

Village Voice: Expressing narrative through community-designed ontologies

by

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Submitted to the Program in Media Arts and Sciences, School of Architecture
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MASTER OF SCIENCE IN MEDIA TECHNOLOGY
At the Massachusetts Institute of Technology
June 2002

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May 13, 2002

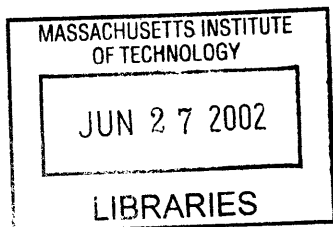
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2002

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Abstract

The Village Voice project is a study of the efficacy of a localized ontology in the dissemination of narrative. It seeks to understand how community members can articulate their lives in ways that allow each other to reflect on the makeup of their overall community, and how they represent their community's needs to those outside of the group. I utilize a knowledge model, or ontology, created by community members as a foundation for representing and retrieving story fragments (video clips). The focus of this thesis will be to study the methodology by which such a knowledge model can be elicited, and the relative benefits of representing stories by this mechanism versus the standard database technique of keyword indexing. I evaluate the strengths and weaknesses of this ontology-driven narrative system within the real-world context of a local community of Somali refugees (Jamaica Plain, MA).

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This publication is an output from a research project funded by Media Lab Asia. Media Lab Asia is funded in part by the Ministry of Information Technology, Government of India. The research was carried out in support of the Media Lab Asia Program by Massachusetts Institute of Technology's Media Laboratory itself (or, when applicable, the statement shall provide: 'or jointly by Massachusetts Institute of Technology's Media Laboratory with Media Lab Asia'). Media Lab Asia does not accept responsibility for any information provided or views expressed.

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The following people served as readers for this thesis

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Acknowledgments

The past two years have helped me think about what the place of media is in the world of culture, design, science, and politics. I have many to thank for this.

First, I would like to thank my parents and brother for their support over the years.

A huge thanks to all the beautiful people from the Somali community of Boston that I have met during the course of my fieldwork. I have been inspired by so many of you.

My UROPs, Elaine and Erik, have both been an incredible help to the design and implementation of this project. You guys were the best team of UROPs any graduate student could have asked for.

Thanks to my many friends in the area who have supported me over the last two years: Ben, Chloe, Andrew, the Marketing Schemes of Vishnu, Neviadomsky, Matt, Liluye, Assaf, Jonah, JK, Boston rokk kids – you are rad.

Big thanks to the Electronic Publishing Community: Alex, Jose, Vadim, Marco, Sunil, and Cameron. I've learned a lot from our discussions and brainstorming.

I'm very grateful to both my thesis readers: Glorianna Davenport and David Cavallo. Glorianna, thank you for helping me shape my ideas about film, story, and interactivity. David, thank you for helping me think about how to work with communities and create artifacts that can serve their needs.

Finally, an enormous thanks to Walter Bender, my thesis advisor. Thank you for helping me focus my many ideas and writings into a thesis that I am proud of.

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Chapter 1: Introduction

Alan Shaw points to the potential of communication technology to enhance community life:

If we focus our attention only on how this technology can connect us to people who are physically distant from us, then we are robbing ourselves of the potential for using these tools to address some of the most profound experiences that we will face in our lives. This is why epistemology is mightier than technology. Without adequate forethought, our technological advances can become disconnected and even contrary to some of our deepest collective assets and endeavors.
[Shaw, 1995, p. 17]

I am interested in creating tools that are designed around the priorities and issues of local, geographically- and culturally-defined communities.

Village Voice is an effort to build upon the growing movement in community publishing and storytelling. A number of studies, e.g., *Silver Stringers* [Smith et al., 2000], *MUSIC* [Shaw, 1995], *Locality in the Global Net* [Heinonen et al., 2002], etc., have demonstrated that empowering communities to create their own stories stimulates a process of reflection, which in turn facilitates the sharing of values, knowledge, structure, and dreams.

There is a purpose behind my naming this project Village Voice. A village is a set of people who have a shared history, co-dependence, and present-day connections with those who are living in proximity to them. These links are not merely passive ties, but allow the villager to actively occupy a role within the larger community.

I have modeled Village Voice after the work of Murtaugh [Murtaugh, 1996], who pioneered content-driven, decentralized navigation of narrative. In such systems, narrative unfolds based upon both what the viewer is watching and an overarching model of story. I expand on Murtaugh's work both by incorporating content generated by the community and by utilizing the Concept Maps techniques developed by Novak and Cañas [Cañas et al., 1999]. Concept Maps are learner-created knowledge models.

