

GetContours: an interactive tongue surface extraction tool

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Automated methods for extracting 2D tongue surface contours from sequences of ultrasound images are continuing to improve in sophistication and accuracy, ranging from Active Contour models (Kass et al. 1988) as implemented in EdgeTrak (Li et al. 2005), Deep Belief Networks as implemented in Autotrace (Fasel & Berry 2010), and Markov Random Field energy minimization as implemented in TongueTrack (Tang et al. 2012). However, a need remains for simple interactive tools that can be used to seed and propagate tracings of the tongue, and to validate these methods through comparison of automatic and manual tracings.

GetContours is a Matlab-based platform that provides straightforward click-and-drag positioning of reference points controlling a cubic spline fit to a displayed ultrasound image of the tongue surface. It supports image filtering, averaging, and contrast enhancement. Praat TextGrids (Boersma & Weenink 2015) labeled on associated audio can be imported to identify and annotate articulatory events of interest, allowing rapid selection of key frames within image sequences. While GetContours provides an implementation of the Kass et al. (1988) 'snake' algorithm for automated contour tracking, it also supports a 'plug-in' interface for applying externally available alternative algorithms seeded by the current contour.

We demonstrate GetContours through a comparison of interactive and automatic tracking of sequences of midsagittal tongue shapes produced in running speech observed simultaneously with ultrasound and electromagnetic articulometry (EMA). Results are compared with the corresponding point locations of EMA sensors attached midsagittally to the speaker's tongue.

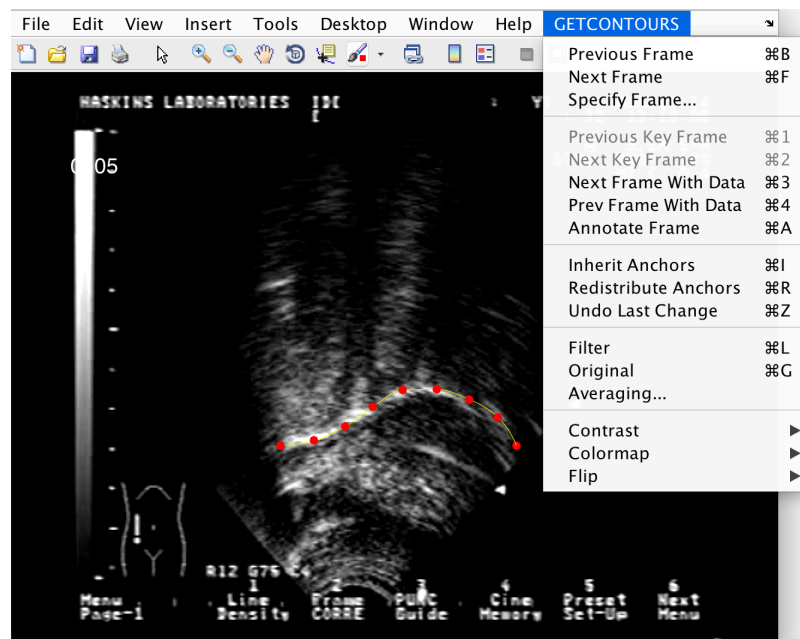


Figure 1: Illustration of US frame fit using GetContours showing available options

References

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