

Osaka Prefecture University - Intelligent Media Processing Group

**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

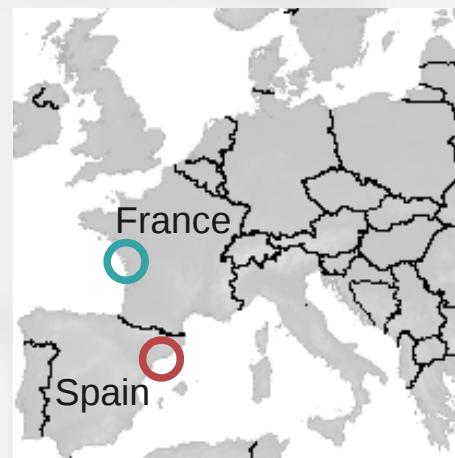
Advisers: Jean-Christophe Burie¹, Jean-Marc Ogier¹
Dimos Karatzas²

¹L3i

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

²CVC

- 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>
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      <item>E</item>
      <item>SE</item>
      <item>S</item>
```

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



LUBBIN - Les Bulles du Labo - <http://bulles.doc-en-stock.fr/>

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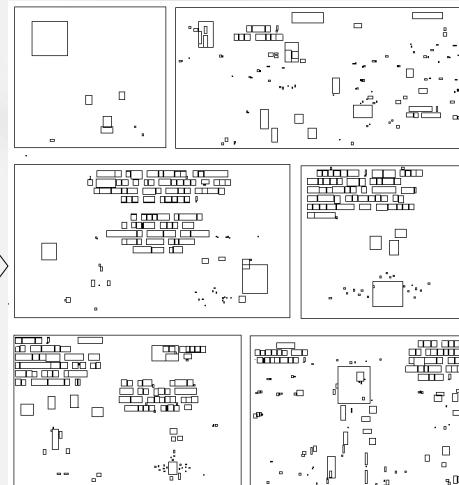
LUBBIN - Les Bulles du Labo - <http://bulles.doc-en-stock.fr/>

Frame extraction [1]

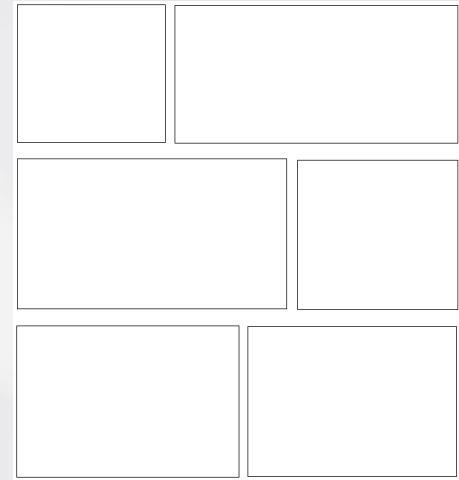
Binary image



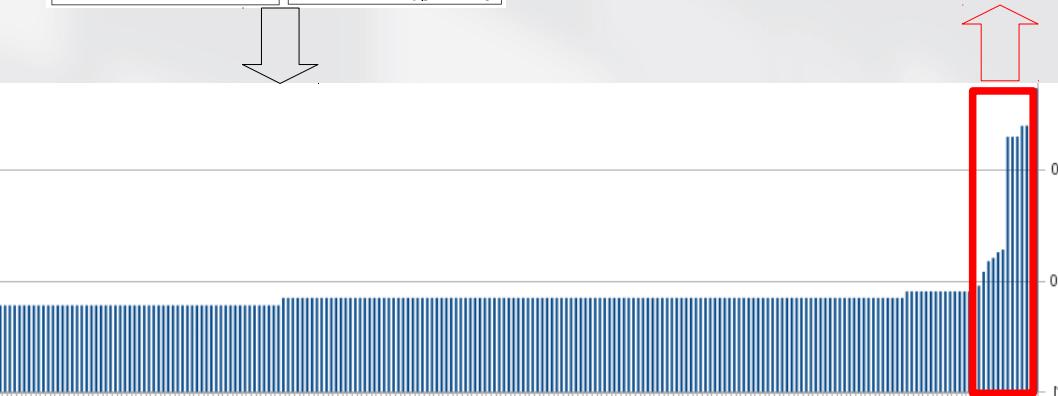
Connected components



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

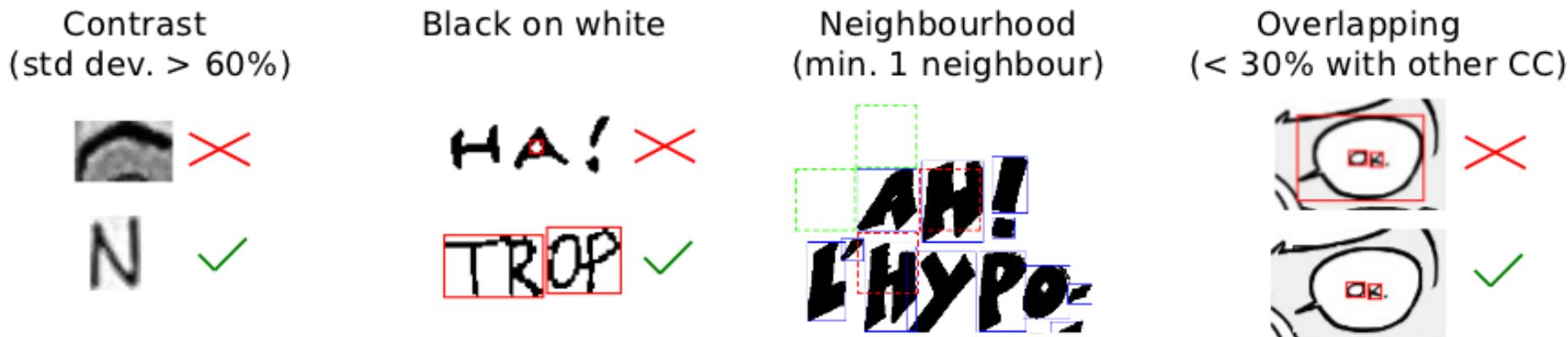
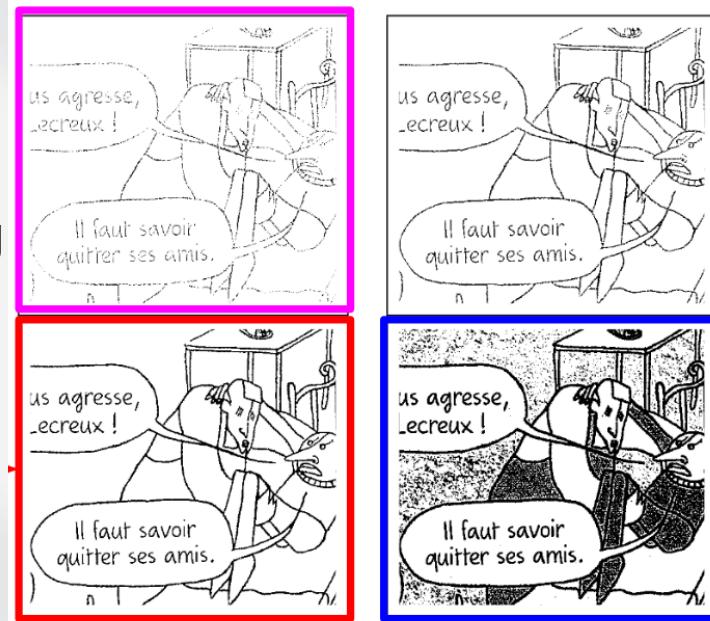
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Text localization [2]

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

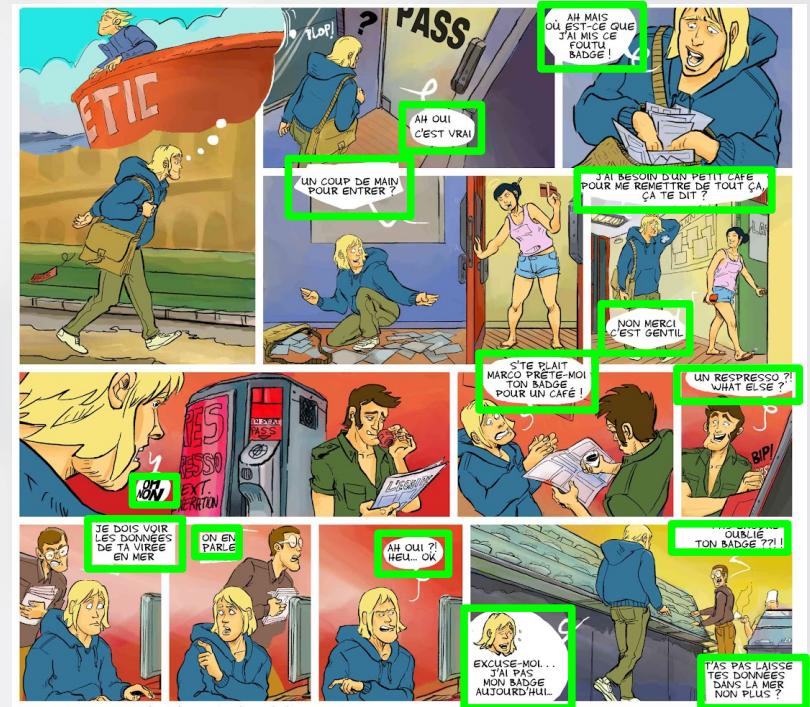


[2] Automatic Text Localisation in Scanned Comic Books