My hypothesis is that a knowledge model, or ontology, created by community members, better facilitates the sharing of knowledge across a community as compared to keyword indexing. My contribution is a demonstration that a community-built ontology is more than a static structure with which to represent community knowledge: When continuously populated with their stories, ontology becomes a dynamic structure that is used by members to model the evolution of their community.

Village Voice has been deployed in a community of Somali refugees, based in Jamaica Plain, MA. This community has dramatically expanded over the last five years due to the civil war in Somalia. It hopes to adapt to the Boston area, while maintaining its ancestral culture. According to community members with whom I have spoken, there is a desire to archive their experiences as they face new challenges in the United States. They wish to find a means to tell stories to their community, as well as to incoming refugees and others outside of the community. Traditionally, story has been orally transmitted in Somali culture, so the use of a medium that records and retells story is new to them.

In the thesis, I tell the story of my work with this Somali community, including the designing, building, and testing of a storytelling system that incorporates ontology. I evaluate my work relative to a keyword-based representation, using both quantitative and qualitative

methods.

I begin in Chapter 2, where I provide background information on communities, community publishing, storytelling systems, and ontology. In Chapter 3, I discuss the methodology by which Village Voice was introduced to the Somali community. This is followed by a discussion of the ontology design process. In Chapter 4, I describe the storytelling system that was implemented. In Chapter 5, I present an evaluation of the Village Voice in regard to its ability to disseminate story in the community. In Chapter 6, I present my conclusions and suggest directions for future research. Appendix A is the syllabus of the storytelling workshop offered to the Somali community, Appendix B is the survey given to community members as part of the evaluation, and Appendix C presents some diagrams of the results of the quantitative experiment.

Chapter 2: Background

In this chapter, I discuss research that explores what a community is, and how it is shaped by the process of publishing. I focus on the role of story as a mechanism to unite communities. Because my thesis is an investigation of the role of ontology in representing stories, I also discuss the state of the art in knowledge representation.

2.1: Communities

In this section, I:

1. Provide a definition of what a community is and introduce a taxonomy of different types of communities,
2. Introduce the growing movement of community publishing that this thesis builds on,
3. Discuss the importance of active communities by introducing a theory of social capital,
4. Review projects that have used networked technologies to foster active publishing communities.

Definitions and Taxonomy

There are several definitions for community in social science literature.

McMillan and Chavis posit that there are four major identifying factors of a community:

- Membership: members have a feeling of belonging
- Influence: members have a sense that group matters, that as a group they can make a difference
- Fulfillment: the authors claim; "A strong community is able to fit people together so that people meet each other's needs while they meet their own."
- Emotional Connection: Members having a shared history
[McMillan and Chavis, 1986, p.623]

These four factors were subsequently re-expressed by McMillan as:

- Spirit: a sense of emotional safety, boundaries and belonging
- Trust: a sense of order, and a structure that is believed in
- Trade: a sense of how members benefit from one another and

- Art: a shared history that becomes the community's story symbolized in art
[McMillan, 1996, p.325]

I use McMillan's definition as the basis for examining community in this thesis. His definition provides a standard from which the attributes of an "ideal" community can be discussed:

An ideal environment would be one where community members could participate because they feel that they belong. It would provide a sense of security and emotional safety. Members of the community could establish some form of order if they chose, but all members would have opportunities to make contributions and share the benefits of those contributions. And finally, there would be an opportunity to explore their shared history through some form of expression—in the communities that we describe, this means narrative and photography. [Smith et al., 2000, p.732-733]

The emergence of network communication technologies has brought about new candidates to fit McMillan's definition of community. Smith et al. uses the following taxonomy to describe these communities [Smith et al., 2000]:

- Ethnic/political communities: These are communities that may have no proximity, yet have a common political identity, or ethnic background. A variety of web sites have been designed to allow these groups to come together.
- Geographic communities: These are communities that have physical bounds. These sites aim to complement the face-to-face interaction that already occurs.
- Virtual communities: Virtual communities are groups that come together based on a common interest that the web medium makes possible.
- Demographic communities: A number of web-based demographic communities have emerged to serve various constituencies. Web sites that are based upon a demographic community are growing in popularity.
- Activity-based communities: These communities are defined by a shared activity such as shopping, making music, or playing games.

Community publishing

Network technologies have enhanced community access to information. This has allowed communication to expand between communities and the traditional holders of information, such as the government and media. Individuals around the world have begun to tell their stories using technologies such as web logs, a recent but expanding phenomenon. This represents a contrast to traditional media, in which stories are published by larger entities, leaving the user in a position to digest and read, but not criticize and publish. The emerging model provides community members with the possibility to be active, engaged creators of content and designers of their technological infrastructure.

