

## **Segmentation and indexation of graphical complex objects from comic books**

Christophe Rigaud

Visiting researcher from January 12 to March 23, 2013

# Plan

- Institutions
- Project and dataset
- Thesis research
- Collaborations

# Christophe Rigaud

Doctoral researcher (2nd year)

Segmentation and indexation of complex objects from comic books

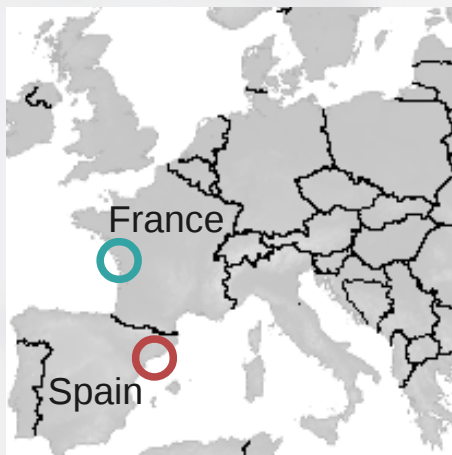
Advisers: Jean-Christophe Burie<sup>1</sup>, Jean-Marc Ogier<sup>1</sup>  
Dimos Karatzas<sup>2</sup>

<sup>1</sup>**L3i**

- La Rochelle University (ULR)
- 80 members
- Image and document analysis group
  - Comics project

<sup>2</sup>**CVC**

- Barcelona University (UAB)
- 175 members
- Document analysis group
  - Comics team



# Comics project

- L3i lab (La Rochelle, France)
- June 2011 – September 2014
- Participants: 2 PhD students, 5 assistant professors, 3 professors,
- Comic books:
  - Cultural heritage
  - Need to be valorized by the new technologies
- Objectives:
  - Augmented reading experience
  - Information retrieval (semantic query, full text)
  - Dataset for scientists

# eBDtheque: comics database and ground truth

- Just submitted to ICDAR'13
- 100 ground truth pages
  - ~800 frames
  - ~600 balloons
  - ~4500 text lines
- <http://ebdtheque.univ-lr.fr/database/>

```
<component name="Balloon" type="Region">
  <metadata-list>
    <metadata name="rank" constrained="no" type="int"/>
    <metadata name="shape" constrained="yes" type="String">
      <item>cloud</item>
      <item>ovale</item>
      <item>peak</item>
      <item>rectangle</item>
      <item>none</item>
    </metadata>
    <metadata name="queueDirection" constrained="yes" type="String">
      <item>N</item>
      <item>NE</item>
      <item>E</item>
      <item>SE</item>
      <item>S</item>
    </metadata>
  </metadata-list>
</component>
```

Identifier: CYB\_BUBBLEGOM\_T02\_010

Collection: Bubblegôm Gôm  
Album: La Légende des Yaouanks  
Page: 32

Drawer: Cyborg 07  
Writer: Cyborg 07  
Editor: Studio Cyborga  
Release date: 2009  
Language: french  
ISBN: 979-10-90655-01-0  
Website: [Link](#)

Definition (px): 750 x 1060

Panels: 16  
Balloons: 19  
Lines: 70



# Segmentation and indexation of complex objects

- Frame detection
- Text localization
- Speech balloon detection
- Object detection

