



Project 9 Final Report

USIMAGTool:

UltraSound IMAGing Software



Aug. 10 2007

hosted by *Boğaziçi University*, *Multimedia Group*

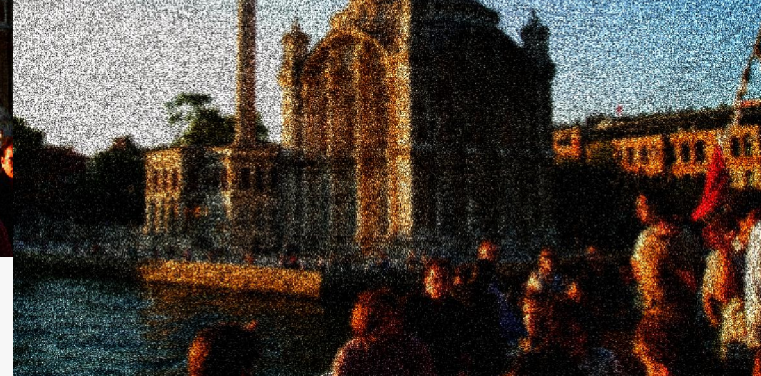
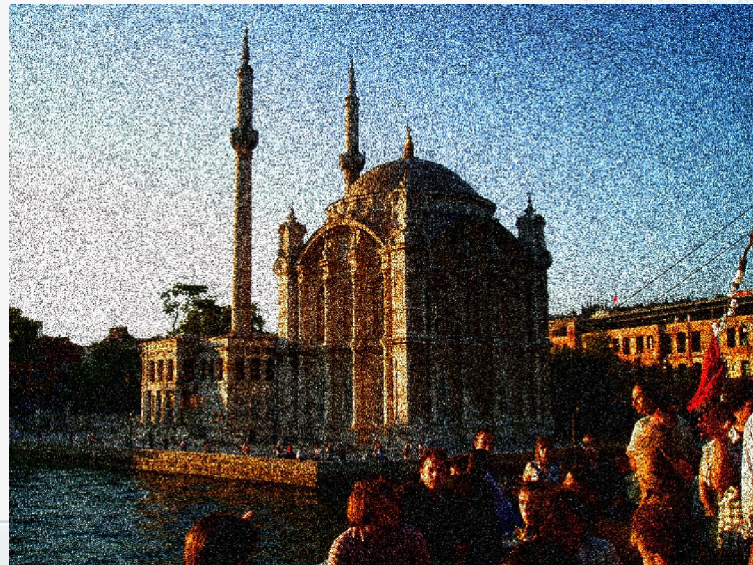
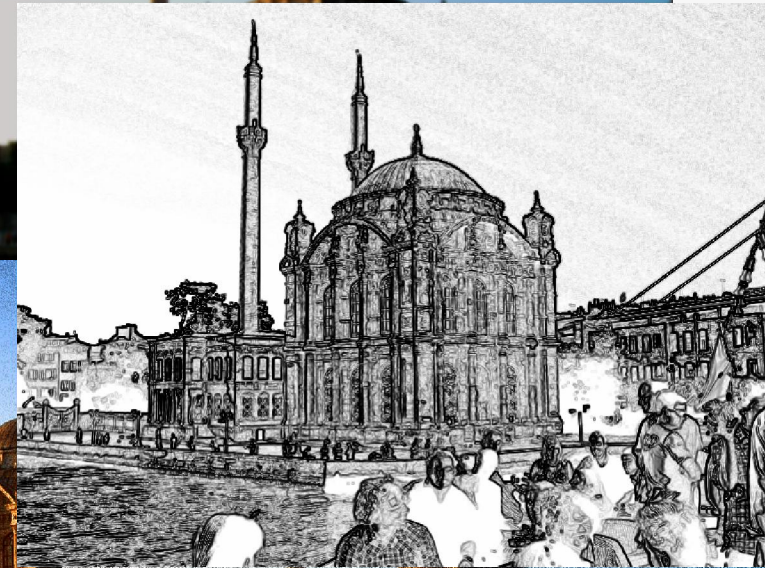
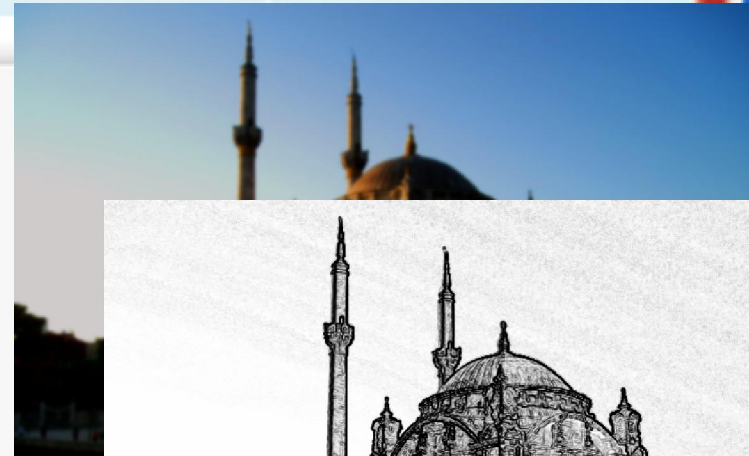
Initial Motivation

