Object localization enhancement by multiple segmentations fusion

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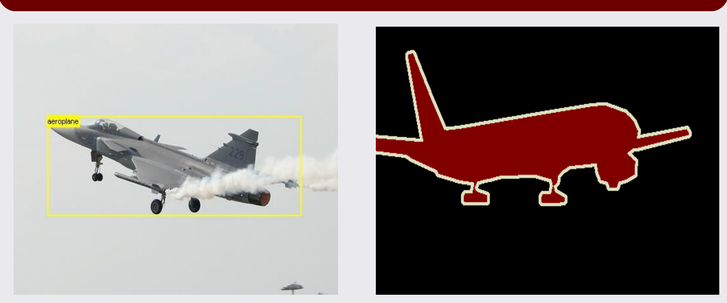
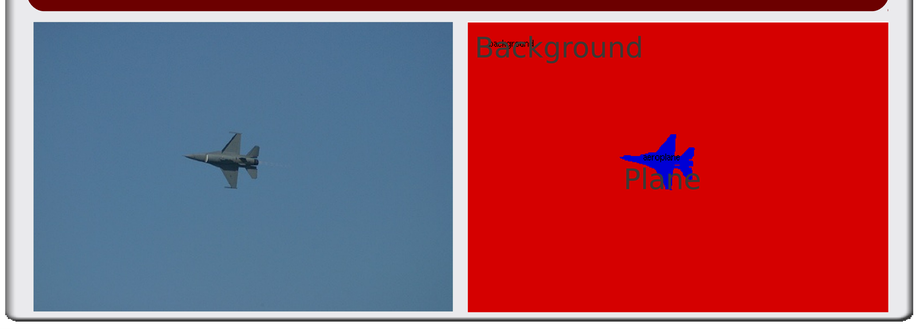
Image segmentation