Community publishing is a process of creation, where the publisher's aim is to express experience, knowledge, perspective, or story that is reflective of a community to which he or she belongs. Alan Shaw has expressed three criteria from which a publishing process could be evaluated: connection, construction, and continuity. [Shaw, 1995]

Connection is a function of the nature of the community and what the characteristics are of the process that connects the community via the publishing event. Construction refers to the process of creation, within which the traditional consumer becomes the producer of the information that is published. Finally, continuity reflects the sustainability of the publishing process.

Turpeinen argues that publishing projects should recognize the following to stay faithful to these three themes:

- Recognition that all communities are different
- Support multiple roles and subgroups inside the community
- Provide strong sense of ownership
- Emphasize thinking before publishing
- Tools should be flexible and expandable. [Turpeinen, 2000]

As communities engage in the process of publishing, they become active. An active community does not necessarily have to be proximal or traditional, but still needs to maintain the shared values and ties while engaging energetically in a collective process, such as publishing. Active is then a “coherent, stable, relatively long-term endeavor directed to a definite goal or project ” [Turpeinen, 2000, p.17].

Social capital

The sociologist Robert Putnam has written a considerable amount about the impact that social bonds have on a number of life satisfaction indicators. He argues in his book, Bowling Alone, that American society has become disconnected from the traditional means by which people receive social affirmation. These have included family and friends, recreational leagues, political parties, and religious institutions. In this work, Putnam refers to “social capital” as an important concept:

Whereas physical capital refers to physical objects and human capital refers to properties of individuals, social capital refers to connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them . . . A society of many virtuous but isolated individuals is not necessarily rich in social capital [Putnam, 2000, p.19]

Social capital is an expression of the value that arises from interacting, active communities. It is unattainable by a single individual. The core idea of Putnam’s theory is that social networks and heightened intra-community interaction generate a greater social capital, and that any process that changes a community’s social network dynamics, affects its social capital.

Thus, Putnam argues that a well-connected individual in a poorly connected society is not as productive as a well-connected individual in a well-connected society. Moreover, even the poorly-connected individual in a well-connected society may derive benefits from the collective externalities of the society.

Putnam finds a decline in civic, religious, and political participation across American society. This is dangerous because the loss of these connections indicates the loss of social capital, which Putnam argues is linked to significant problems that affect communities. Communities with less social capital have lower educational performance and higher crime rates, among other phenomena [Putnam, 2000].

Putnam also expresses a relationship between lower social capital and an increase in television usage. However, the link between the telephone or a networked computer, and social capital is murky because these media are more interactive. Theorists have argued that social networks can be both created and supported by computer sources, through their sharing of information resources, and creation of common spaces that never existed previously where people can communicate [Wellman, '99; Brown and Duguid '00].

To link these networks to the step where active community publishing can result is an important but complicated step. It is important that community publishing tools allow each community to be aware of what others are doing, and allow the publishing process to be one where the community expresses its stories as an integrated part of the publishing world, resulting in "trusted networks of connections inside communities and across community boundaries" [Turpeinen, 2000, p.20]. Building links between communities, involves the step of community modeling, a way of understanding and describing the community undergoing the publishing process.

Ray Oldenburg writes extensively about the influence of technology on interaction within communities, arguing that many "third places", where socializing could occur outside of home and work, have been lost. The question that relates this to Putnam is whether the establishment of a new "third place" via a technological medium, would help the rediscovery of social capital. Is "virtual" social capital a contradiction in terms?

The absence of any correlation between Internet usage and civic engagement could mean that the Internet attracts reclusive nerds and energizes them, but it could also mean that the Net disproportionately attracts civic dynamos and sedates them. In any event, it is much too early to assess the long-run social effects of the Internet empirically [Putnam, 2000, p.171].

Similar to the use of the telephone, Putnam has found that computer-mediated communication has helped to maintain contact over great distance. But relative to the construction of community and social capital, physical proximity is still critical. Still, the computer has its role in augmenting the interactions between communities that are geographically bounded:

This finding is wholly consistent with the informed prediction by MIT researcher Dertouzos, an enthusiastic champion of computer-mediated communication: "Though some unimportant business relationships and casual social relationships will be established and maintained on a purely virtual basis, physical proximity will be needed to cement and reinforce the more important professional and social encounters" [Putnam, 2000, p.179].