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Initial Motivation



Motivation

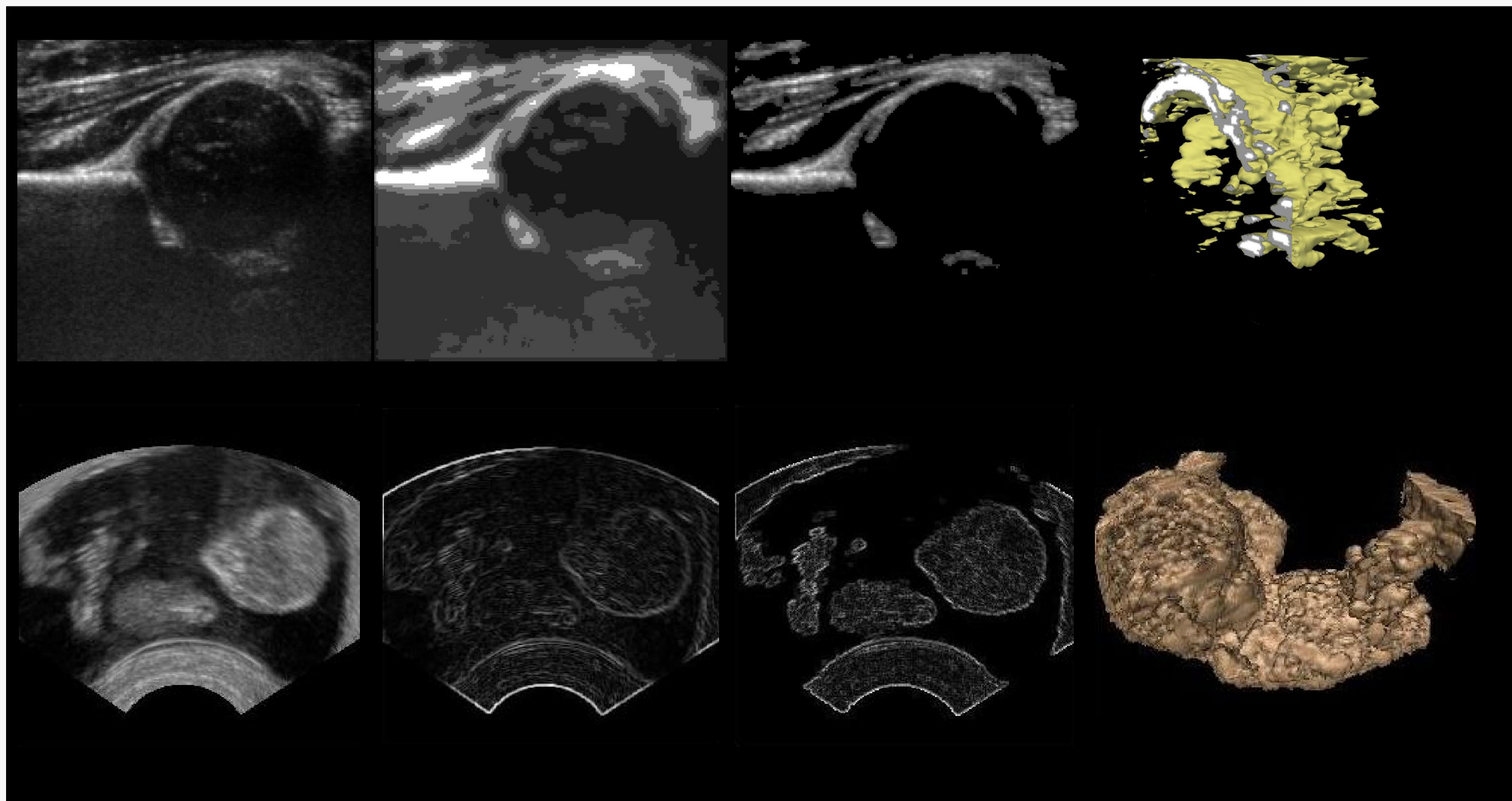


- § Interfaces for image processing:
 - ú Gimp, Photoshop...
- § Graphical user interfaces for medical image processing:
 - ú Medical Studio, Slicer, Julius, Amira, Analyze, ...
- § We need a specific tool for:
 - ú Ultrasound
 - ú Elastography
- § Reusable for other applications (modular, open source)

Ultrasound Imaging

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Objectives

§ Interface design and development for medical image analysis

- ú Elastography and Ultrasound
- ú Other modalities (MRI, CT, X-rays)

§ Features

- ú Open source
- ú Multi-platform
- ú Efficient (Based on Object Oriented language)
- ú User friendly
- ú Modular and flexible (easy to modify by developers)
- ú Integrate in the same framework algorithms for US and Elastography signal processing

Tools



§ ITK (Insight ToolKit)

- ú Image processing

§ VTK (Visualization ToolKit)

- ú Visualization

§ Fltk (Fast Light ToolKit)

- ú GUI

§ Fluid

- ú Graphic Editor To Design GUIs

Main Contributions

1. USIMAGTool and Usability:
 - § GUI
 - § Wizards
2. New capabilities: Segmentation, filtering, new algorithms...
3. Elastography: new techniques
4. Multimodal interfaces: Wiimote

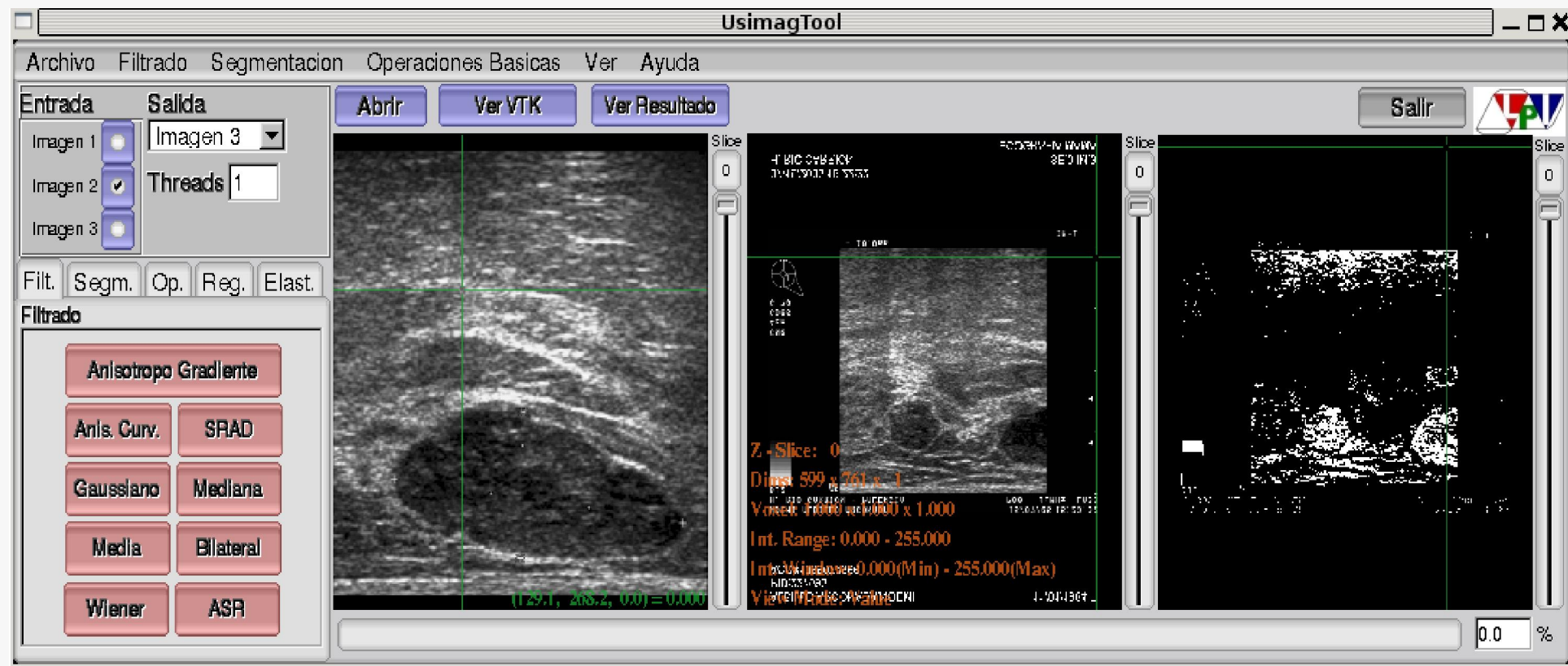
USIMAGTool and Usability (Usimagbility?)