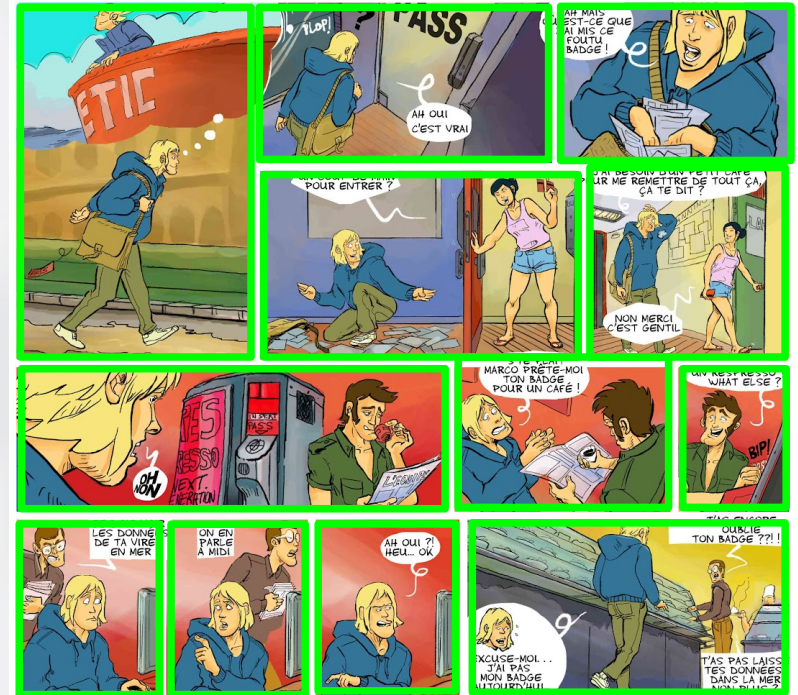


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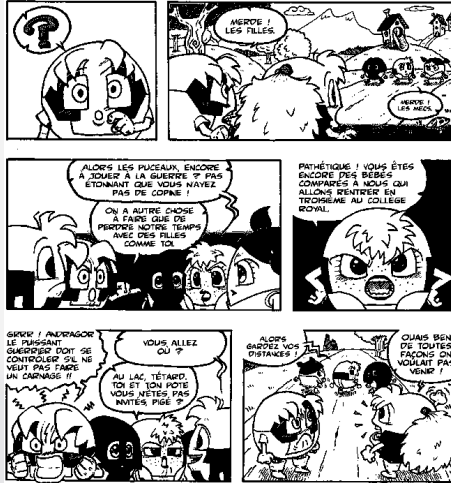
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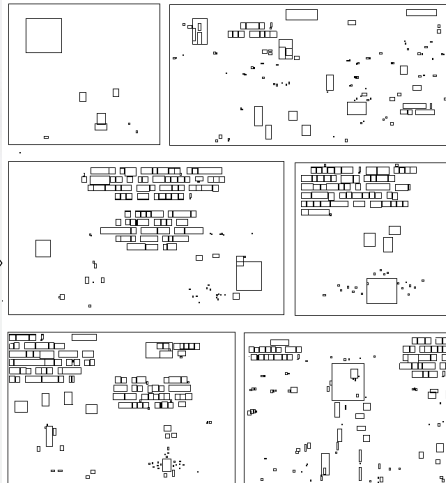
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# Frame extraction [1]

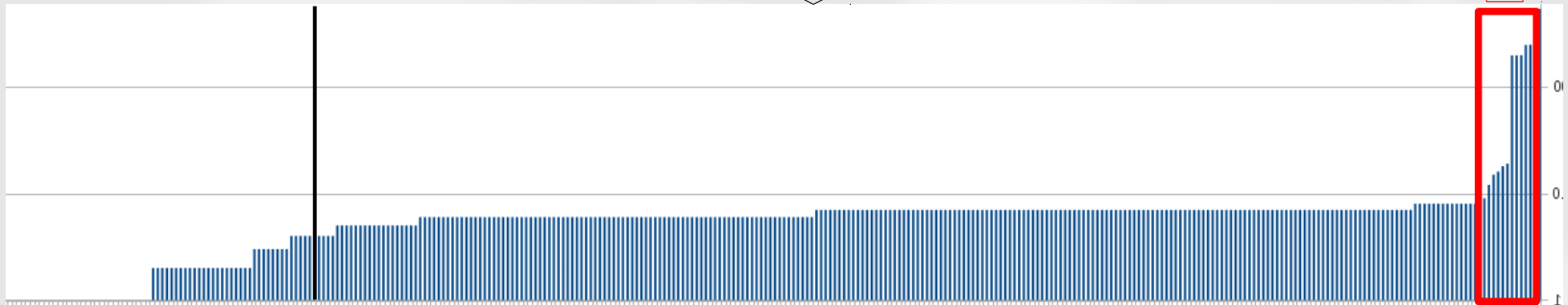
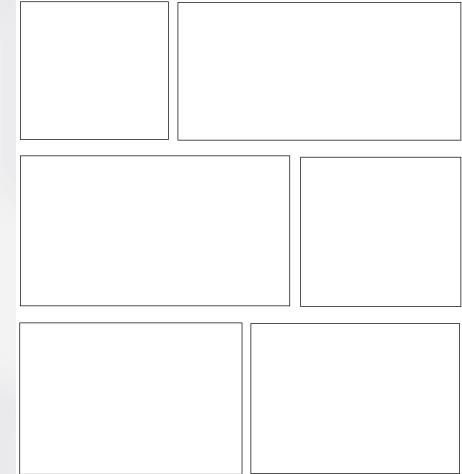
Binary image



Connected components



Filtering



Connected component height

## [1] Robust frame and text extraction from comic books

Christophe Rigaud, Norbert Tsopze, Jean-Christophe Burie, Jean-Marc Ogier

Lecture Note in Computer Science (LNCS), Graphics Recognition. New Trends and Challenges, vol. 7423, pp.129-138, 2013