Projects

Village Voice builds on a lineage of projects that have focused on using communication technology to create an active publishing process, sustain existing social networks and create new ones.

MUSIC – Rebuilding physically proximal communities

MUSIC (Multi-User Sessions In Community), Alan Shaw's doctoral project, is a significant benchmark in this research. This was deployed in Boston's "Four Corners" neighborhood as a Bulletin Board system (BBS) to help residents share information, set up events and projects, share their creations (such as articles or pictures), and discuss community issues. Certain aspects of the system are private for the individual user (such as email inboxes) while others are public. Community members were supplied with computers at home from which they could log onto the system. Shaw found that many projects were both created as well as organized online and that most of those who logged in regularly to the system were involved with these projects,

meaning they used the system to facilitate and further their involvement in a community project.

The philosophical approach Shaw took in this project is described as Social Constructionism. This idea builds on the Constructionist model of the individual as a constructor, not passive receiver, of knowledge. Social constructionism combines this idea with the sociocultural view that shared experiences allow these constructions to take on meaning [Vygotsky, 1986]. The resulting theory is that a social setting is enhanced by the developmental activity of the individual.

Social constructionism is an epistemological paradigm that suggests that becoming acquainted with one's neighbors is an act of extending one's self. Computer networking is a technical tool that can support this endeavor. However, the network is not the active force; the people are. The critical agency is based entirely upon the prerogatives of the people involved [Bender et al., 1996, 369]

Appropriately, MUSIC was applied in an urban setting where fractured, less cohesive social relations persisted. Over the period of time from which he observed the role of this technology in the field, Shaw concluded that MUSIC enhanced the development and organization of the neighborhood's shared social constructions [Shaw, 1995].

Shaw finds five types of social constructions that are essential to community development: 1. social relationships; 2. social events; 3. shared physical artifacts; 4. shared social goals and projects; 5. shared cultural norms and traditions [Shaw, 1995].

Unlike MUSIC, the constructions shared in Village Voice are stories. In the next section, I discuss the importance of storytelling along with several projects that have merged story and multimedia in unique ways.

Silver Stringers

What happens when a senior citizen community, filled with stories and experiences, is given the tools to publish a community journal? This experiment, known as Silver Stringers, demonstrates the role of technology in testing the social cohesion of a publishing process. It demonstrates a successful deployment of a story-sharing technology in the community context.

What we see in the Silver Stringers is a group of older adults embracing technology for a purpose – creating stories of their lives and communities for others to learn from. These stories are ways for them to make sense of their life histories, to reconcile a multitude of experiences into coherent narratives [Smith et al., 2000, p.737].

In this experiment, publishing technology has inspired face-to-face interaction in a geographically bounded community. The process of creating a journal to represent the stories of this community has led to increased interaction and community building.

We do this for fun. Everyday is Friday in this group. Meetings often drift away from formality. . .we are at the “cutting edge” and there is no precedent for this [Turpeinen, 2000, p.52]

Patterns of role sharing and organization have evolved out of this process, which has provided members with a sense of shared responsibility and continuity as they create this electronic journal.

Silver Stringers points to the power of story as a means of sharing experience. In the six years this project has existed many story creators have been uncovered. The Stringers have become active publishers, critics of traditional media, and teammates in the creation of their community journal. [Smith et al., 2000]

Junior Journal

Similar to Silver Stringers, the Junior Journal unites youngsters around the world in the creation of a publication that reflects their ideologies and their belief that their actions can affect the world. In this case, the publishers communicate completely by e-mail, yet they have remained committed to

the process for 3+ years. 30-40 countries are represented across this community of publishers.

SilverWire

SilverWire is a tool that attempts to address the challenge of building links between web-based communities. It was developed to construct models of different publishing communities and use these to augment the communication, and shared knowledge between them, while potentially spearheading new inter-community publishing projects. Page layouts, publishing practices, and story ideas can be exchanged through this system (as well as articles themselves). It was recognized that tools that enable communities can communicate their experiences to each other require an identification of the shared space around which connections can be established [Turpeinen, 2000].

This project raises several interesting questions, including: Can a community be effectively modeled in terms of how it relates to the process of online publishing? How can the synthesis of multiple models translate into heightened communication and knowledge sharing?

2.2: Story

In this section, I:

1. Review the interdependence between story, identity, and community,
2. Discuss the role of communication technologies in the context of an oral tradition of storytelling,
3. Discuss hypermedia and the automatist storytelling paradigm,
4. Review two storytelling projects.