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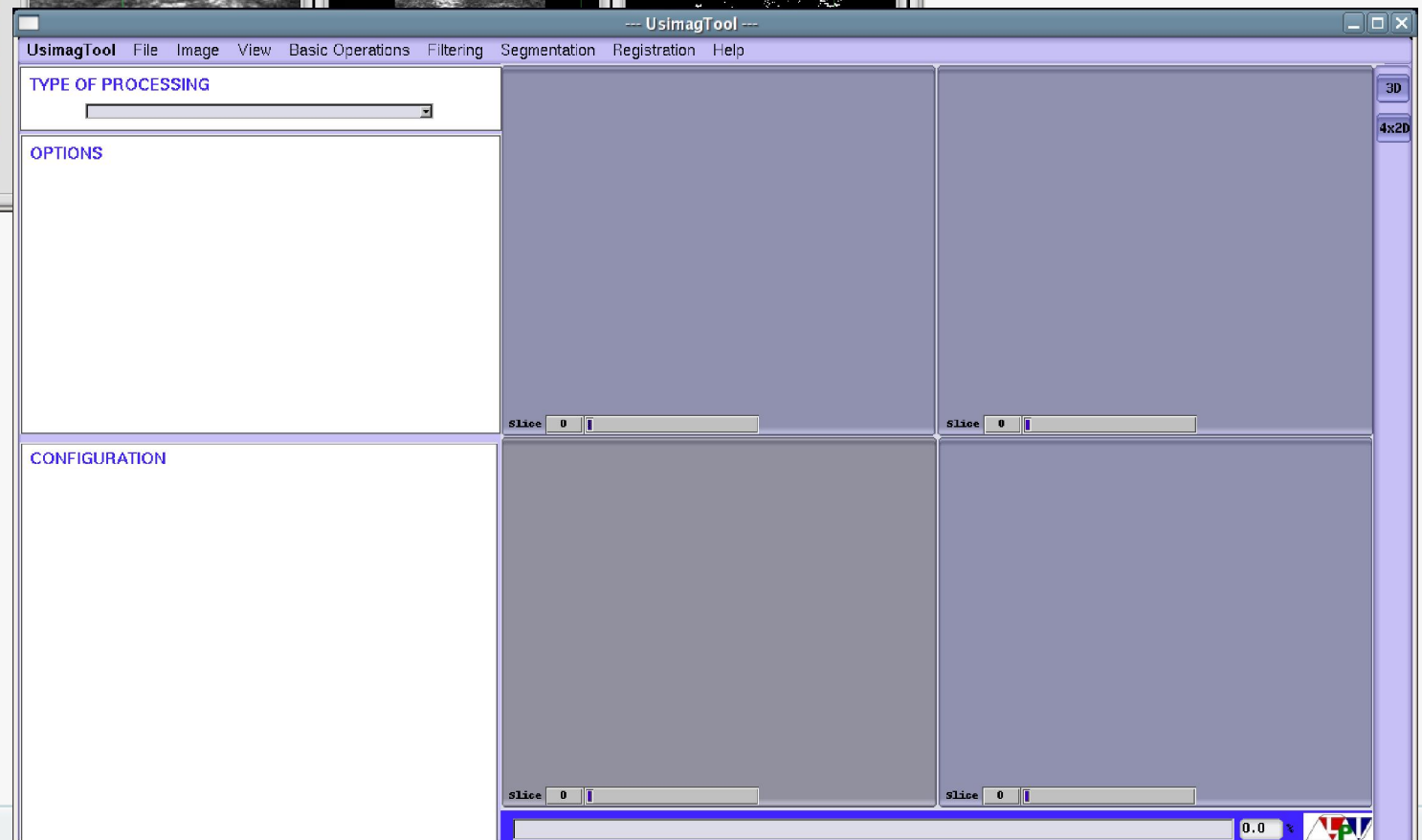
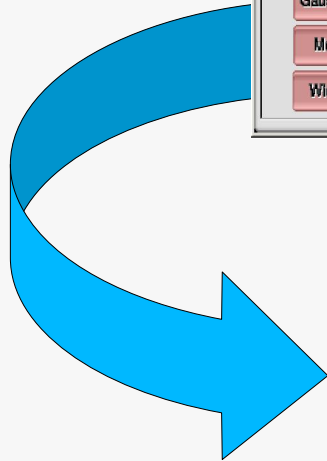
§ Old GUI

