Face components detection using SURF and SVMs

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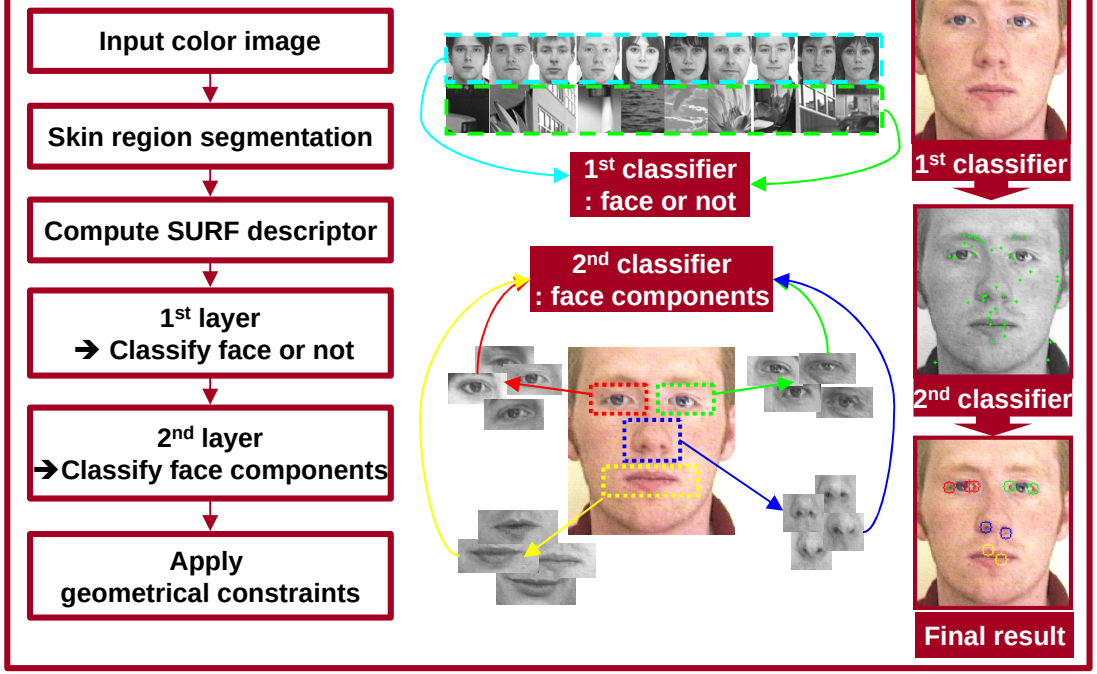
Introduction

- Feature-based method to classify salient points as belonging to objects in the face or background classes
- SURF (Speeded Up Robust Features) descriptor to generate feature vectors
- SVMs (Support Vector Machines) as classifiers consist of a two-layer hierarchy of SVMs classifiers
  - ➔ 1st layer : a single classifier checks Face or Background trained using SURF descriptors from both face and background images
  - ➔ 2nd layer: each component classifier of eye, mouth, and nose for labeling trained using SURF descriptors extracted from each component images

(ex: the mouth classifier was trained by SURF descriptors of mouth against nose and eye images)

System overview



Future work

- Remodel better geometrical priors to pair different face components together, in particular for dealing with several faces in a same image, and different head poses.
- Research the method to extract more features because SURF descriptors are detected in fewer numbers in low resolution images, decreasing the overall performance of the detection.

Conclusion

- The proposed method has high detection rate.
- We presented a method to localize face components and it can be applied to both the recognition whether there are faces or not in video sequence and other object detection tasks in computer vision.

Experiment results

DB \ Classifier		Left eye	Right eye	Mouth	Nose	Number of images	Total number of Descriptors
Face high resolution	Detection rate	97%	97%	93%	72%	100	9095
	Error rate	6.4%	8.2%	4.7%	0.57%		
Face lower resolution	Detection rate	88%	93%	56%	28%		2914
	Error rate	3.0%	3.7%	2.4%	0.68%		
Face lowest resolution	Detection rate	43%	49%	5%	1%		1218
	Error rate	0.65%	0.98%	0%	0.16%		
nonFace	Error rate	6.7%	6.7%	6.7%	0.87%	242	18012

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