Optimization and Evaluation of the Usability of a Touch-Enabled Semi-Automated Hepatic Lesion Segmentation System

Master‘s thesis introductory talk

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Outline

- Motivation
- Hepatic Lesion Segmentation System
- Usability Improvement
- Usability Evaluation

Motivation

Usability Definition

Usability is the extent to which a product can be used by specified users to achieve specified goals with efficiency, effectiveness and satisfaction, in a specified context of use.

ISO/IEC 9241 standard

Hepatic Lesion Segmentation System

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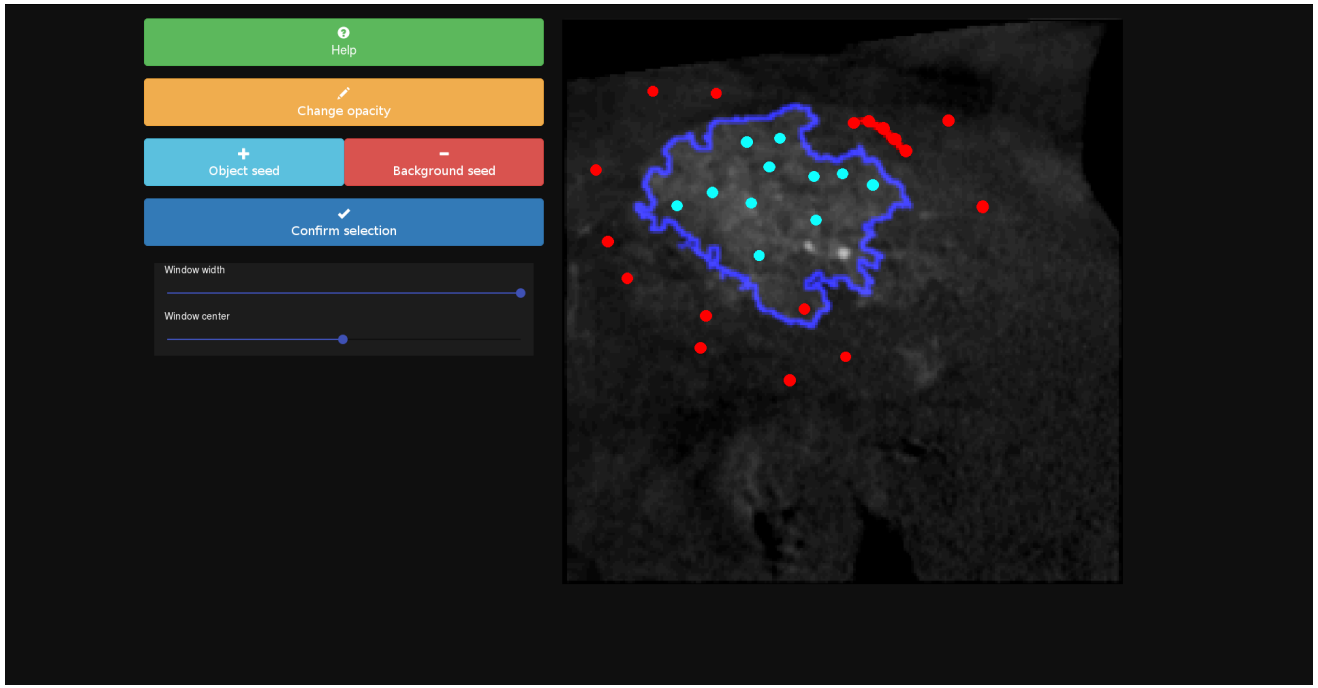
Usability Context of the System

Usability is the extent to which a product can be used by specified users to achieve specified goals with efficiency, effectiveness and satisfaction, in a specified context of use. **ISO/IEC 9241 standard**

Hepatic Lesion Segmentation System		Surgeon, Physician
Manual or Semi-automatic Segmentation		Interventional Environment