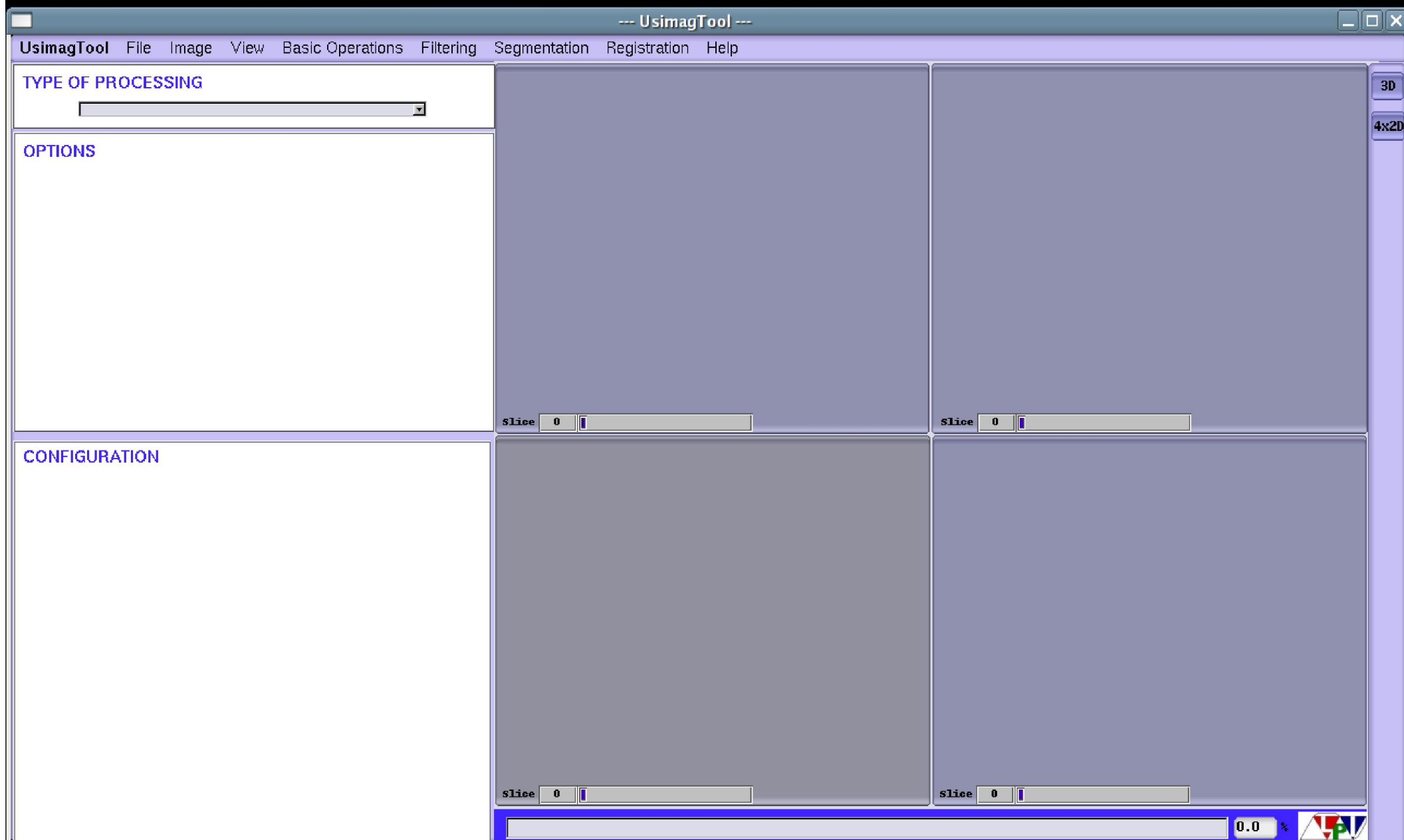


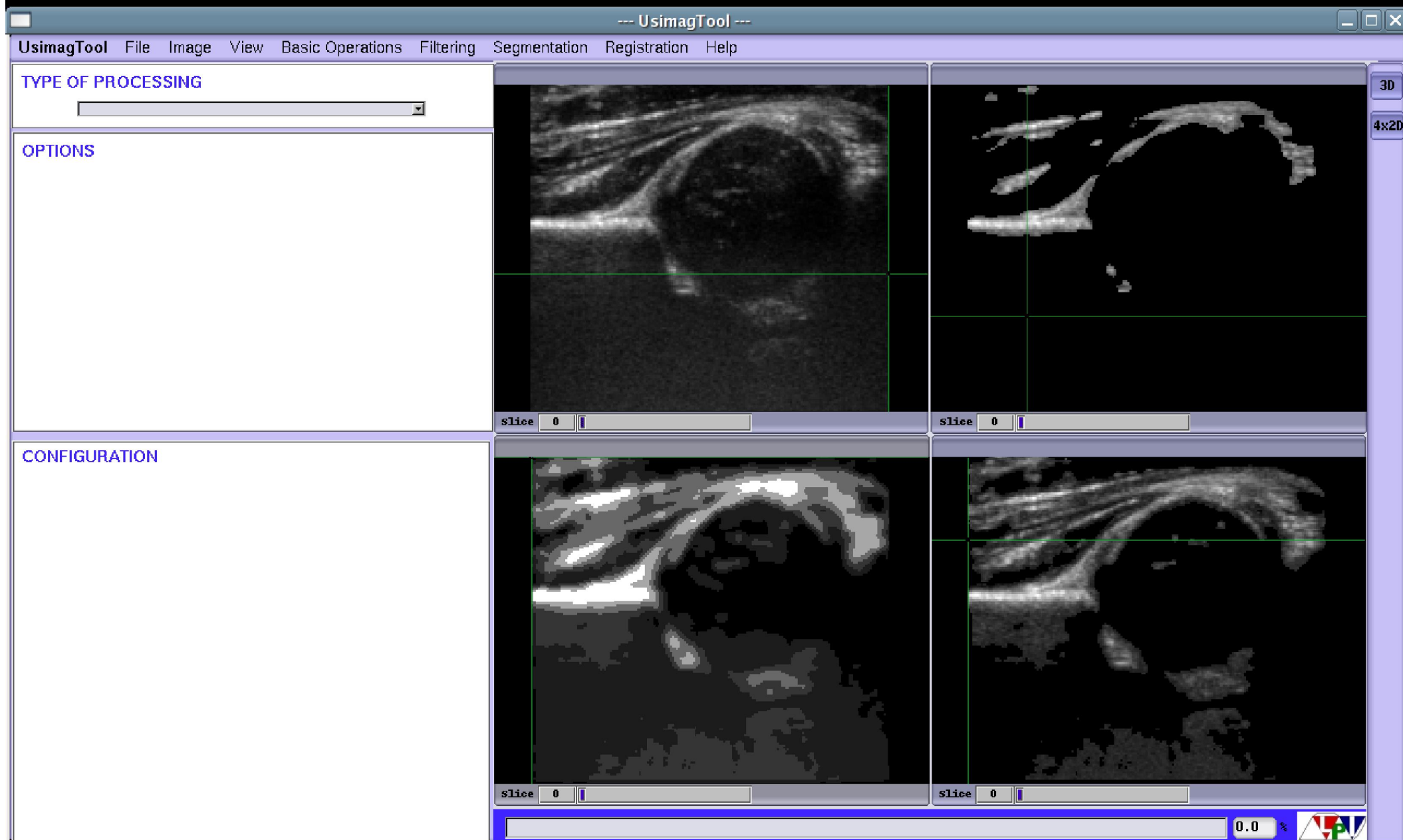
New GUI

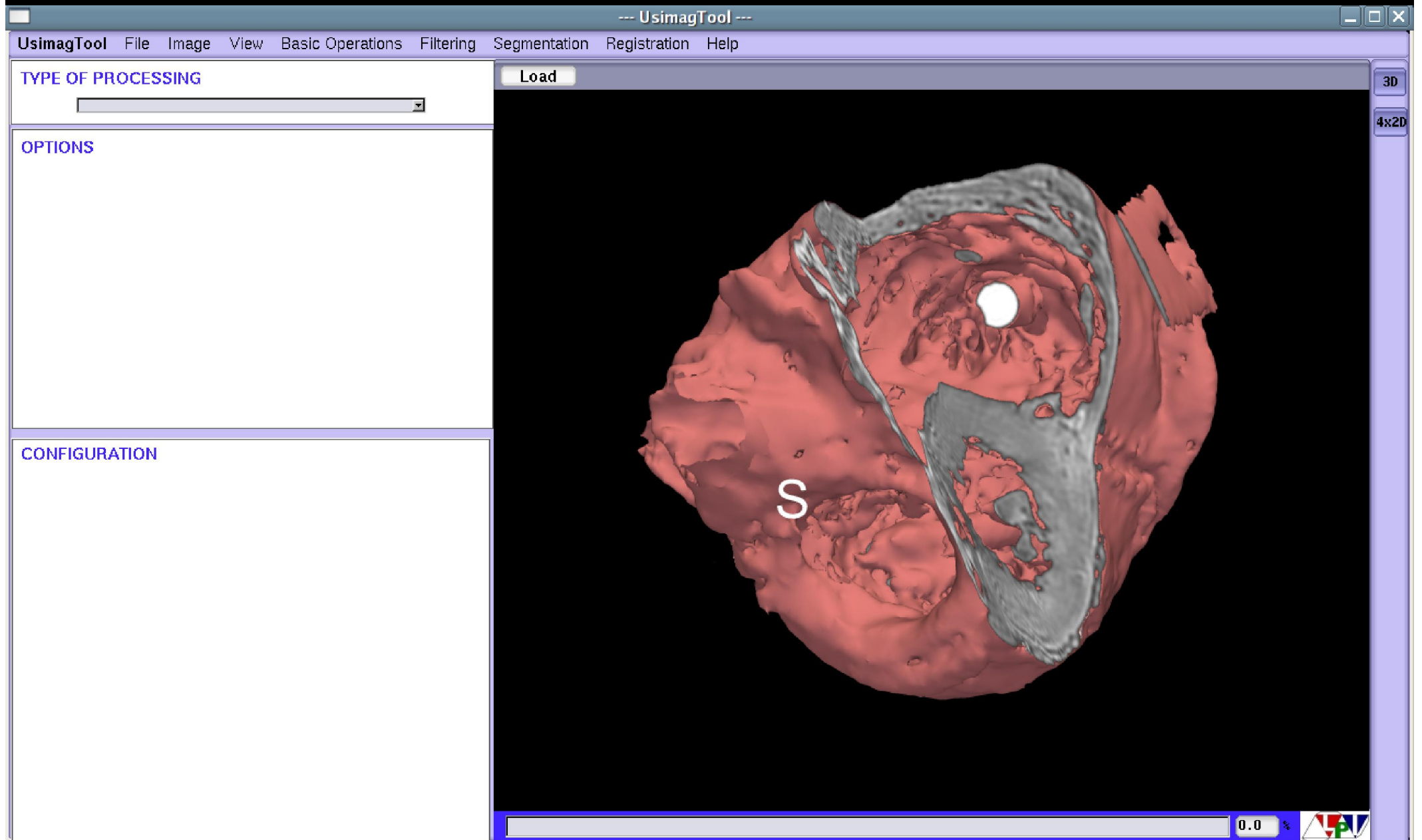
