IssueBrowser: Knowledge Acquisition via Multimedia Data

Swapna Joshi
Dept. of Electrical and
Computer Engineering
University of California
Santa Barbara

Jonathan Ventura
Dept. of Computer Science
University of California
Santa Barbara

Benjamin Adams
Dept. of Computer Science
University of California
Santa Barbara

Karl Grossner
Dept. of Geography
University of California
Santa Barbara

Angus Forbes
Media Arts and Technology
University of California
Santa Barbara

Monica Bulger
Dept. of Education
University of California
Santa Barbara

Tobias Höllerer
Dept. of Computer Science
University of California
Santa Barbara

B. S. Manjunath
Dept. of Electrical and
Computer Engineering
University of California
Santa Barbara

1. ABSTRACT

The pervasiveness of digital multimedia in the 2008 United States presidential election can hardly be overestimated. Anyone seeking to learn more about the election has at their disposal a plethora of digital media content such as online news articles, bloggers, 'informational' and public candidate videos, etc. These data not only originate from traditional sources of media "translated" to the web but also come from an increasingly large web campaign presence by the candidates themselves (all 19 have/had sites). Navigating through all these data can be difficult for users as the information is available in various media formats and scattered across many locations on the web. In addition, each of these sources of data has implicit information (such as temporal relationships, semantic values, etc.) that is not readily available to a casual consumer, but which nevertheless could be of interest to someone seeking a more nuanced understanding of the data. Furthermore, there are connections across these data (made up of various media formats) that only become apparent when they are analyzed together. For users wishing to amalgamate the data available to get a fuller picture of a candidate and his or her position on particular issues, methods for mining the multimedia data becomes more and more important.

Towards these ends, we propose "IssueBrowser," a multimedia data mining application that accumulates and allows for exploration of multimedia data about the 2008 U.S. presidential election. A novel interactive visualization installation is designed to aid users' understanding of the complex, shifting tapestry of candidates and issues involved.

Data is in the form of text, including speeches, debate transcripts, news reports and blog entries, as well as relevant video clips, all harvested automatically from various web sources. This stored data is then analyzed for issue relatedness and presented in a navigable weighted spring graph visualization spanning four large plasma screens in a public setting. All forms of text are analyzed for their similarity to 34 reference documents derived from candidates' issue position papers. The resulting 34-value array, termed an "issue signature," can be aggregated by individual, party, news source, place or time, both as weights to motivate the size and position of graphical elements and a means to quantify variation in "issue aboutness" for the election according to various perspectives. With the help of speech recognition we obtain transcripts for each of the videos. The transcript is then compared against a bag-of-words to relate the videos to 34 issues identified. The output of this comparison supplies us with timings of the segments when these issues were uttered within a given candidate video. We then used shot detection as a way of bounding our results into more coherent video snippets. The analysis and unique combination of multiple media content presented by IssueBrowser help give the user insights into the various presidential candidates and their positions on issues in a manner that might not be possible when observing the constituent media *in situ*.

IssueBrowser features a modular architecture that gathers data related to issues and/or candidates from the sources mentioned, filters out irrelevant portions, and adds meta-information so that the data is usefully connected together. We present an innovative visualization system that allows users to interpret data (and connections between them) from various perspectives and from various sources – perspectives and sources to which users might not be exposed during a normal web search. Our layout algorithm has both temporal and spatial aspects that work together to balance simultaneously both a broad view of a range of issues as well as increasingly detailed information about particular aspects of an issue or a cluster of issues. In addition to displaying text (articles, quotes, facts) and images (video, photos), we provide a novel interaction system which allows multiple users to choose collaboratively the various aspects of particular issues they are interested in exploring. Users influence the flow of new information by "pinning" particular data – that is, forcing new queries to return data to be related to the currently selected data.