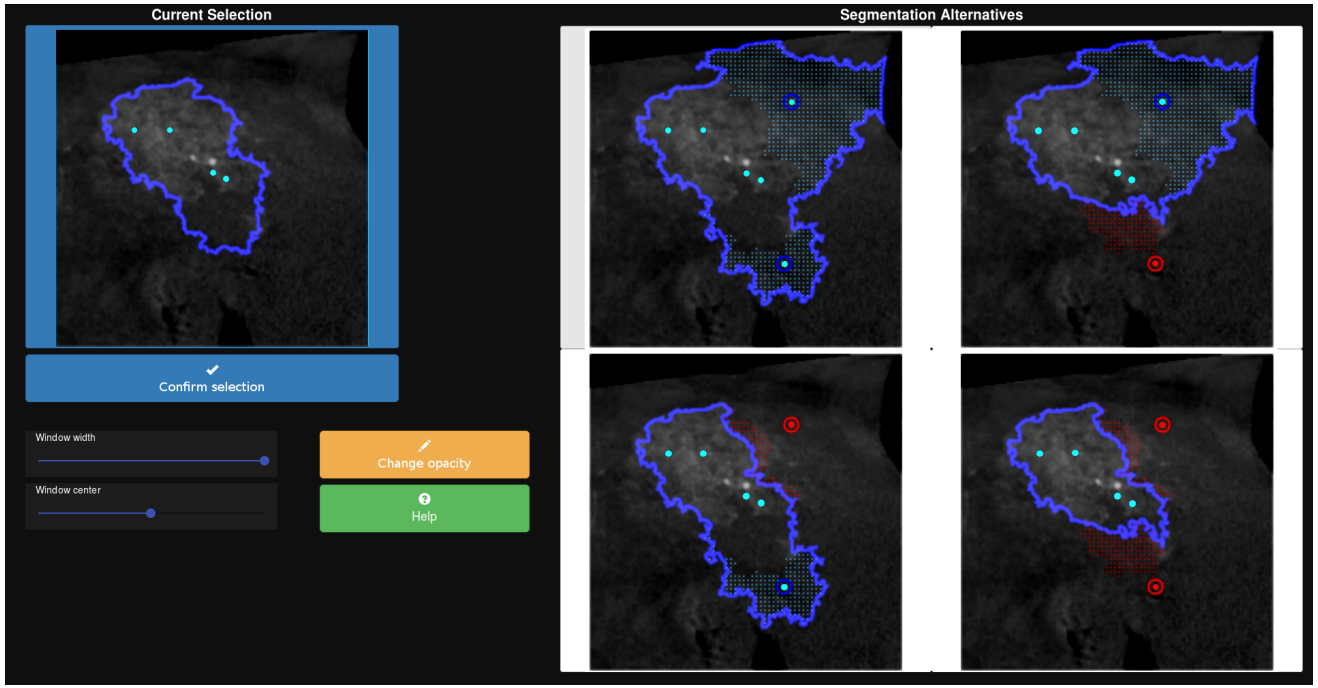
Iterative and Interactive Manual Segmentation

- user places seed points by hand
- segmentation computed after each interaction



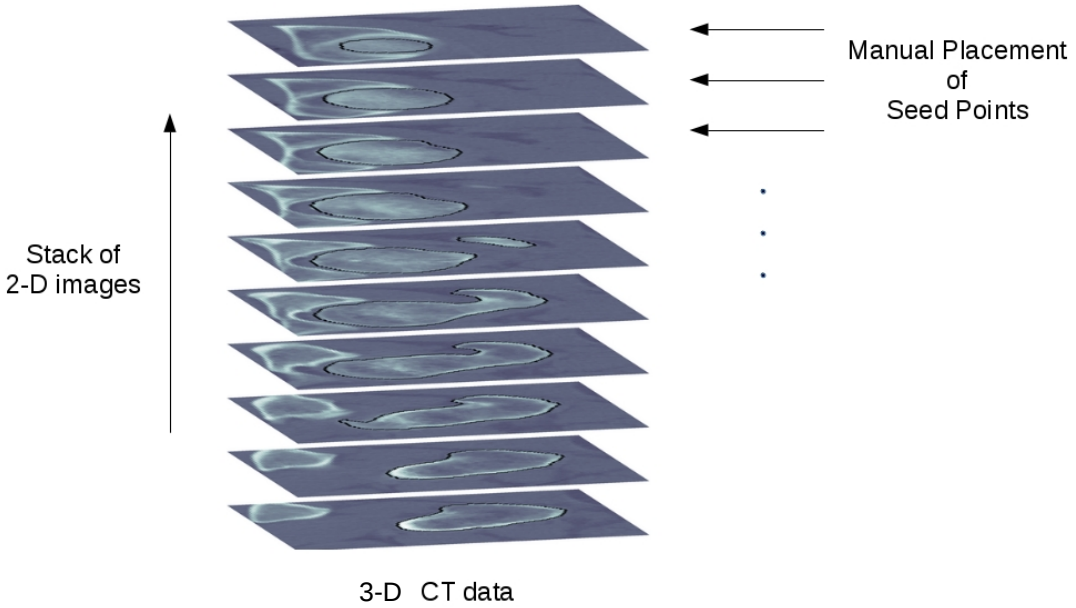
Iterative and Interactive Semi-automatic Segmentation

