GetContours: an interactive tongue surface extraction tool

available from **https://github.com/mktiede/GetContours**

Mark Tiede[1,2]
tiede@haskins.yale.edu

D. H. Whalen[2,1,3]
dwhalen@gc.cuny.edu

Overview

- **GetContours** is a multi-platform **Matlab**-based tool for obtaining tongue contours from Ultrasound data
- Integrated with **Praat**[1]: uses point or interval TextGrids to identify 'key frames' of interest
- Anchor points defining a cubic-spline are placed and positioned interactively:
  - click to place a new point; click and drag on an existing point to reposition; control-click to delete
  - export contours as frame tagged point positions in tab-delimited text format similar to **EdgeTrak**[2]
- Supports optional 'plug-in' procedures for image pre-processing (e.g. resizing or enhancement) and automated tracking (e.g. 'snake' deformable active contour models[3], optical flow methods[4])

FRAME	TIME	NOTE	POINT	X	Y
974	16.216	eine	1	281.250	318.250
974	16.216	eine	2	281.606	316.025
974	16.216	eine	3	282.034	313.832
974	16.216	eine	4	282.529	311.671
974	16.216	eine	5	283.086	309.544

Select frames within movie; optionally limit selection to Praat-derived 'key frames'

⌘A: Add or edit frame annotation ("eine")

⌘I: 'Inherit' locations of previous anchor points as starting positions in new frame

⌘R: Reposition anchor points equidistantly

⌘T: Apply automatic tracking plug-in

⌘Z: Revert from last change to anchors

⌘L: Compute image forces (Canny edge filter)

