Hochschule Flensburg
University of Applied Sciences

A new 3D Interaction Concept for Radiological Image Analysis

Touch, Tilt and Turn

Colin Drude, Dennis Jordan, Fabian Müller, Michael Teistler

Motivation

- mouse based 2D input not effective for navigation through 3D image data

We present

- new input solution: mouse approach + three degrees of freedom for rotation of MPR plane
- tablet and pen with motion sensors
- examination of datasets with pen and tablet, while oblique MPRs are displayed on a computer screen

Methods

- Orientation and position of the pen control the sectional plane.
- There are two different modes:
  1. T_abs controls absolutely
  2. T_rel controls relatively
- option of rotating the image volume to three pre-set orientations

Evaluation

- 18 laypersons, three different tasks in each interaction mode + mouse
- User Experience Questionnaires (UEQ) for each interaction method
- three simplified radiological tasks to avoid necessity of medical knowledge:
  1. Align spheres on sectional plane
  2. Identify the correct number of ellipsoids
  3. Identify distinct objects

Results & Discussion

- Mouse appreciated for best accuracy
- Absolute mode described as intuitive and most effective
- Relative mode deemed too complex, could be most effective with training
- No significant difference compared to mouse in time and failure rate
- UEQ results and interviews show: tablet modes perceived more attractive and more satisfactory

- Further iterations could surpass this prototype as accuracy and ergonomics improve
- More evaluations with experts needed

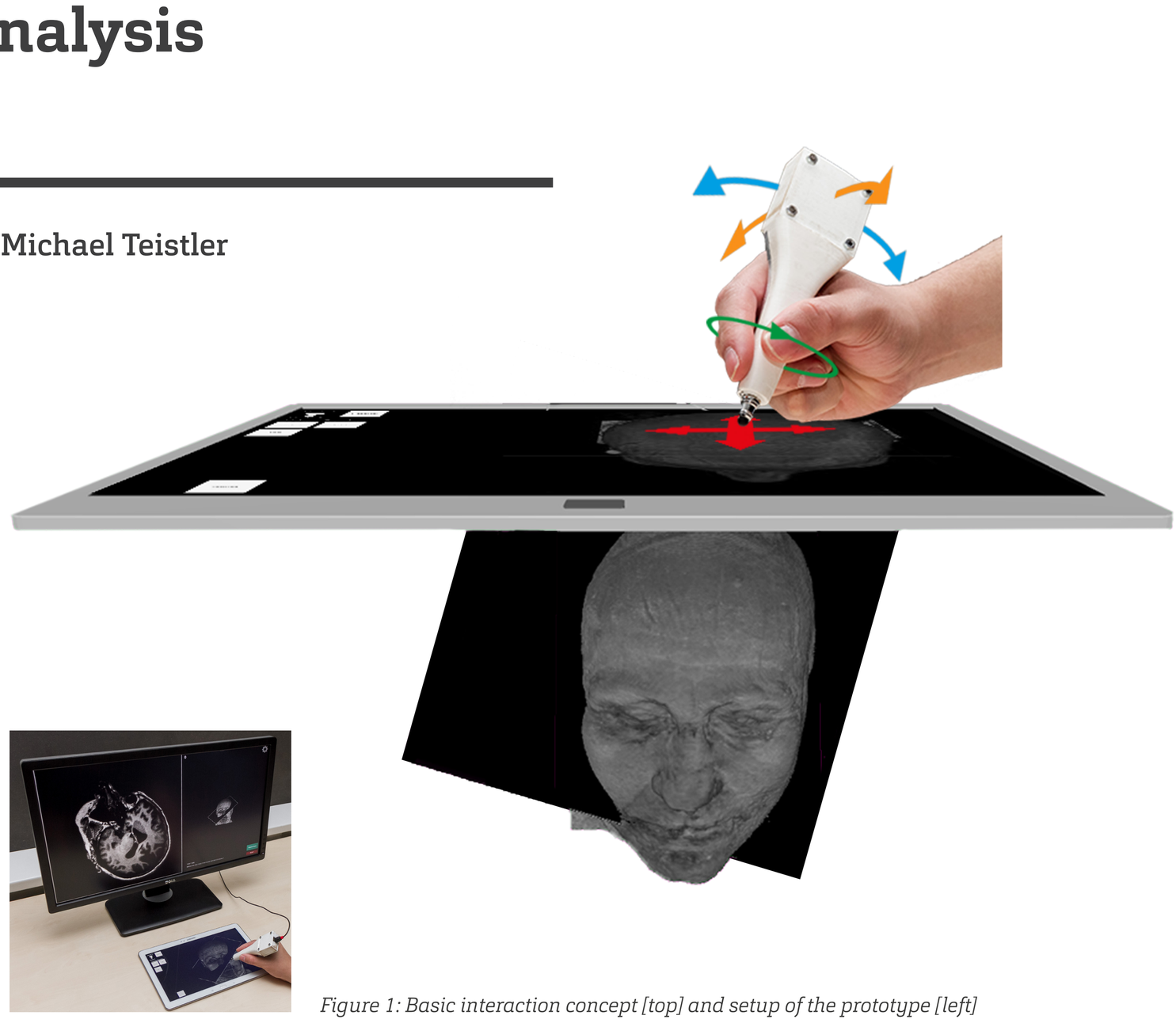

Figure 1: Basic interaction concept [top] and setup of the prototype [left]

Figures 2, 3, 4: Average time [left], error rate [right] of each task and UEQ results (Interaction method comparison of all tasks) [bottom]