- automatic seed point generation
- user chooses between four segmentation alternatives



Manual vs. Semi-automatic Segmentation

- in 2-D: same efficiency and quality of the resulting segmentation
- in 3-D: manual segmentation becomes inefficient, due to manual placement of seed points in each slice of the CT data set



Usability Improvements

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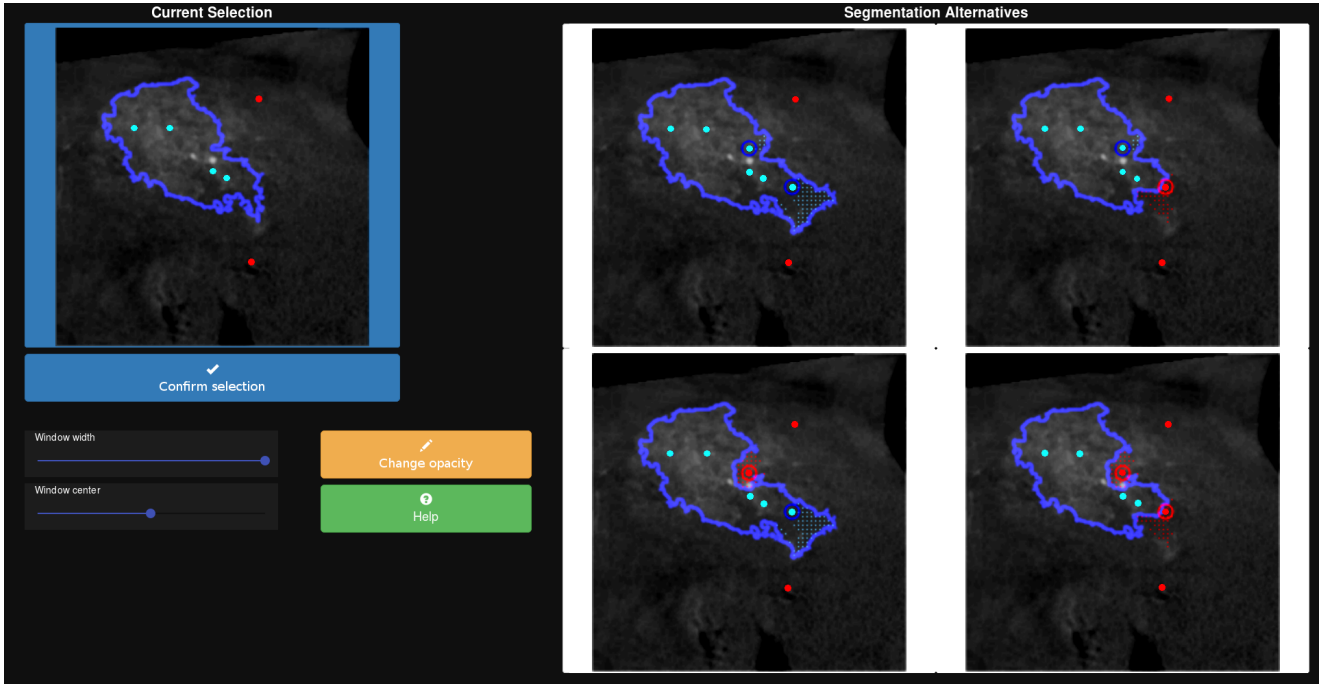
Iterative and Interactive Semi-automatic Segmentation

- alternative futures show same data with different segmentations
- optimization of display space usage necessary



Usability Improvement Challenges

- ideal usage of display space, arrangement of content
- integration of further touch gestures
- prevention from unintended user action and easy reversal of actions
- more intuitive representation of content

Usability Evaluation

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Usability Evaluation Methods

usability inspection

user interface design evaluation with respect to established standards

usability testing

representative number of end users perform set of tasks [2]

Thank you!

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References

[1] R. Inostroza, C. Rusu, S. Roncagliolo, C. Jimenez and V. Rusu, "Usability Heuristics for Touchscreen-based Mobile Devices", *Information Technology: New Generations (ITNG), 2012 9th International Conference on*, Las Vegas, NV, 2012, pp. 662-667.

[2] F. Paz and J. A. Pow-Sang, "Current Trends in Usability Evaluation Methods: A Systematic Review", *Advanced Software Engineering and Its Applications (ASEA), 2014 7th International Conference on*, Haikou, 2014, pp. 11-15.