

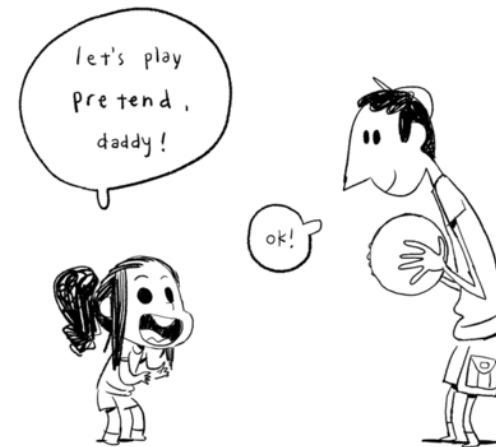


Speech balloon contour classification in comics

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Summary

- Project
- Speech balloons
- Detection
- Classification
- Dataset
- Evaluation
- Conclusion

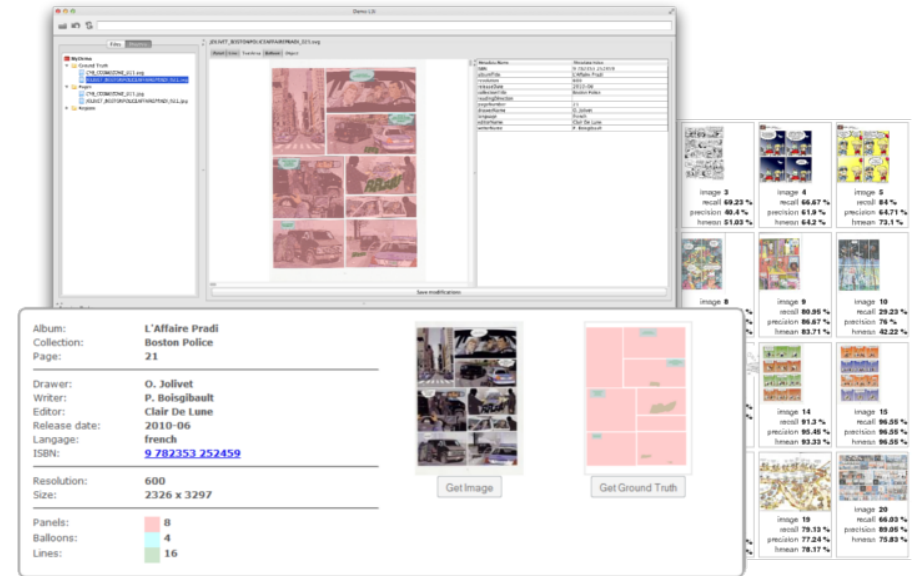


<http://www.tumblr.com>

Project

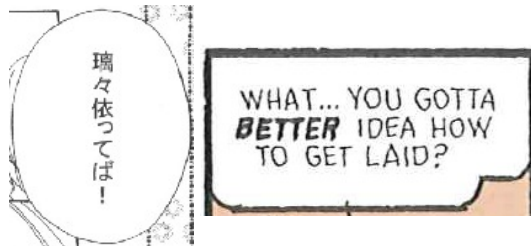
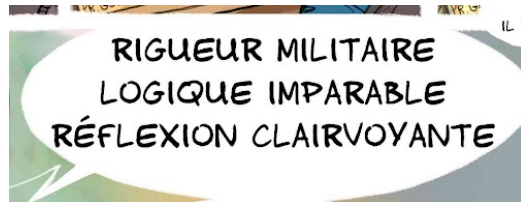
L3i project: eBDtheque

- June 2011 – September 2014
- Participants
 - 2 doctoral researchers
 - 5 assistant professors
 - 3 professors
- Comic books
 - Cultural heritage
 - Need to be valorized by the new technologies
- Objective: comics content understanding
 - Augmented reading experience
 - Information retrieval (e.g. semantic query, full text search)
 - New dataset
- Progress
 - Panels, text lines, balloons, people

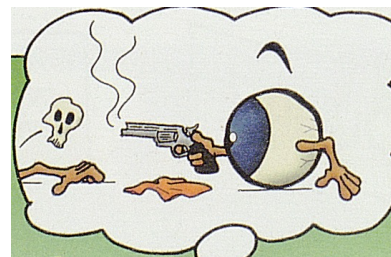


Speech balloons

Shapes and contours



Smooth contour:
dialogue, conversation...