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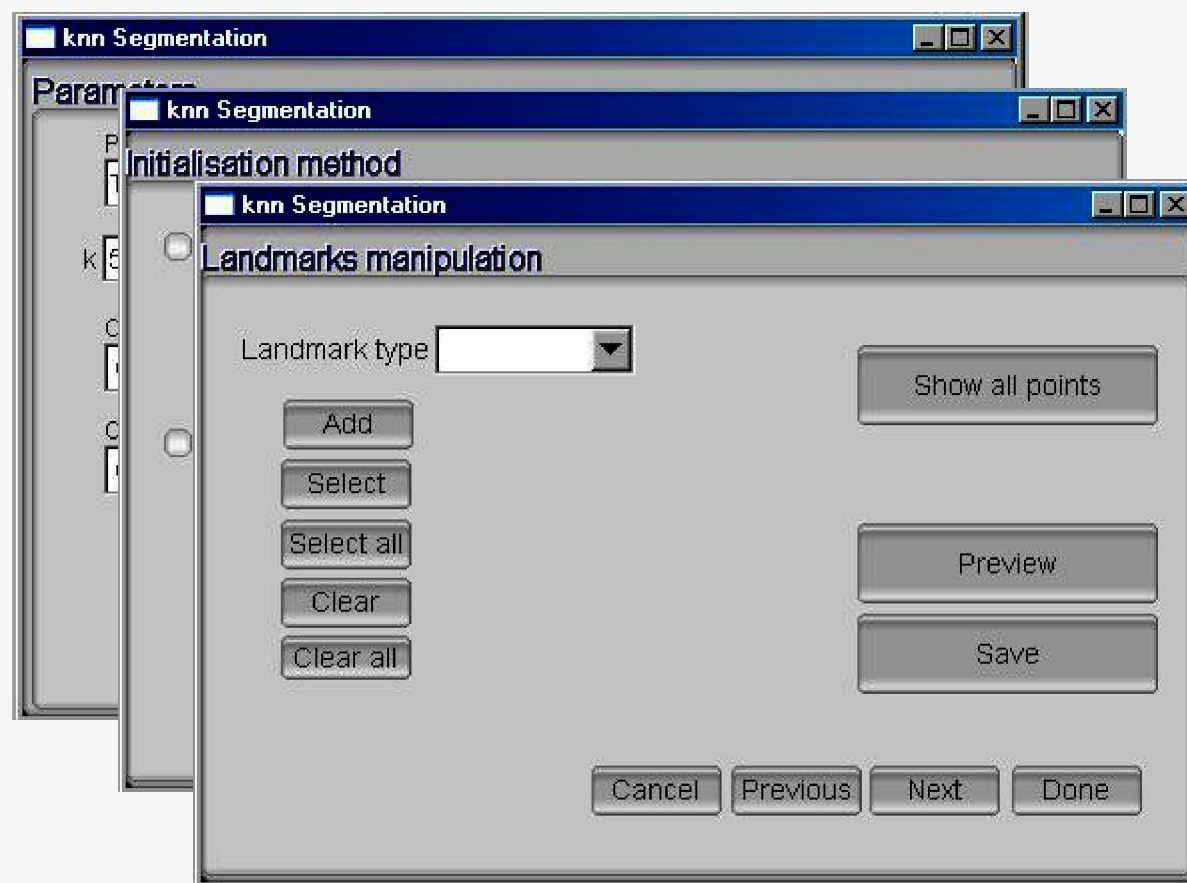


