

Gaining Efficiency in Human Assisted Transcription and Speech Annotation in Legislative Proceedings

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ABSTRACT

We present a study using the Digital Democracy transcription tool. Human transcribers work to up-level and annotate California state legislative proceedings using the tool. Four phases of UI and functionality improvements are introduced and for each phase, the resulting change in efficiency is measured and presented.

CCS CONCEPTS

• **Human-centered computing** → **Information visualization**: *User interface management systems*; • **Applied computing** → **E-government**: *Computing in government*;

KEYWORDS

government transparency, transcription system, transcription software, transcription tool, speech annotation, speech tagging, speaker recognition, speaker detection, user behavior, log analysis

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1 OVERVIEW

Legislative and parliamentary proceedings present a rich source of multi-dimensional information that is crucial to citizens and journalists in a democratic system. At present no fully automated solution exists that is capable of capturing all the necessary information during such proceedings. Even if professional-quality automated transcriptions existed, other tasks such as speaker identification, entity disambiguation, and rhetorical position identifications are

not fully automatable. While many governments rely on expensive, manually-produced transcriptions and annotations such as [1][3][5], others are left entirely without digital transcriptions.

Entity tagging or annotation tools such as introduced by Stenertorp et al. [4], Papazian et al. [2], or Widlöcher and Mathet [6] focus on linking metadata to plain text. Although such annotation tools fulfill a different purpose as transcription tools do overall, both create metadata for plain text records.

We work with a set of 7304 individual transcription sessions (1290 hours of video) where each session is the record of one bill discussion. We further concentrate on a set of 2800 sessions belonging to a single cohort of 20 editors who have experienced four versions of our transcription tool. We find that through introduction of features in the transcription tool, we can improve human assisted transcription efficiency by 10.7 percent over 3 phases. Our analysis regarding phase 4 remains inconclusive at submission time, due to not enough completed tasks being available.

1.1 Digital Democracy

The main goal of the *Digital Democracy* initiative is to provide full insight and access into US state legislative processes in four US states (California, Florida, Texas and New York) with a combined population of one third of the entire USA. For this, videos of legislative committee hearings are combined together with auxiliary information such as searchable transcriptions, bills discussed in hearings, identify of participating speakers like legislators, lobbyist, witnesses, and members of the general public. In addition to giving insight into the proposal of new bills and laws, it also presents a chance for the general public to monitor lobbyists, lawmakers, and advocates. All information can be searched and queried, and the results are high quality thanks to human-assisted transcription. Practical usage of the aforementioned platform can be examined by visiting www.DigitalDemocracy.org.

Digital Democracy uses a human-assisted approach for generating transcription texts and metadata. While automatic transcription might be sufficient in other areas, a legislative setting requires professional transcripts. This is achieved by human editors manually up-leveling transcription text and performing annotations such as

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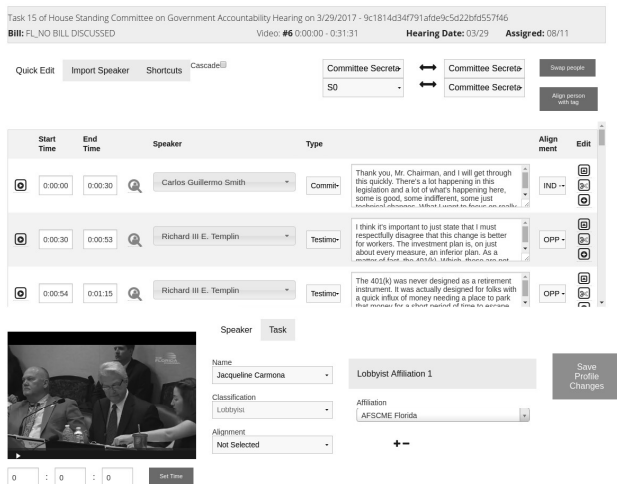


Figure 1: Main Screen of Transcription Tool’s Transcript Editing Interface

Table 1: Transcription Tool Efficiency Change Over All Investigated Versions

Version	TTE (minutes)	Efficiency Improvement (%)
0	4.401	-
1	4.014	8.793
2	3.943	1.768
3	3.938	0.129
4	4.407	-11.91

speaker and position identification. 1 shows the tool we developed that serves a platform for our experiments.

1.2 Research Questions

The main question we are interested in is to what extent do our improvements to the transcription tool increase efficiency in human assisted transcription independent of the task, state, or the particular people doing the work. Secondly, which aspects of this work yields the largest efficiency gain? To answer the second question, we break down the various aspects of human assisted transcription and measure their output independently to the largest extent possible.

2 RESULTS

An efficiency analysis for a cohort of 20 editors, who worked with all versions of the tool, was performed. Table 1 shows an efficiency improvement of 10.7% from version 0 to version 3. However, version 4 seems to produce an decrease in efficiency. Due to not having enough usage data to further investigate version 4, a more detailed analysis has to be performed at a later time. Figure 2 visualizes the tool efficiency by comparing the time necessary to transcribe one minute of video speech over each version for the given editor cohort.

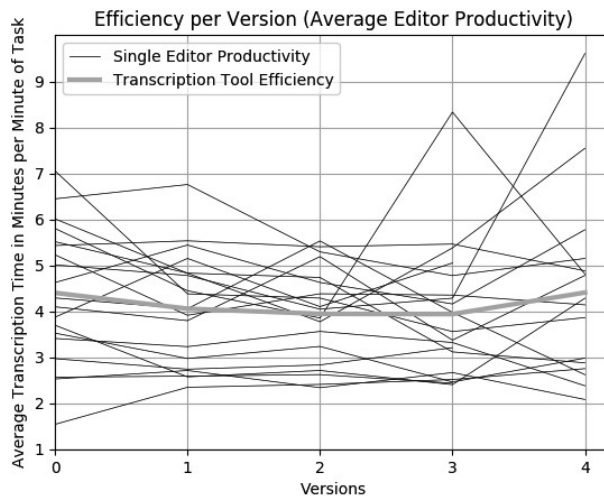


Figure 2: Transcription Tool Efficiency per Version

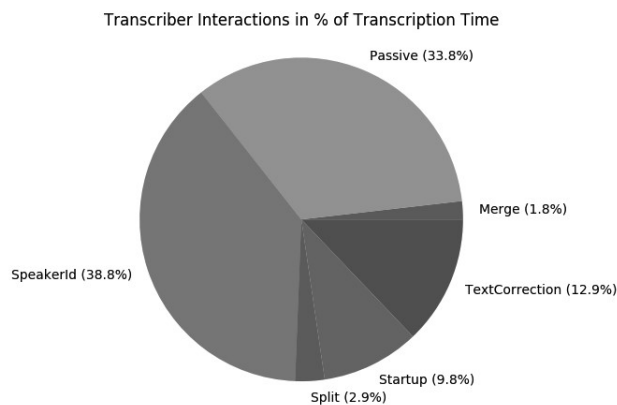


Figure 3: General Editor Interactions and Their Contribution to Overall Transcription Time On Average

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