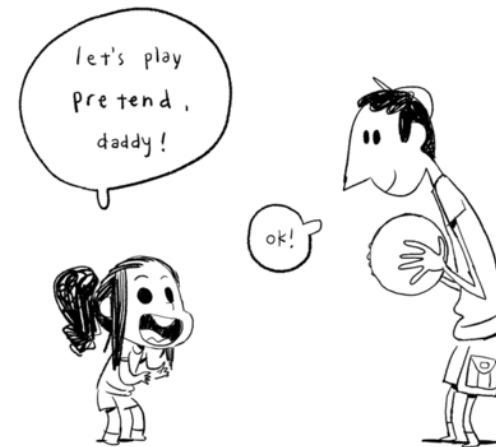# Speech balloon contour classification in comics

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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
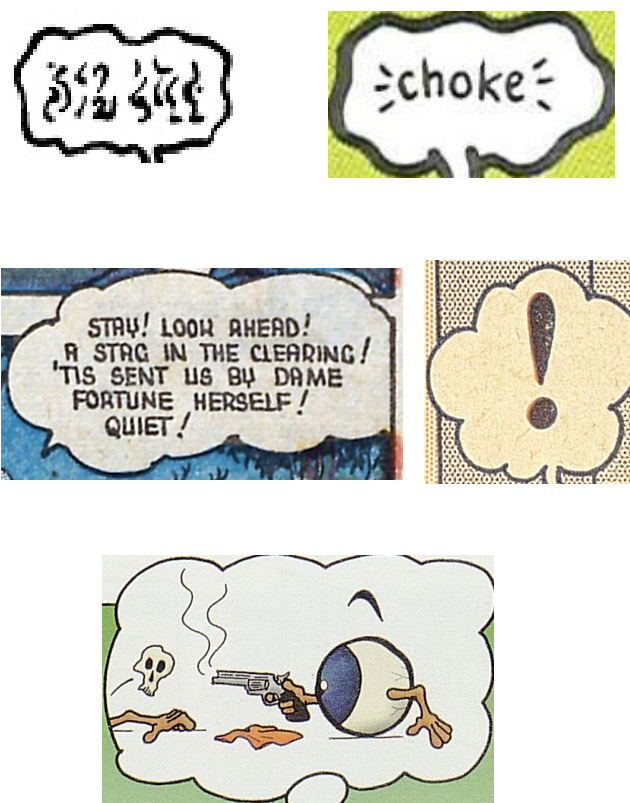   - Panels, text lines, balloons, people
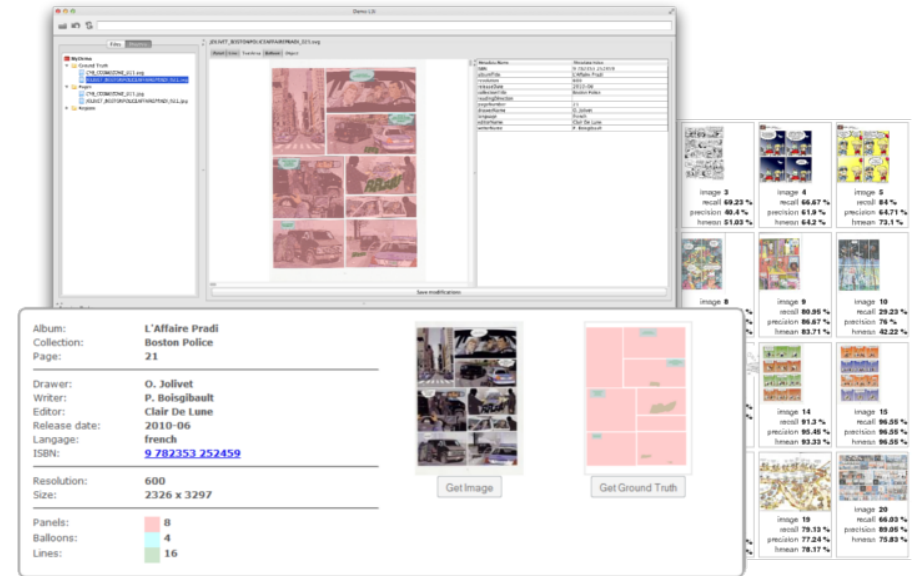
Speech balloons