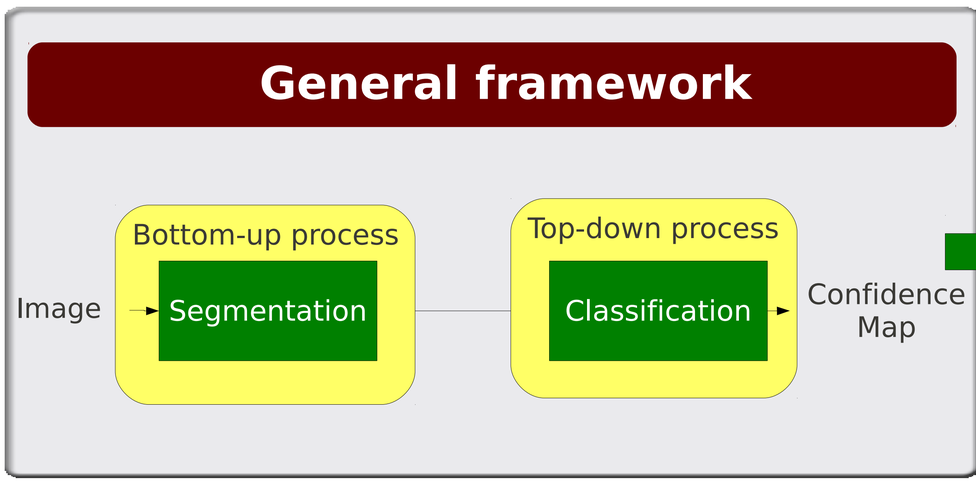
Object localization



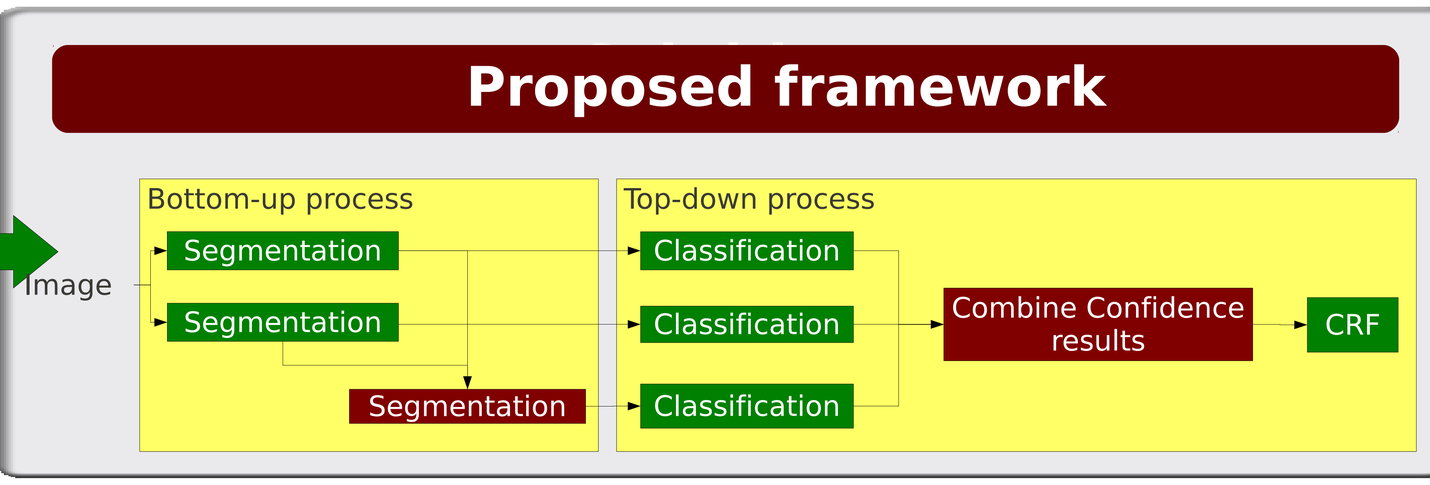
Object class segmentation

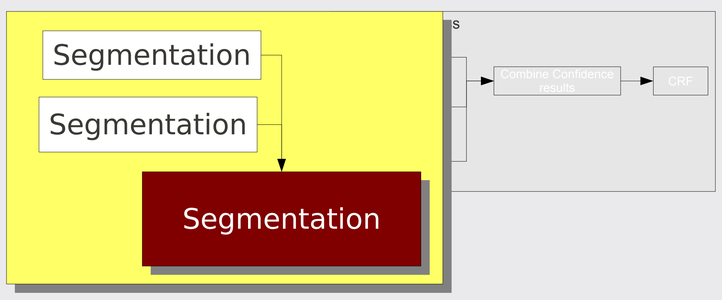


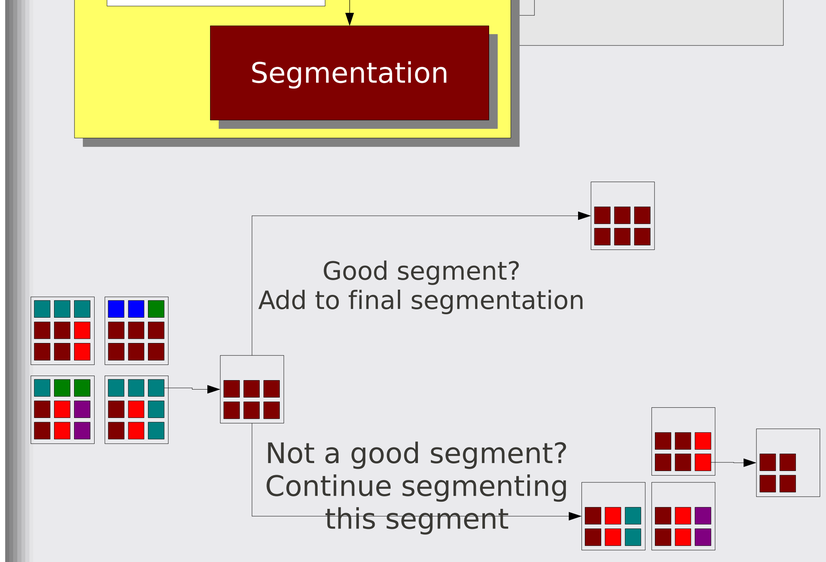
General framework



Proposed framework



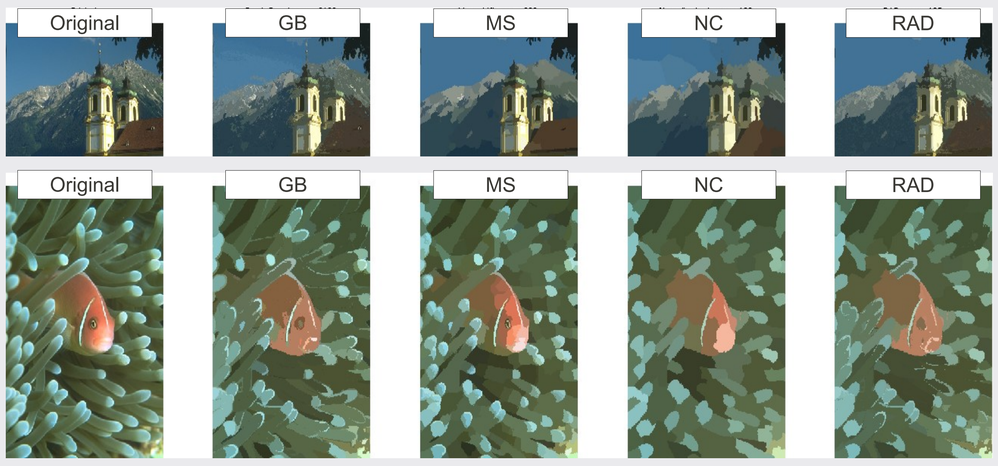




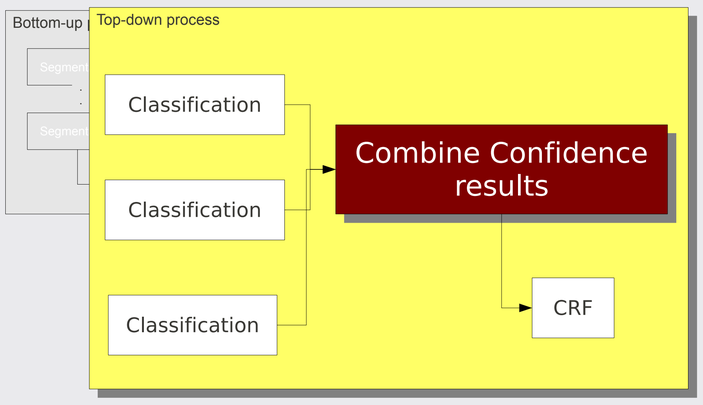
What is a good segment?

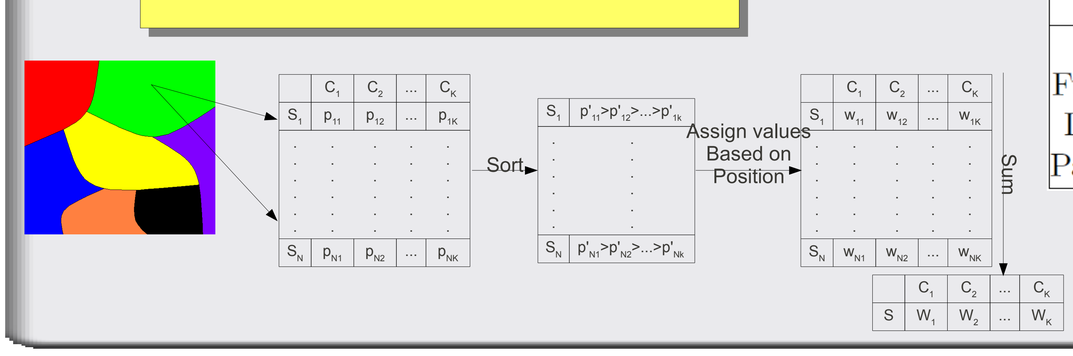
Evaluating segments goodness

- Color distribution
- Unimodality test
- RAD
- Alternate segmentation



	PRI	VoI	GCE	BDE
Mean-Shift	0.7424	4.5293	**0.0842**	**14.2716**
Graph-Based	0.7082	5.1148	0.1150	17.2428
Normalized-cut	0.7079	4.1370	0.1153	14.7337
Mix+RAD	**0.7483**	**3.5364**	0.1433	14.8047





	Background	Aeroplane	Bicycle	Bird	Boat	Bottle	Bus	Car	Cat	Chair	Cow	Diningtable	Dog	Horse	Motorbike	Person	Pottedplant	Sheep	Sofa	Train	TVmonitor	Avg Accuracy
Best Mix	49	21	20	10	15	**9**	32	48	56	28	13	**37**	56	19	61	48	33	32	**45**	44	38	**34**
Mix all	50	16	19	15	11	7	32	47	**62**	**29**	**14**	31	53	20	63	58	27	26	39	43	38	33
Viitaniemi (2007)	23	19	21	5	**16**	3	1	**78**	1	3	1	23	**69**	**44**	42	0	**65**	**40**	35	**89**	**71**	30
Fulkerson et al. (2009)	56	26	**29**	**19**	**16**	3	**42**	44	56	23	6	11	62	16	**68**	46	16	10	21	52	40	32
Ladicky et al. (2007)	**78**	6	0	0	0	0	9	5	10	1	2	11	0	6	6	29	2	2	0	11	1	9
Pantofaru et al. (2008)	59	**27**	1	8	2	1	32	14	14	4	8	32	9	24	15	**81**	11	26	1	28	17	20

Conclusions

- A novel approach for combining different segmentations to obtain a better segmentation
- A novel approach for combining classification results from several segments to better recognize objects.
- Superpixels don't provide the best level of representation of the objects.

[1] Caroline Pantofaru, Cordelia Schmid, and Martial Hebert. Object recognition by integrating multiple image segmentations. In European Conference on Computer Vision, volume III, pages 481–494, 2008.
[2] B. Fulkerson, A. Vedaldi, and S. Soatto. Class segmentation and object localization with superpixel neighborhoods. In Proc. ICCV, 2009.