Wizards

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§ kNN segmentation Tool



WorkPackages

§ Basic Operations

§ Segmentation

- kNN
- US kidney segmentation

§ Registration for Elastography

- Demons (new implementation)

§ Filtering:

- Mean, median, Gaussian...
- SRAD, DPAD, Wiener with BIAS correction...

Elastography

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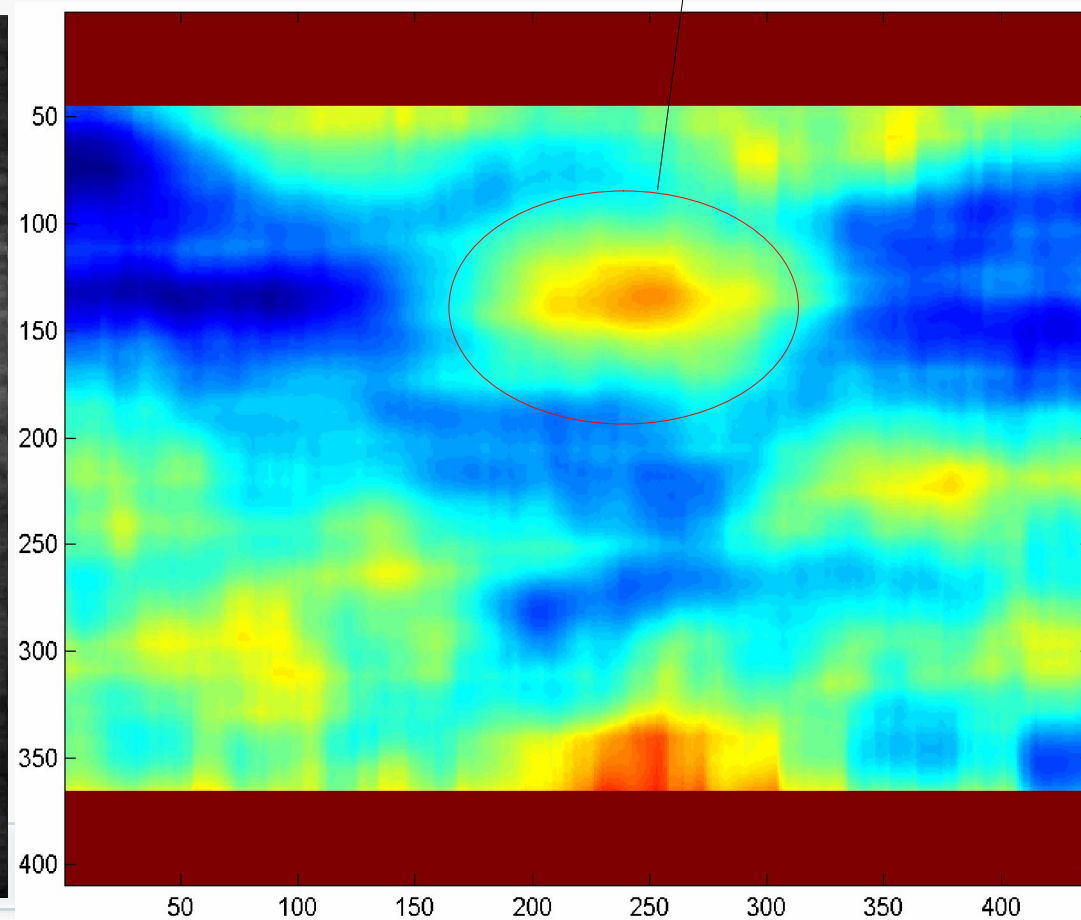
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Corresponding elastogram for Demons

Input US B-mode Image
Pos

Stiffer Inclusion Detected!!!