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

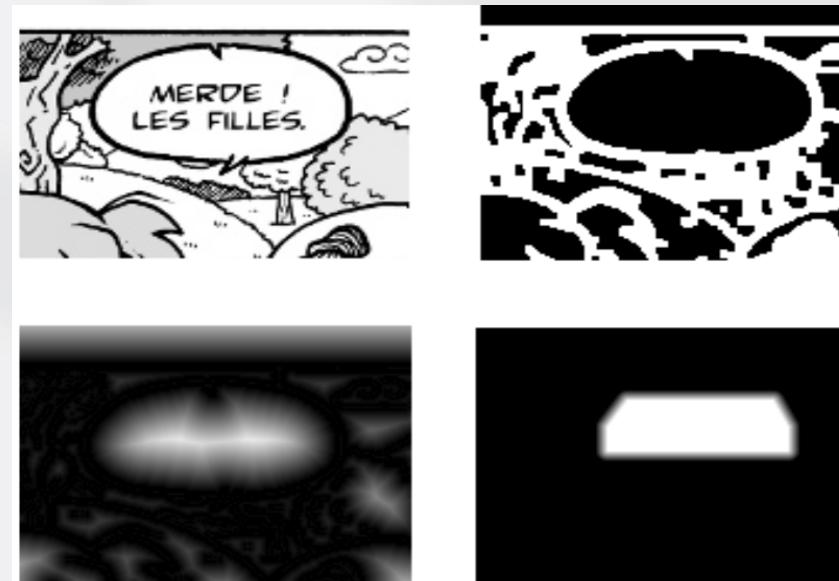
- Frame detection
- Text localization
- **Speech balloon detection**
- Object detection



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Speech balloon detection [3]

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

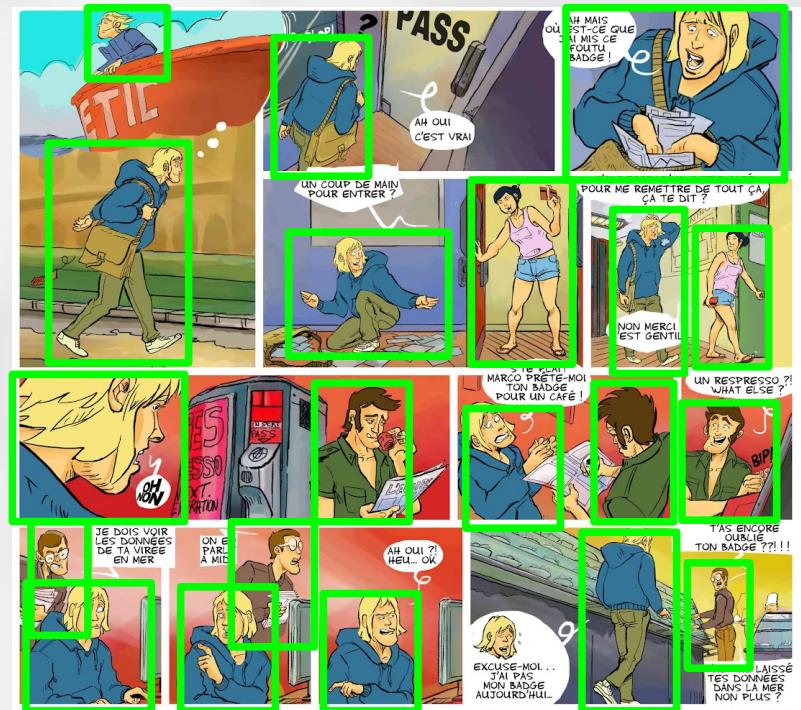


[3] An active contour model for speech balloon detection in comics

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

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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 Weihan (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