⌘G: Revert to original image

Average across multiple frames for noise reduction

Interactive histogram-based image contrast manipulation

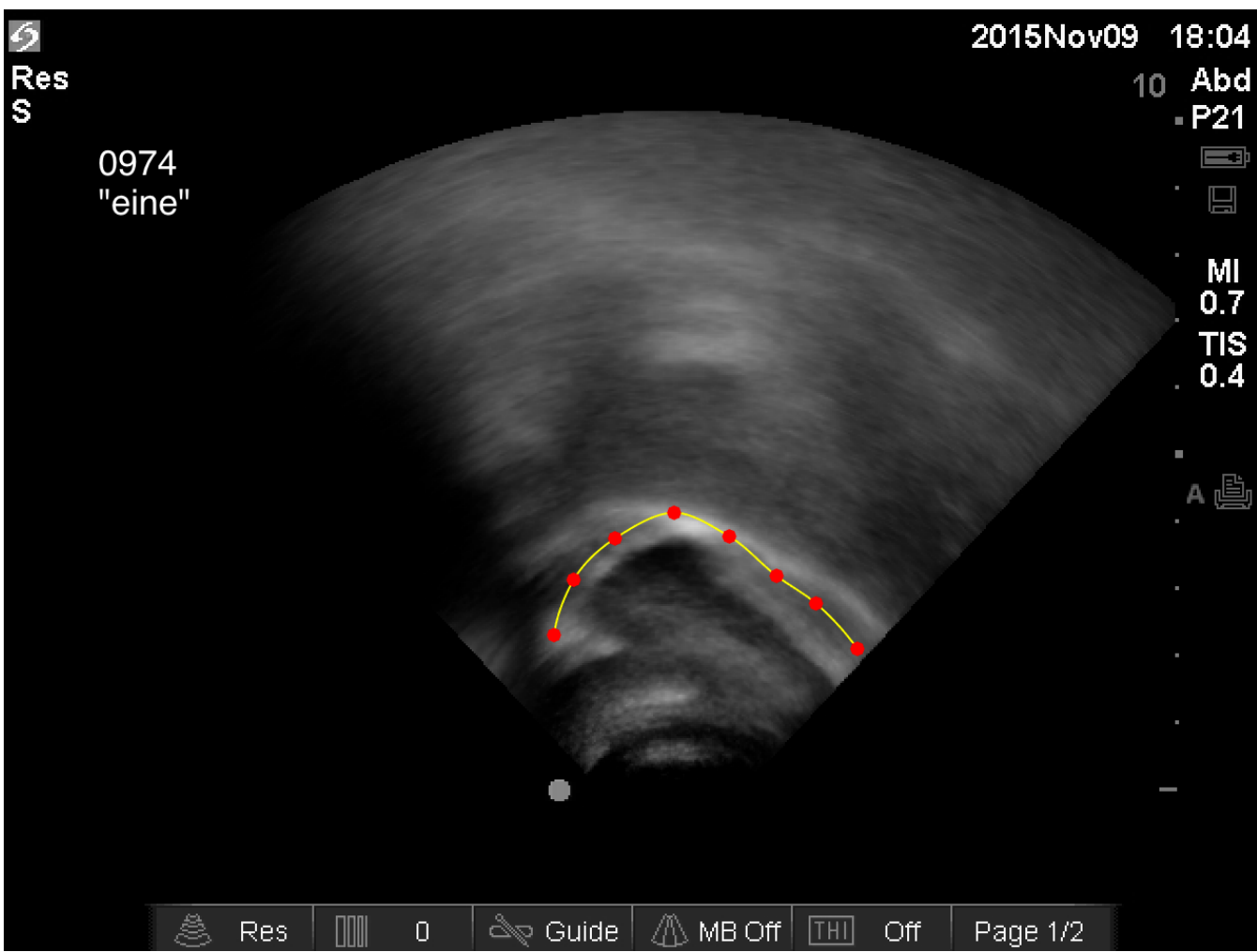Colormap and image orientation selection

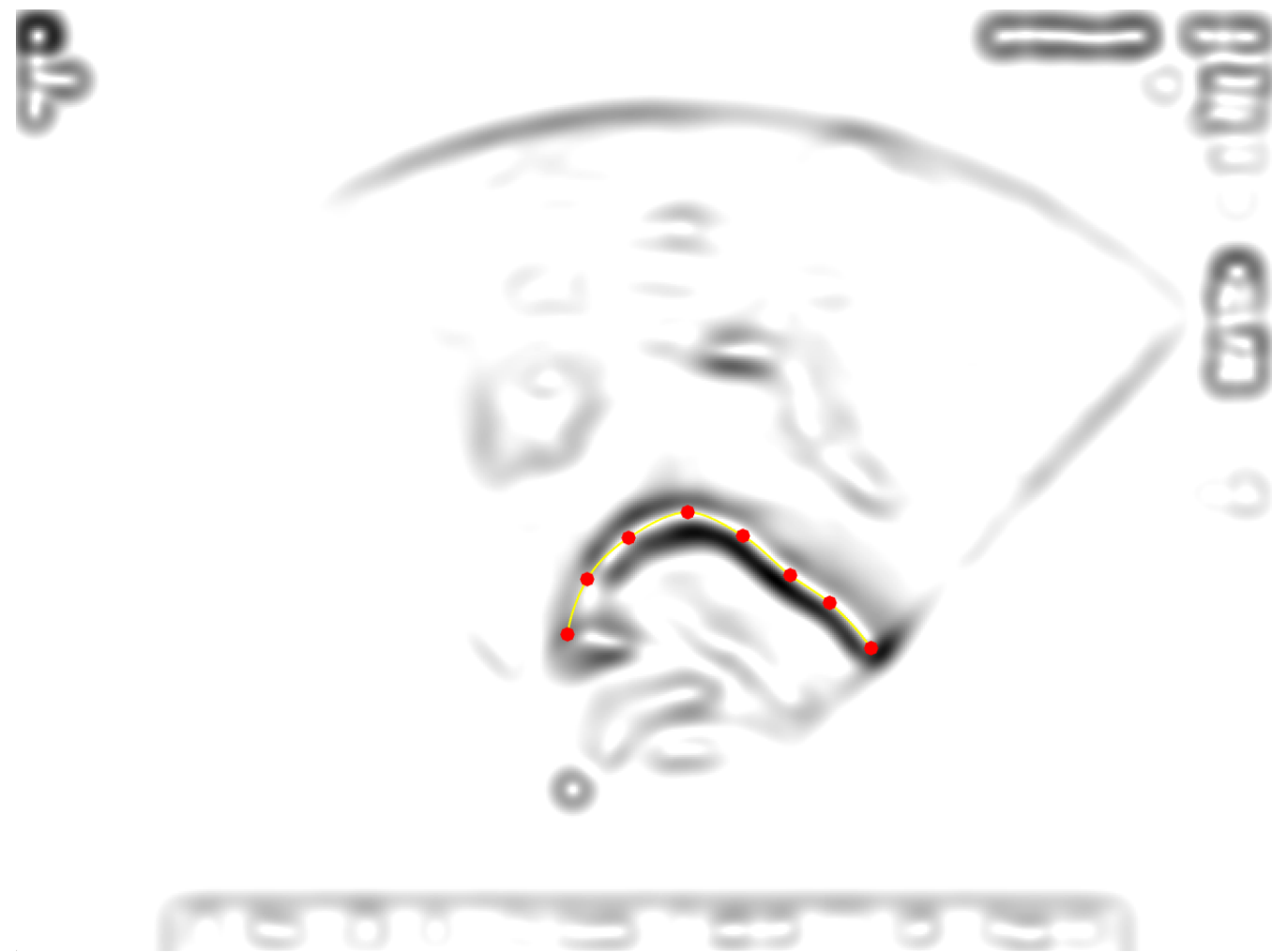