Elastography

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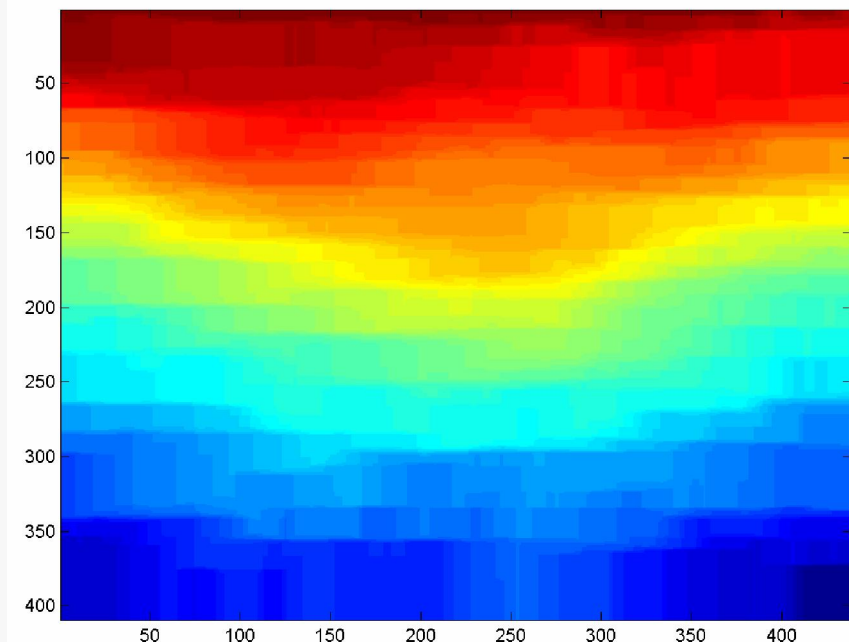
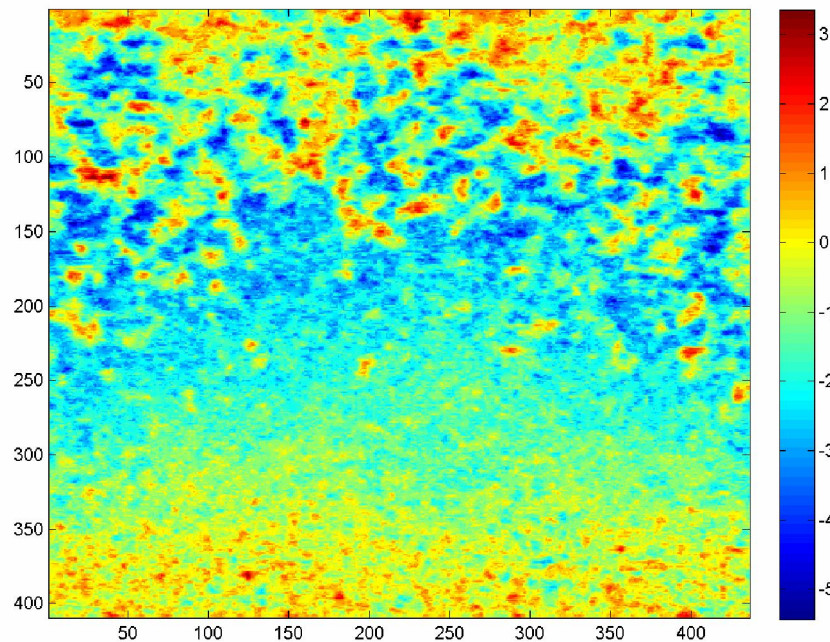
New Displacement Estimation through
Registration

DEMONS

NOW!!!!