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

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

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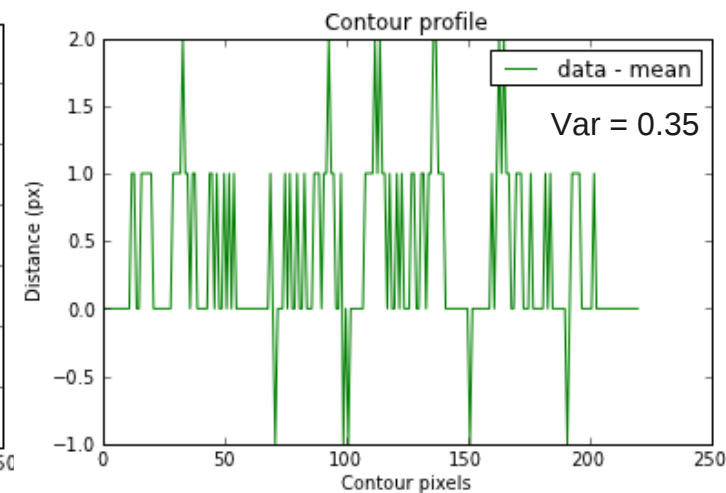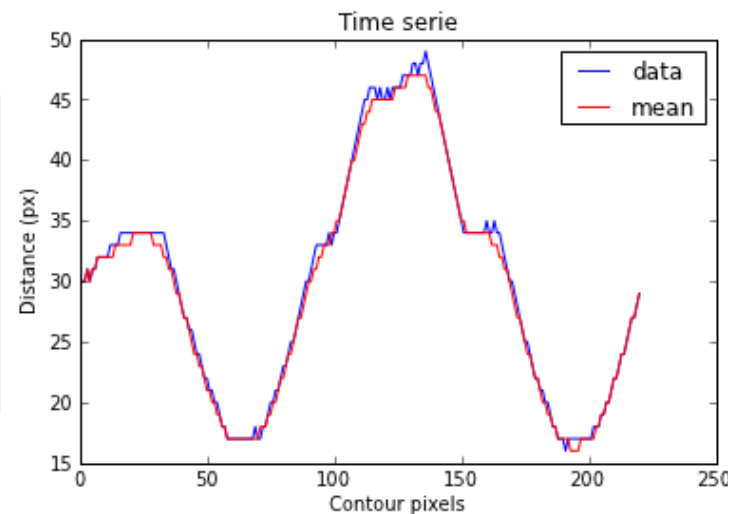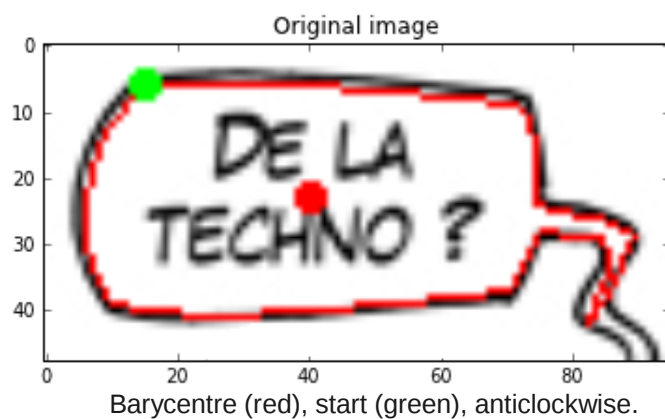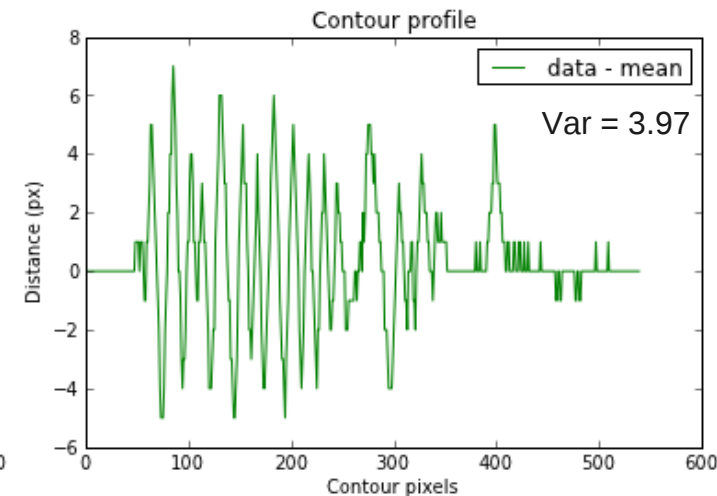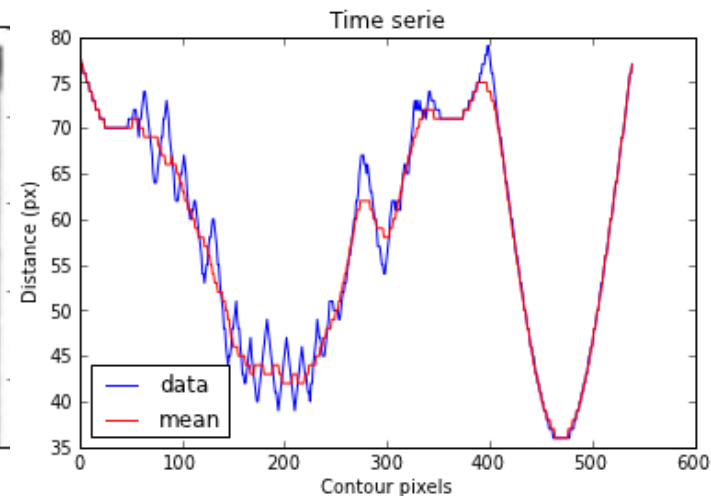
 [1] C. Rigaud, D. Karatzas, J. Van de Weijer, J-C Burie, J-M Ogier. An active contour model for speech balloon detection in comics. In 12th International Conference on Document Analysis and Recognition (ICDAR), 2013

Classification

Shape/contour separation

Barycentre (red), start (green), anticlockwise.

Var = 3.97

Barycentre (red), start (green), anticlockwise.

Var = 0.35

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 < var <= 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

Conclusion

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THANK YOU VERY MUCH