

# Ballooning Snake

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SSIP 2006

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# Outline

- 1 Introduction
- 2 Active Contour Models - Theory
- 3 Implementation
- 4 Results and Outlook

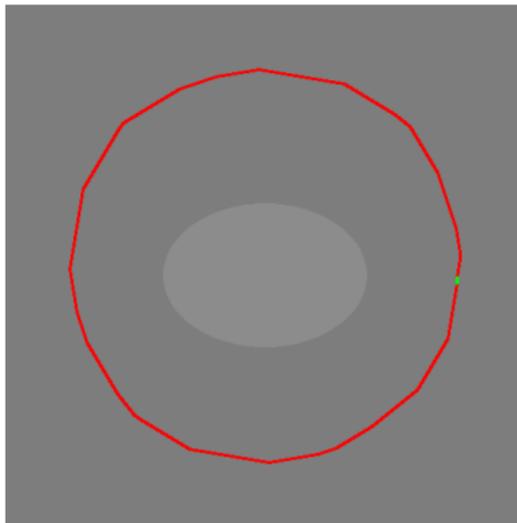
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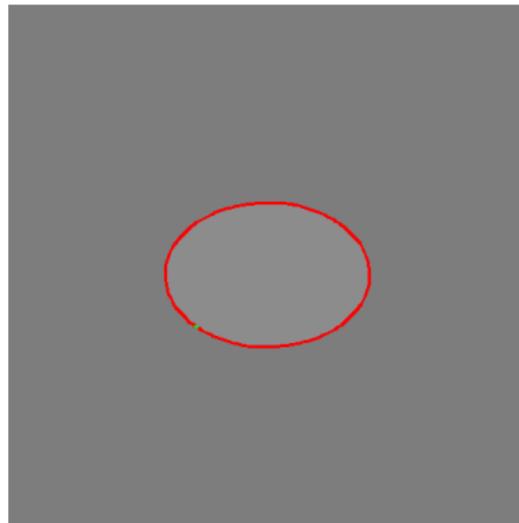
# Team Members

- Erika Tunyogi** - Theoretician, Researcher
- Feza Carlak** - Coordinator, Researcher
- Nicolas Popovic** - Graphic and Web Page Designer
- Manuel Werlberger** - Software Engineer

# Motivation



Initialisation



Result

# Introduction

- Snake is a form of Active Contour
- Introduced by Kass, Witkin and Terzopoulos
- Energy minimizing spline
- Depending on Shape and Location of the Object
- Used for Segmentation
- Not sufficient to converge the contours to the image
- Interaction process needed

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# Greedy Algorithm

- The quantity is minimized by:

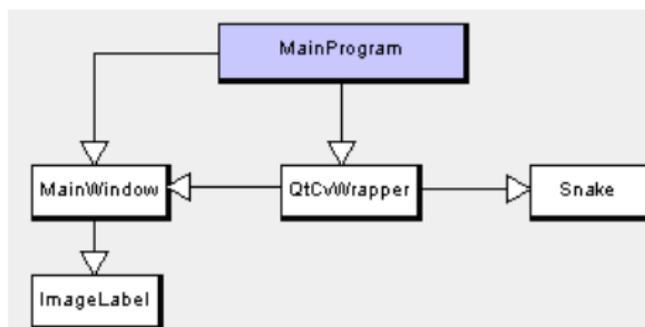
$$E = \int (\alpha(s)E_{cont} + \beta(s)E_{curv} + \gamma(s)E_{image})ds$$

- $E_{cont}$  and  $E_{curv}$ : first and second order continuity constraints
- $E_{image}$ : measures image quantity (edge strength or intensity)

