.16	0.45	21.6	100	35.56
I_{A_3}	4	0.01	0.51	0.16	44.4	100	61.54
I_B			0.44	0.19	40	100	57.14
I_{A_4}	2	0.06	0.33	0.28	30.77	100	47.06
I_B			0.33	0.28	30.77	100	47.06
			Image **b** with γ_0, γ_3.				
	n_a	t	SSIM	MSE	P_m	R_m	F_m
$\mathbf{I^*_{FA_2}}$	4	0.01	1.0	0.0	100	100	100
I_B			0.45	0.16	41.18	100	58.33
$\mathbf{I^*_{FA_3}}$	4	0.01	1.0	0.0	100.00	100	100
I_B			0.45	0.16	41.18	100	58.33
I_{A_4}	2	0.01	0.58	0.11	50	100	66.67
I_B			0.47	0.19	36.84	100	53.85
			Image **c** with γ_0, γ_1.				
	n_a	t	SSIM	MSE	P_m	R_m	F_m
$\mathbf{I^*_{FA_2}}$	4	0.5	1.0	0.0	100	100	100
I_B			0.18	0.49	24.14	100	38.89
$\mathbf{I^*_{FA_3}}$	4	0.01	1.0	0.0	100.00	100	100
I_B			0.97	0.02	87.5	100	93.33
$I_{F_{A_4}}$	1	0.01	0.88	0.12	56	100	71.79
I_B			0.85	0.1	60.87	100	75.68
			Image **d** with γ_1, γ_4.				
	n_a	t	SSIM	MSE	P_m	R_m	F_m
$\mathbf{I^*_{FA_2}}$	4	0.5	1.0	0.0	100	100	100
I_B			0.29	0.22	33.33	100	50
$I_{F_{A_3}}$	2	0.01	0.39	0.19	36.84	100	53.85
I_B			0.39	0.17	38.89	100	56.0
$I_{F_{A_4}}$	1	0.01	0.43	0.19	36.84	100	53.85
I_B			0.15	0.42	20.59	100	34.15
			Image **e** with γ_0, γ_1.				
	n_a	t	SSIM	MSE	P_m	R_m	F_m
$\mathbf{I^*_{A_2}}$	4	0.58	1.0	0.0	100	100	100
I_B			0.66	0.19	71.43	100	83.33
$\mathbf{I^*_{A_3}}$	4	0.06	1.0	0.0	100	100	100
$\mathbf{I_B}$			1.0	0.0	100	100	100
$I_{F_{A_4}}$	4	0.01	1.0	0.0	100	100	100
I_B			0.96	0.02	100	96.67	98.31

Image **f** with $\gamma_0, \gamma_1, \gamma_3$.							
	n_a	t	SSIM	MSE	P_m	R_m	F_m
$\mathbf{I^*_{A_2}}$	4	0.58	1.0	0.0	100	100	100
I_B			0.07	0.69	26.32	100	41.67
$\mathbf{I^*_{A_3}}$	4	0.06	1.0	0.0	100	100	100
I_B			0.97	0.01	95.24	100	97.56
$\mathbf{I^*_{A_4}}$	4	0.01	1.0	0.0	100	100	100
$\mathbf{I_B}$			1.0	0.0	100	100	100
Image **g** with γ_1, γ_3.							
	n_a	t	SSIM	MSE	P_m	R_m	F_m
$\mathbf{I^*_{A_2}}$	4	0.55	1.0	0.0	100	100	100
I_B			0.04	0.73	21.67	100	35.62
$\mathbf{I^*_{A_3}}$	4	0.01	1.0	0.0	100	100	100
$\mathbf{I_B}$			1.0	0.0	100	100	100
$I_{F_{A_4}}$	4	0.07	0.97	0.02	92.86	100	96.3
I_B			0.97	0.02	92.86	100	96.3
Image **h** with γ_0, γ_1.							
	n_a	t	SSIM	MSE	P_m	R_m	F_m
$\mathbf{I^*_{A_2}}$	4	0.58	1.0	0.0	100	100	100
I_B			0.66	0.19	71.43	100	83.33
$\mathbf{I^*_{A_3}}$	4	0.08	1.0	0.0	100	100	100
$\mathbf{I_B}$			1.0	0.0	100	100	100
$\mathbf{I^*_{A_4}}$	4	0.01	1.0	0.0	100	100	100
I_B			0.96	0.02	100	96.67	98.31