big result for Elastography

BEFORE



Now working on integration into Usimag Tool

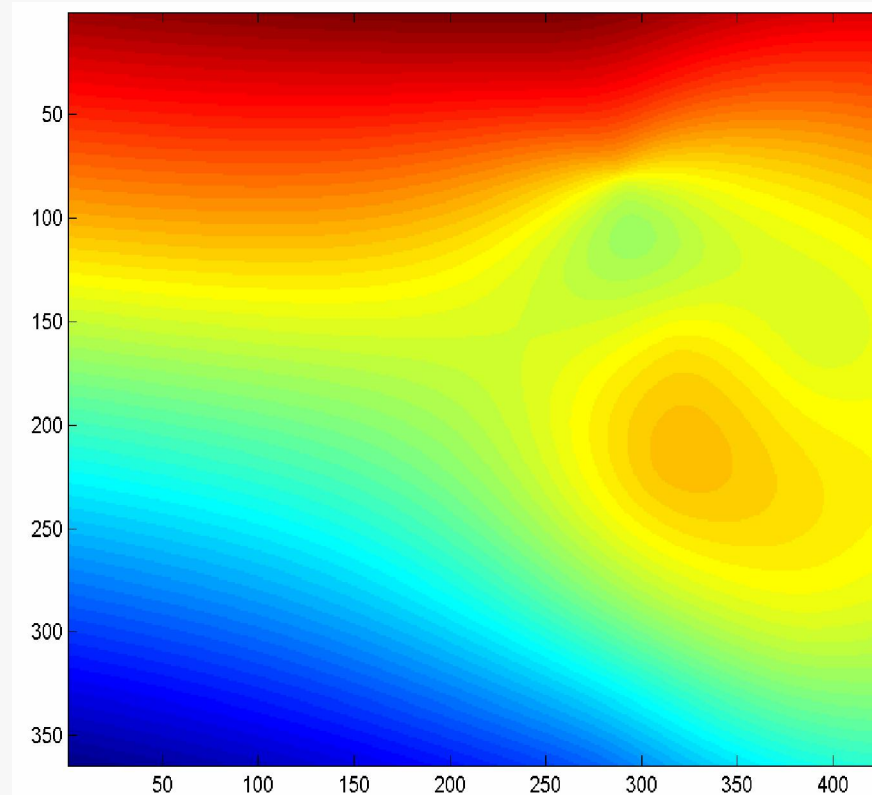
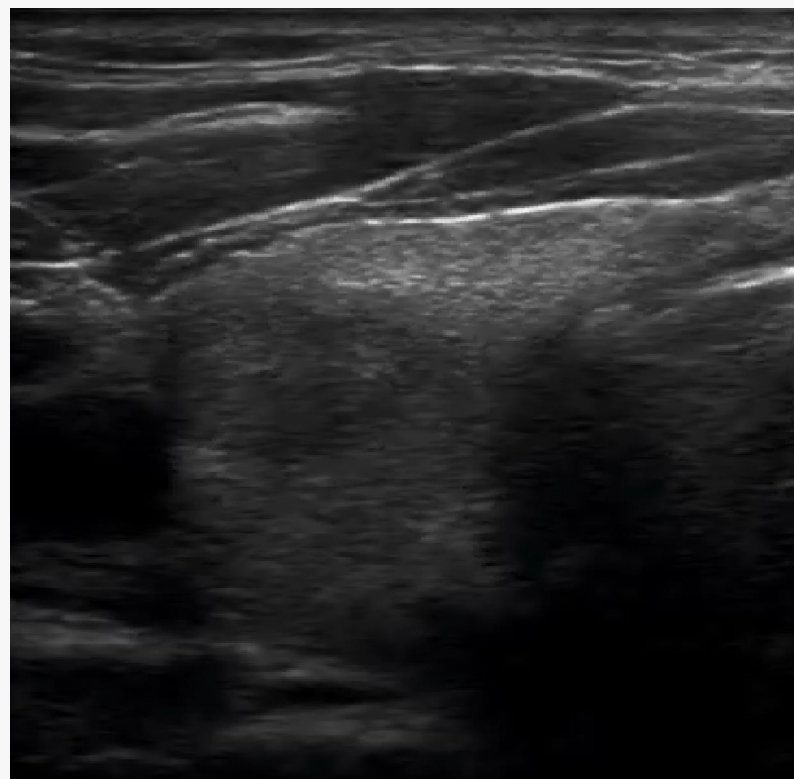
Elastography

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TPS – *ongoing adjustment with new Usimag Tools for landmarks*



B Spline – ahead
timeline

Optical Flow – postponed due to MULTIMODALITY
stuff

Multimodal interfaces

§ Preliminary Wiimote integration

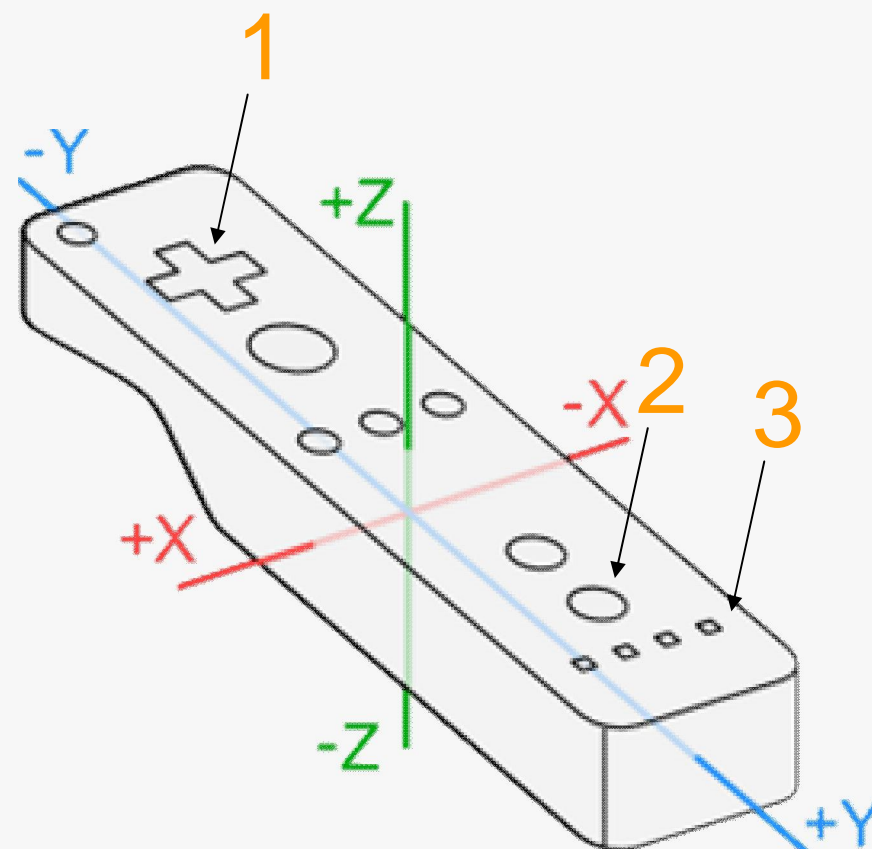
- ú *Wiimote* is a wireless input device. It has a 3-axis accelerometer and 11 buttons.
- ú Customized *Wiiuse* library (www.wiiuse.net)
- ú Written in C. Ment to be portable between Linux and Windows.
- ú Capable of capturing button press events, motion sensing, and will include support for IR pointing.



Navigation on volumes

ú Intended use:

- 1 • Tilt angles (**roll & pitch**) and **keypad** to control 3D cursor navigation and zoom level, respectively.
- 2 • **Buttons** can replace keyboard.
- 3 • **LEDs** might show different user modes.
- It can “**rumble**” and **beep** on errors.



Looking to the future...

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USIMAGTool Release Edition



LOONEY TUNES

"That's all Folks!"

A WARNER BROS. CARTOON

DIRECTOR OF DESIGN: FRANK TUNNEY
MUSIC BY: WARNER BROS. MUSIC DEPARTMENT
ALL RIGHTS AND CHARACTERS RESERVED BY WARNER BROS.