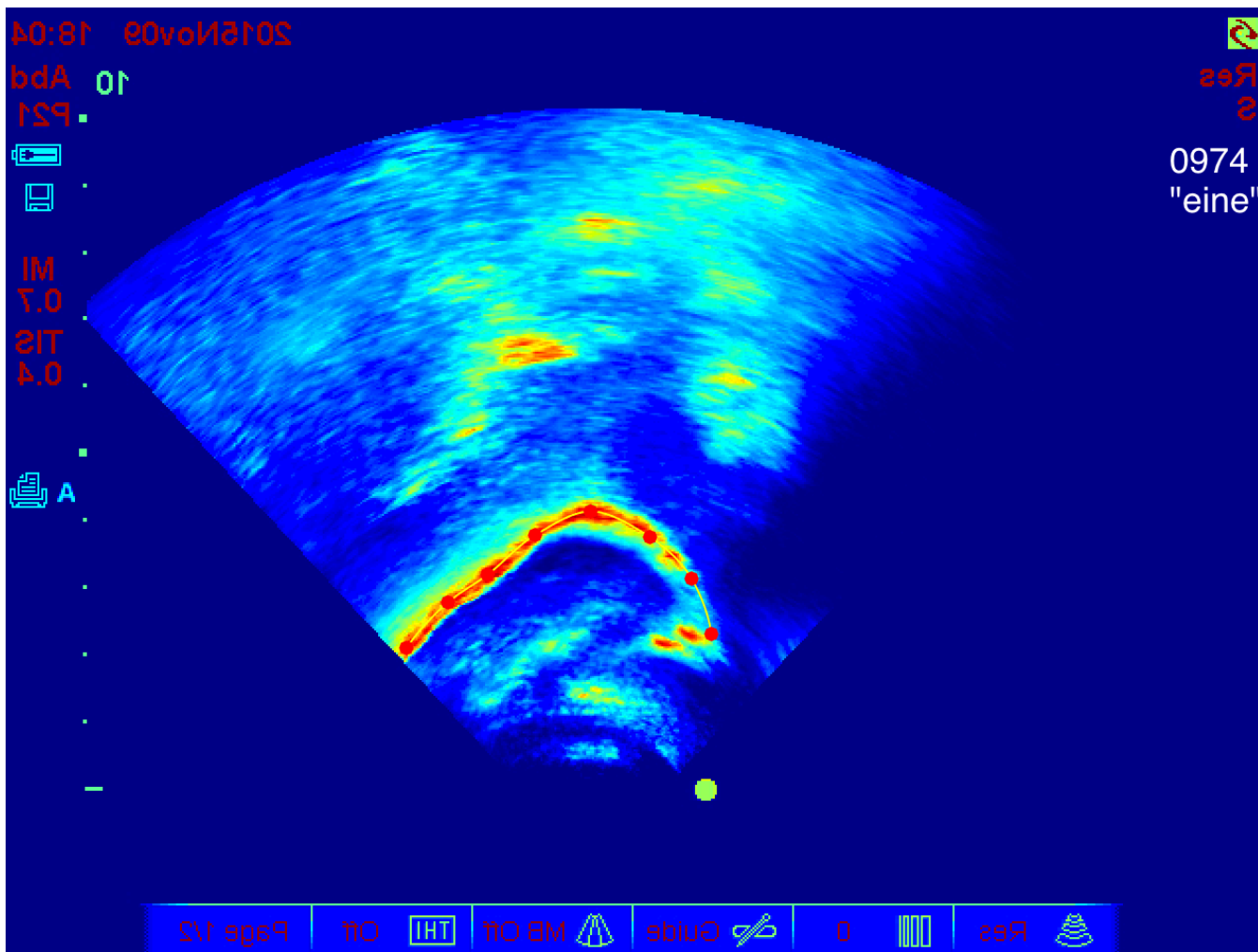## Examples of Image Manipulation
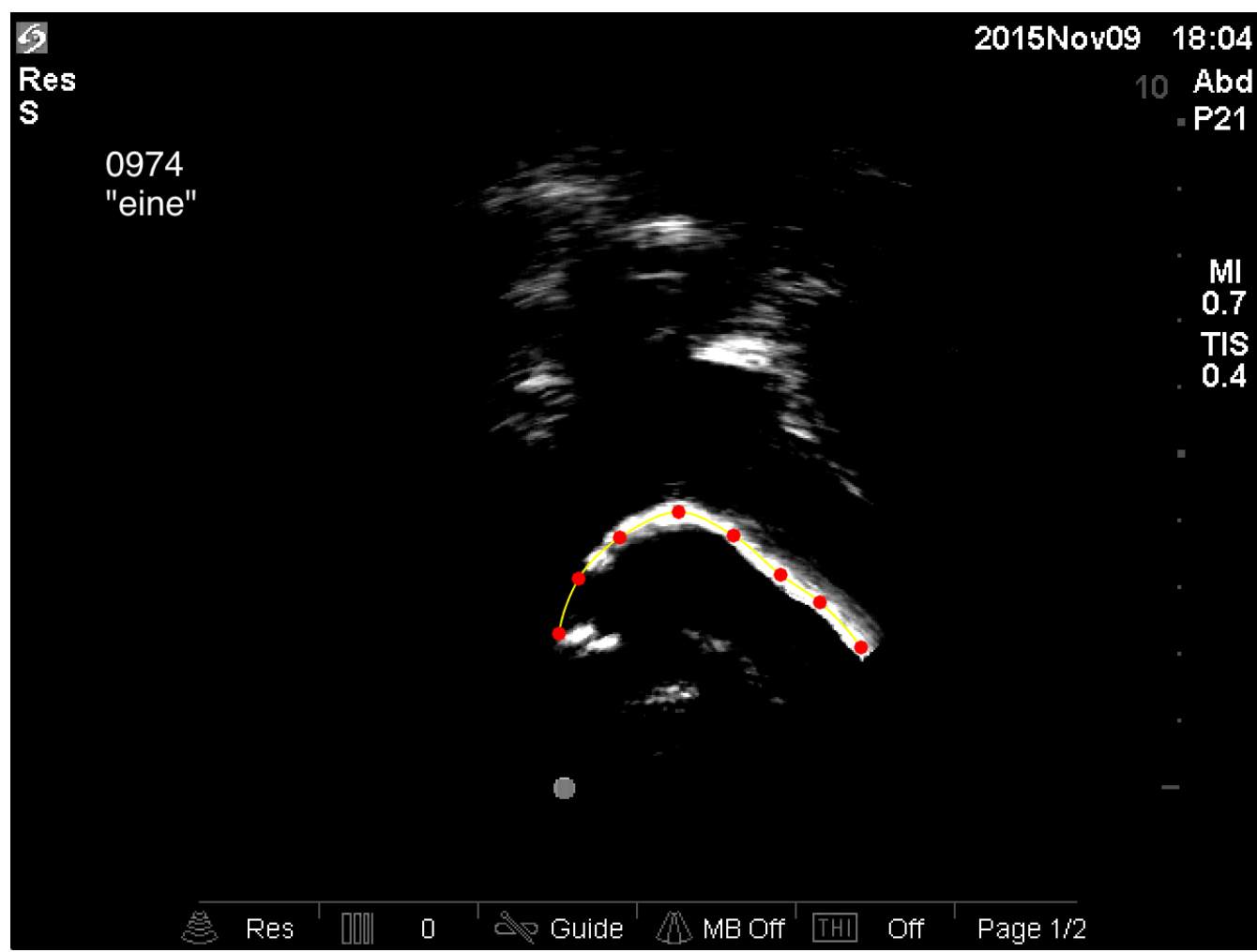