Wavy contour:
Thought, dream, insinuation...



Zigzag contour:
exclamation, event, action...

Image credits: eBDtheque dataset

Detection

Active contour model^[1]

Initialization



Detection

$$\min(E) = \min(E_{\text{internal}} + E_{\text{external}} + E_{\text{text}})$$

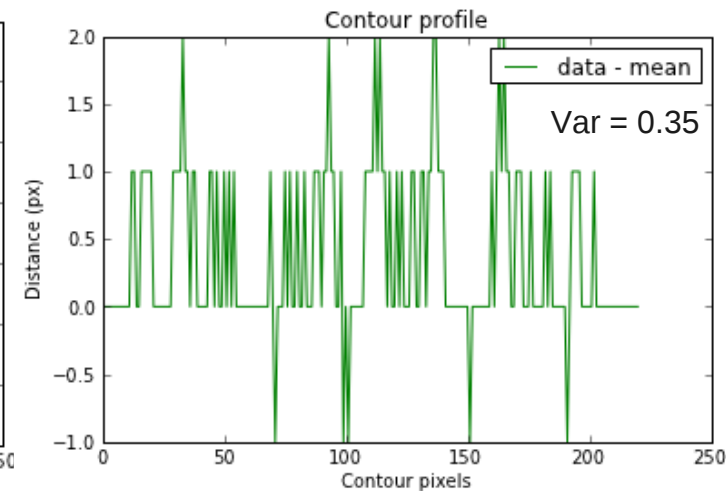
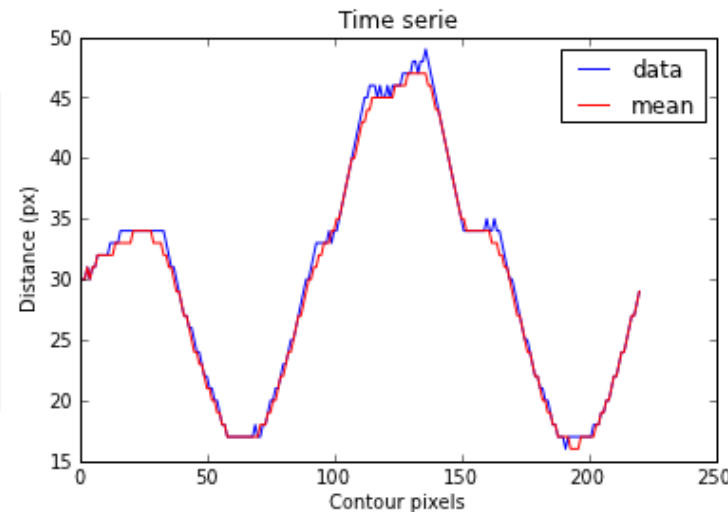
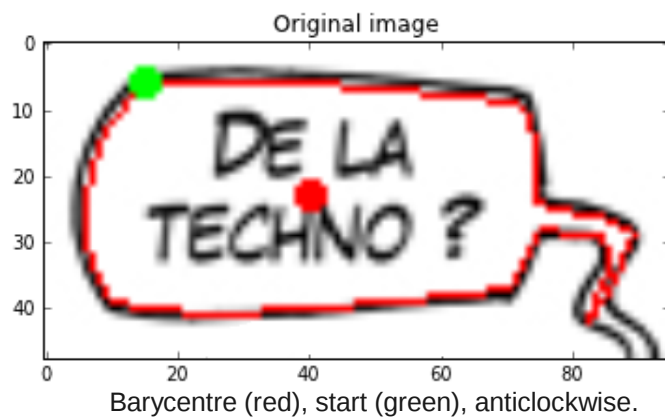
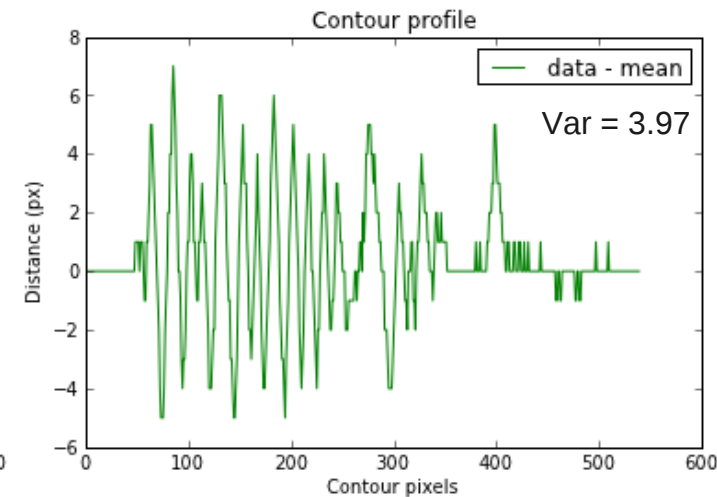
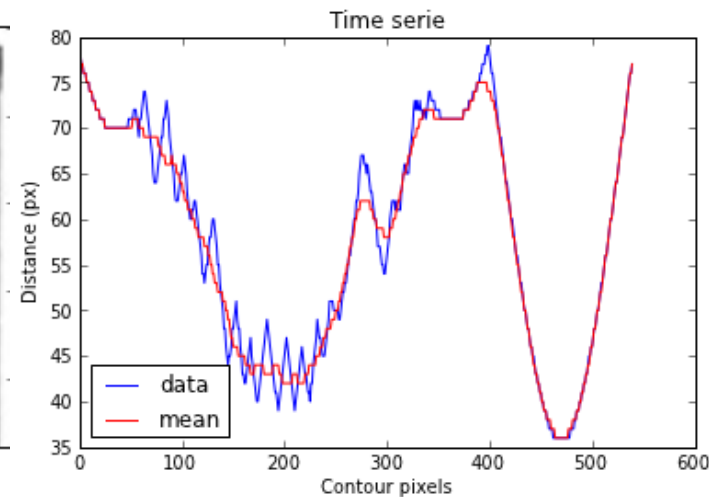
Results



[1] C. Rigaud, D. Karatzas, J. Van de Weijer, J-C Burie, J-M Ogier. An active contour model for speech balloon detection in comics. In 12th International Conference on Document Analysis and Recognition (ICDAR), 2013

Classification

Shape/contour separation



Dataset

<http://ebdtheque.univ-lr.fr>

- eBDtheque subset
 - 22 speech balloons
 - Pixel level ground truth
 - Type {oval, rectangle, peak, cloud}
 - Tail direction



Evaluation

- Label correspondences

Ground truth	Classification	Variance threshold
Oval, rectangle	Smooth	< 1.5
Cloud	Wavy	$1.5 < \text{var} \leq 2$
Peak	Zigzag	> 2

- Confusion matrix

		Predicted class		
		Smooth	Wavy	Zigzag
Actual class	Smooth	13	1	0
	Wavy	1	2	0
	Zigzag	1	0	4

- Accuracy: 86.3%

Conclusion

- One step further in the comics content understanding
- High dependence to balloon detection
- Shape/contour separation
- Contours are more discriminant than shapes
- Next:
 - Normalize the metric according to the size
 - Frequency domain information
 - More data
 - Tail detection and speakers localization

THANK YOU VERY MUCH