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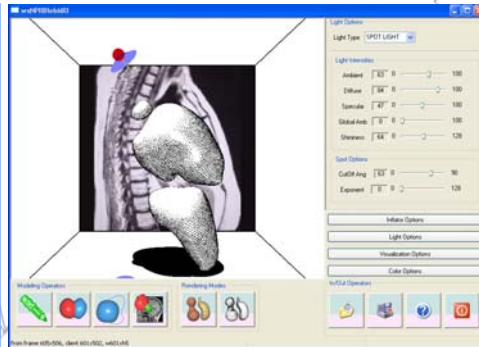
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The **MIBlob** application is designed to support the visualization of medical images (X-rays, MRI). The aim of the system is to provide a simple interface to allow manual 3D reconstruction from the 2D data presented in the image in order to help users to explain concepts to clinical staff such as medical students or even other doctor colleagues. Our system aims not to be an automatic tool but rather provides interactive assistance. Modelling tasks are accessible through a calligraphic interface without requiring specific design or modeler skills since shapes are inflated from freehand contours.



Interface functionalities:

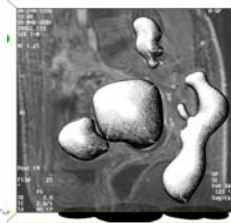
- Load Medical Images (MRI);
- Creates 3D shapes from 2D freehand contour;
- Edit Shape by Oversketching;
- Merge 3D blobs;
- Translate and Rotate Blobs;
- Snap Blobs to image plane;
- Lighting Controls;
- Visualization Control: use colors + illustration look and feel;
- Import / Export 3D meshes.



MIBlob used as support for MRI explanation

Calligraphic Interface:

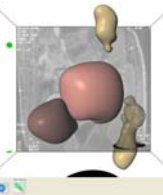
- Direct Manipulation instead of Mouse/Keyboard interaction
 - Interaction based on sketching input
 - Takes advantage of TabletPC computers
- Advantages:
- Mobility
 - Support communication
 - Interaction by sketches



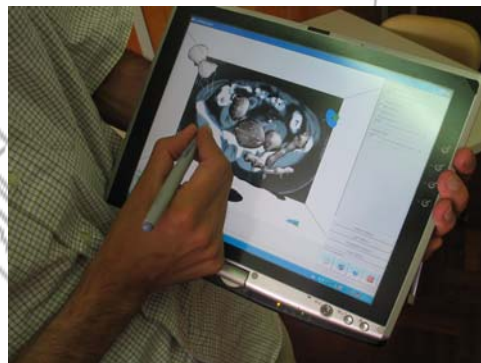
Non Photo-Realistic Rendering

Advanced Visualization:

- Non-PhotoRealistic Rendering mimics traditional illustration techniques
 - Color rendering based on Gouraud Shading
- Advantages:
- Colors help to understand the meaning of the shape
 - Illustration techniques avoid visual garbage from the photo-realistic approach
 - Highlight shape features
 - Similar to medical illustration



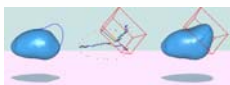
Color rendering of inflated shapes



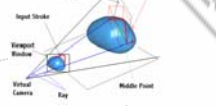
MIBlob application on a TabletPC computer

3D modelling abilities :

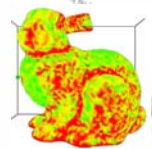
- Simple operators following paper-pencil metaphor
- Do not require modelling knowledge such as traditional CAD systems
- Create shapes based on 2D contour
- Simple editing of shapes by redefining blob contours
- Create complex shapes merging blobs



Blob oversketch to redefine silhouette



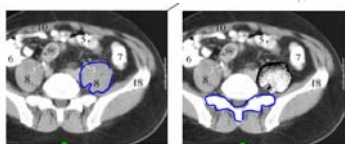
Camera projection used for inflation



Curvature used for polygonization



Adaptive polygonization



Inflation of several blobs based on sketches



Polygonization with several resolutions

Curvature Dependent Polygonization of Implicit Surfaces, Bruno de Araujo e Joaquim A. Jorge, accepted at the VII Brazilian Symposium on Computer Graphics and Image Processing (SIACG/SIBGRAPI 2004), Curitiba, Brazil, Oct 2004

Based on Implicit Surface representation:

- Represent complex and smooth shapes
- Compact, Continuous representation as opposed to polygonal meshes
- Allows smooth modelling operators
- Integrates advanced polygonization algorithm based on curvature measure

Bibliography:
 DE ARAUJO, B., AND JORGE, J. 2003. Blobmaker: Free-form modeling with variational implicit surfaces. In *Proc. of 12 EPCG*, 335-342. <http://virtual.inesc-id.pt/12epcg/papers/03.html>
 SOUSA, M., SAMAVATI, F., AND BRUNN, M. 2004. Depicting shape features with directional strokes and spotlighting. In *Proc. of Computer Graphics International '04*, (to appear). <http://www.cpsc.ucalgary.ca/mario/CGI04/Sousa-ID53-final.pdf>.

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