Multiple Frame Averaging

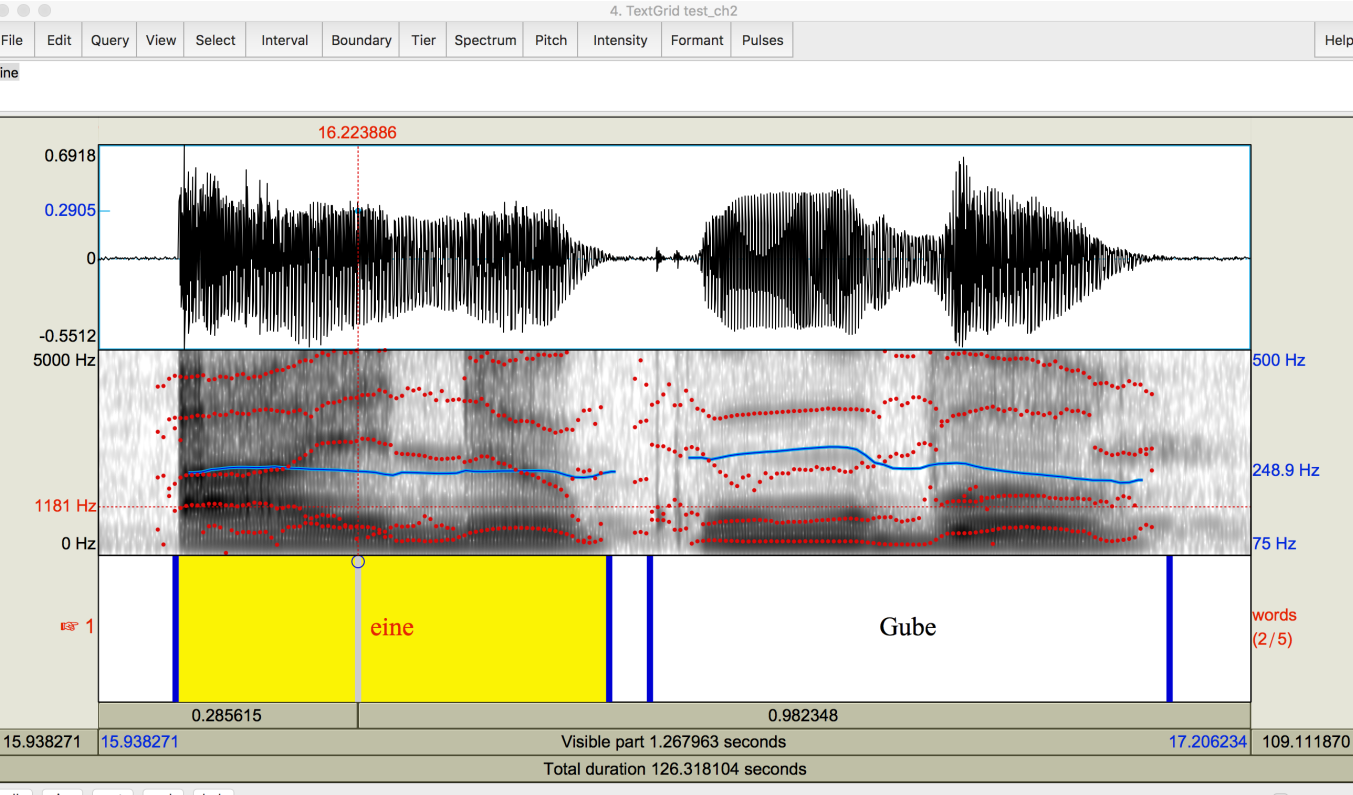Image Forces

Horizontal Flip, Jet Colormap
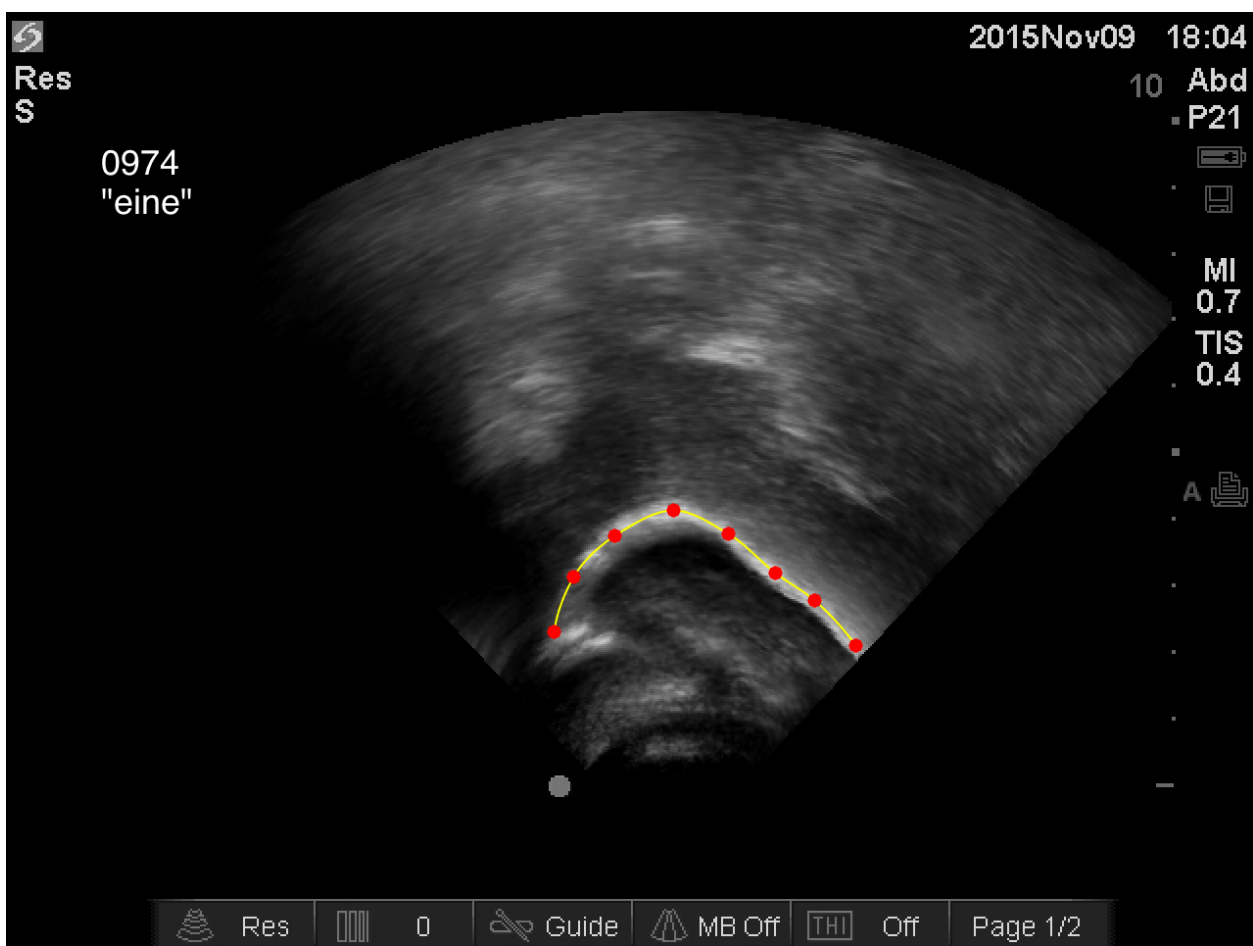

Contrast Enhancement
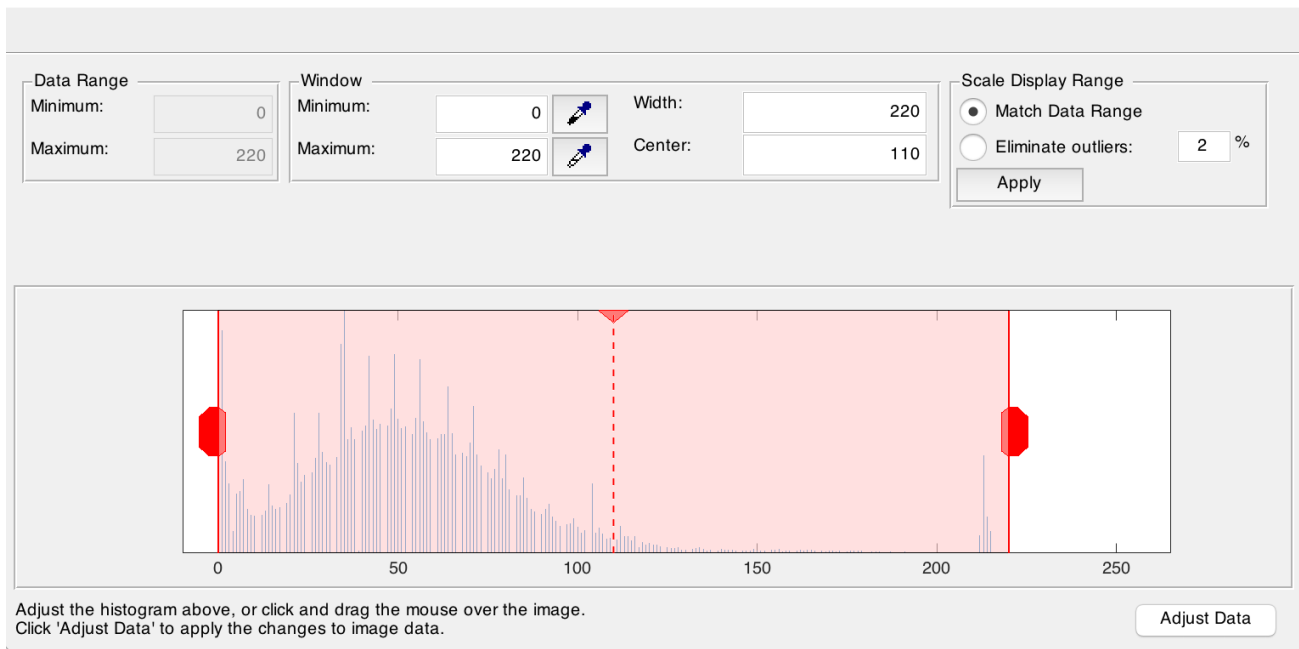
Workflow

1) Label key intervals with Praat

2) Use these intervals as key frames for contour fitting

3) Manipulate Image

4) Save to Matlab format or Export as text file

FRAME	TIME	NOTE	POINT	X	Y
974	16.216	eine	1	281.250	318.250
974	16.216	eine	2	281.606	316.025
974	16.216	eine	3	282.034	313.832
974	16.216	eine	4	282.529	311.671
974	16.216	eine	5	283.086	309.544

References

[1] Boersma, P. & Weenink, D. (2015). Praat: doing phonetics by computer [Computer program]. Version 5.4.14, retrieved 24 July 2015 from http://www.praat.org/

[2] Li, M., Kambhamettu, C., & Stone, M. (2005). Automatic contour tracking in ultrasound images. Clinical Linguistics & Phonetics, 19(6-7), 545–554.

[3] Kass, M., Witkin, A. & Terzopoulos, D. (1988). Snakes: Active contour models. International Journal of Computer Vision, 1(4), 321–331.

[4] Barbosa, A. & Vatikiotis-Bateson, E. (2014). Optical flow analysis for measuring tongue-motion. Journal of the Acoustical Society of America, 136(4), 2105.

Acknowledgments