# Segmentation and indexation of complex objects

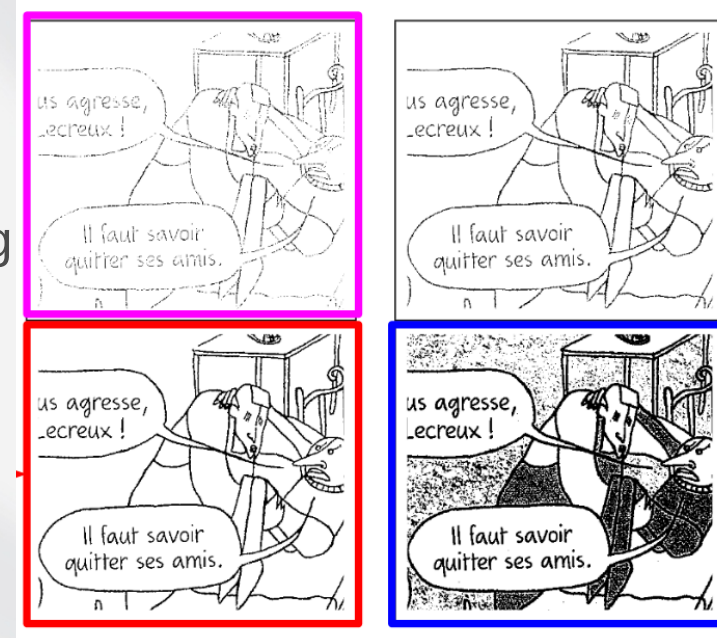
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## Text localization [2]

- Minimum Connected Component Thresholding
- Text graphic segmentation
- Text line localization (consecutive alignments)
- 75% recall and precision



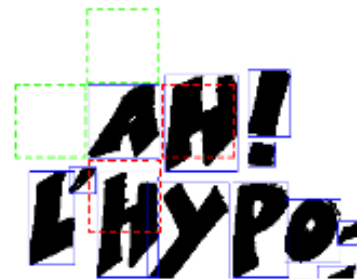
Contrast  
(std dev. > 60%)



Black on white



Neighbourhood  
(min. 1 neighbour)



Overlapping  
(< 30% with other CC)

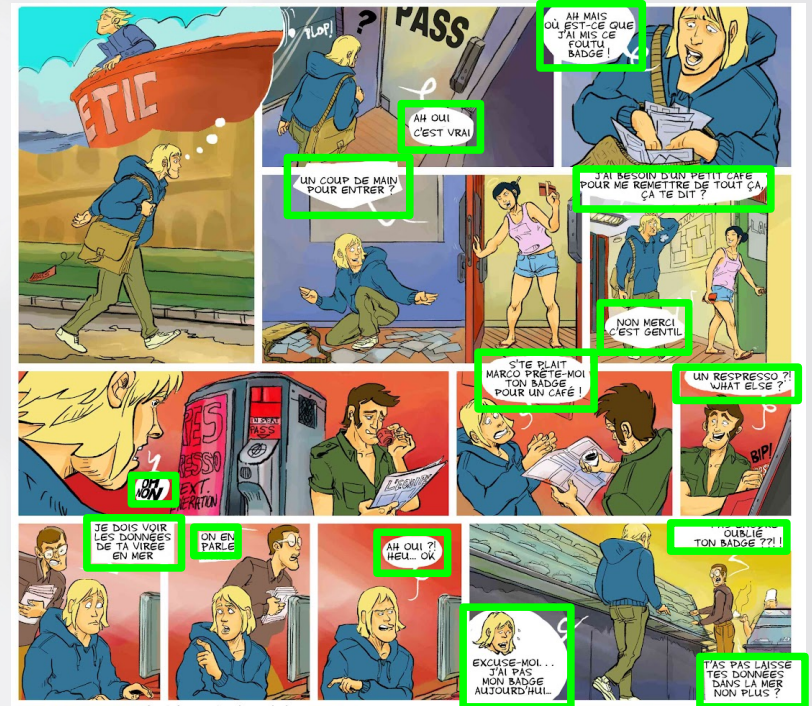


### [2] Automatic Text Localisation in Scanned Comic Books

Rigaud, Christophe and Karatzas, Dimosthenis and Van de Weijer, Joost and Burie, Jean-Christophe and Ogier, Jean-Marc  
Proceedings of the 8th International Conference on Computer Vision Theory and Applications (VISAPP), 2013