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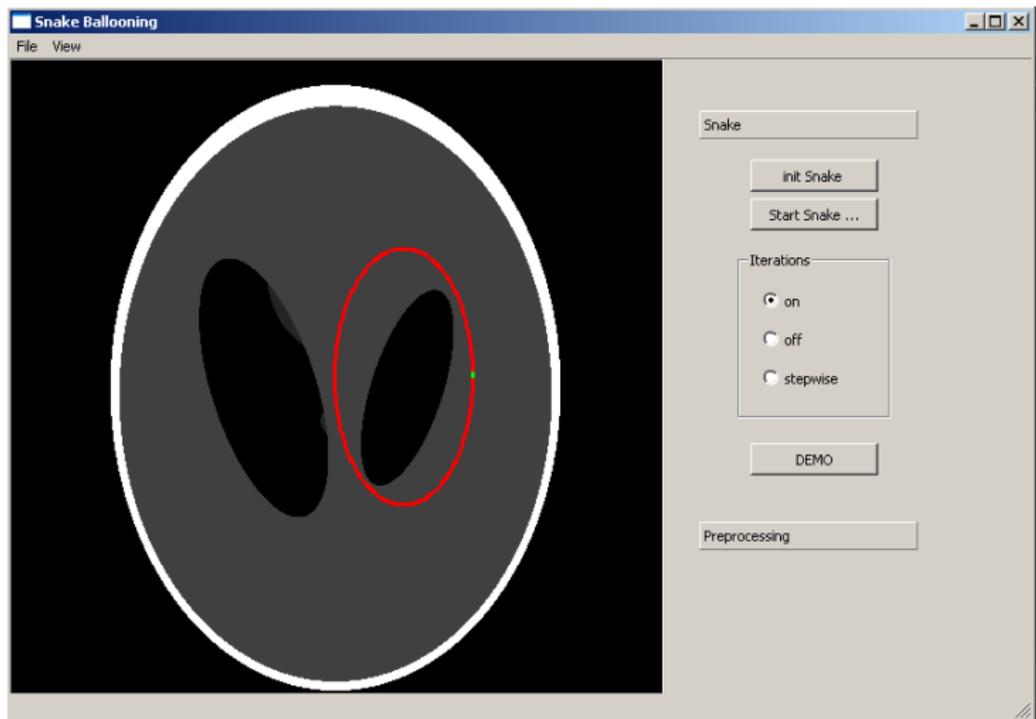
# Implementation



## Used Frameworks

- Image Processing: **Intel OpenCV library**  
<http://sourceforge.net/projects/opencvlibrary/>
- GUI: **Qt 4.1.4**  
<http://www.trolltech.com/>
- Source Code Documentation: **Doxygen**  
<http://www.stack.nl/~dimitri/doxygen/>

# Demo



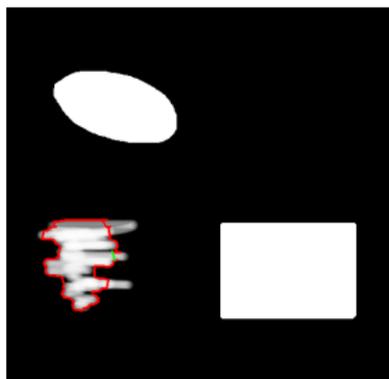
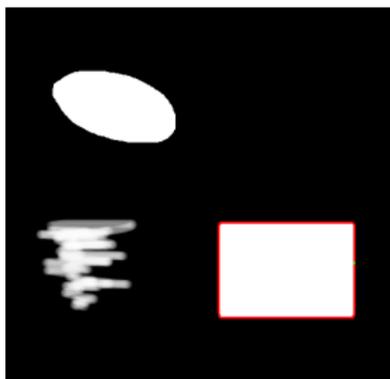
# Algorithm

- Iterative Algorithm
- Neighborhood of each point is examined at each iteration
- Energy calculation for the neighborhood
- New location is determined by the minimized energy point
- Only closed contours are considered

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# Results



# Outlook

- More constraints could be added to obtain better results
- Preprocessing steps could be implemented
- 3D Object Segmentation
- Possibility to change parameters in the gui for different situations
- Gradient Vector Flow (instead of Greedy Algorithm)
- Switch from Snake to Balloons to cover concave structures

## Additional Information:

- SSIP2006 - Project Homepage
- <http://snake.sourceforge.net/>

Thank you very much for your attention!