# Segmentation and indexation of complex objects from comic books

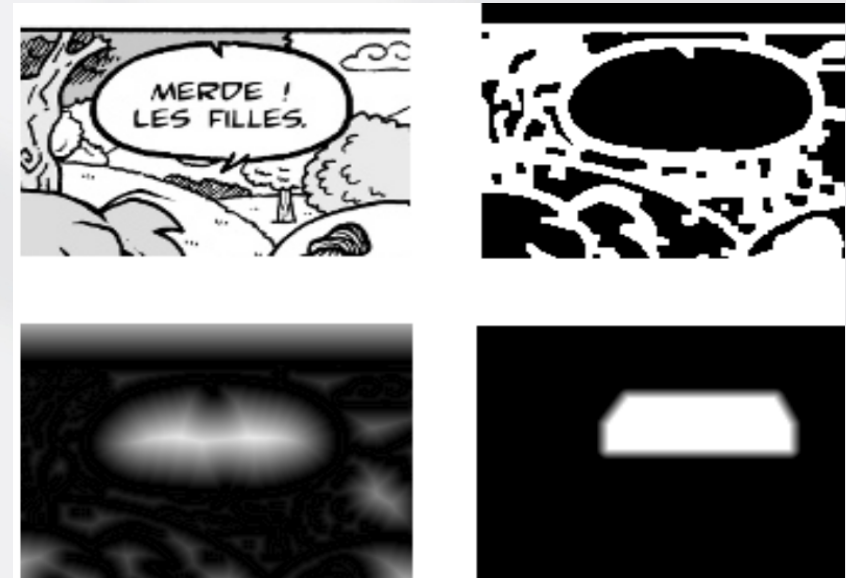
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# Speech balloon detection [3]

- Closed and suggested balloon
- Active contour from text area
- 92% recall and precision



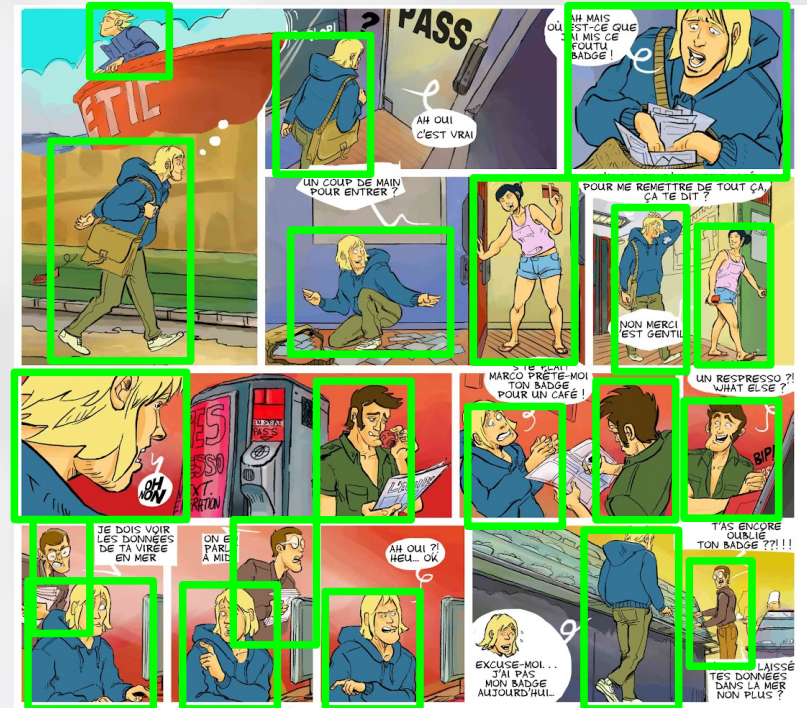
## [3] An active contour model for speech balloon detection in comics

Rigaud, Christophe and Karatzas, Dimosthenis and Van de Weijer, Joost and Burie, Jean-Christophe and Ogier, Jean-Marc  
Pending acceptance...



# Segmentation and indexation of complex objects from comic books

- Frame detection
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- **Object detection**



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# Object detection

- Aim: localize important character in comic books
- Ideas of research
  - Frequent keypoint (e.g. SIFT, HOG)
  - Adjacency/topology frame description
  - Subgraph matching





# Collaborations

- 08/2012 - agreement for scientific cooperation with La Rochelle University
- 09/2012 - research stay of Masaki, Atsushi, Motoi and Weihang (La Rochelle)
- 10/2012 - research stay of Elodie (Osaka)
- 01/2013 - research stay of Romain and Christophe (Osaka)
- 02/2013 - manga pages for eBDtheque dataset
- 03/2013 - character detection in comics???

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ありがとうございました  
*Thank You Very Much*