Story: Identity and community

Village Voice is built upon the premise that story is fundamental to the sharing of experience. In cultures throughout the world, story exists to serve a range of purposes from teaching a moral, contemplating divinity, or

preserving history. Stories are clearly one of the many ways in which we, as humans, present who we are to others [Campbell, 1988]. They also allow us to record our memories or lessons. Stories not only enhance the process of communication but also serve as a means from which different cultures can be identified. Thus, stories are critical on both the level of community and individual.

Donald Polkinghorne, who has studied the link between narrativity and identity, argues that through story we establish identity and provide meaning for our experiences. It is a "scheme by which human beings give meaning to their experience of temporality and personal actions" and a mechanism that relates our thoughts and actions to time, social and cultural institutions, and the places we are [Polkinghorne, 1988, p.11]. Stories transmit culture through parable and myth, entertainment, and even psychological presentation.

Human beings are storytellers by nature. In many guises as folktale legend, myth, epic, history, motion picture and television program, the story appears in every known human culture. The story is a natural package for organizing many different kinds of information. Storytelling appears to be a fundamental way of expressing ourselves and our world to others [McAdams, 1993, p.27].

In Section 2.1, I presented McMillan's definition of community that included spirit, trust, trade, and art. I posit that story is a useful vehicle from which communities can realize this definition. Both spirit and trust are critical to stories such as the Hindu Panchatantra, which promise safety and order to the universe to those who follow the values it teaches. Another Hindu parable, the Ramayana, embodies teamwork, with its emphasis on the importance of uniting in the name of truth. Finally, art is illustrated by stories that record cultural heritage. These stories, which are critical for the survival of the communities they originate from, are often referred to as myths.

(Myths) capture a given society's basic psychological, sociological, cosmological, and metaphysical truths. . .By giving form to a diverse collection of elements, they help to preserve the society's integrity and assure its continuity and health [McAdams, 1993, p.34].

Oral traditions and the role of communication technologies

Alfred Lord, whose work on oral storytelling focused on the singing bards who narrated stories to their respective cultures, explains that the oral tradition has persevered because “the picture that emerges is not really one of conflict between preserver of tradition and the creative artist; it is rather one of the preservation of tradition by the constant re-creation of it.”[Lord, 1960, p.29]. The oral tradition has persevered through its adaptation to the change that is inevitable to all cultures.

In the Somali tradition, the oral process of storytelling is embraced. Historically, the esteemed storytelling bards of each clan transmitted this culture through poetry. I provide a more detailed introduction to this aspect of Somali culture in Chapter 3.

Do computer networking and digital storytelling have a role in such a tradition? I posit that while recording stories and sharing them using a computer system is a breach of Somali cultural history, it may be a productive step given the community’s displacement to the United States. The decentralization of Somali refugees has raised alarms amongst Somali leaders of the need to maintain cultural traditions. Community-designed projects could help these people create, record, and share their culture, which blends the worlds of Somalia and the West. Additionally, I posit that a video-based approach is appropriate for this oral tradition. An oral tradition evokes the visual imagination of the listener. While video may not possess the same level of interaction, it does allow the stories of a community to be retold

Village Voice is intended to spread experience through story. My goal is to allow a community to be exposed to its shared folklores. Some argue that modernization has compromised the culture of storytelling, particularly in the Western world.

Every morning brings us the news of the globe, and yet we are poor in noteworthy stories. This is because no event comes to us without being already shot through with explanation. In other words, by now almost nothing that happens benefits storytelling; almost everything benefits information. Actually it is half the art of storytelling to keep a story free from explanation as one reproduces it [Benjamin, 1955, p.89].

Hypermedia and storytelling systems

Most written stories make a clear separation between story creator and reader. Often these stories are static in the sense that they are already written, and an order has been ascribed to the content.

The possibilities computation offers changes the dynamic. Hypermedia is a paradigm that allows content to be related using pre-defined links. The interaction is discontinuous, however, because the user has to click on one of a set of choices to allow the story to continue.

A piece of art needn't necessarily relinquish control to its user, of course. However, stories could take advantage of computer systems to empower the user the power to grasp linkages within the content in a more personal way.

Interactivity may function to increase viewer engagement with the narrative by facilitating a specific viewer's knowledge and viewing situation. As a form that supports multiple meanings, the interactive narrative has the potential to tell more complex and personally meaningful stories than those to a mass audience [Murtaugh, 1996, p.13].

In this thesis, I build on Michael Murtaugh's and Natalia Tsarkova's work. Murtaugh's design of interfaces that can allow for decentralized story browsing combined with Tsarkova's community created content, serve as dual influences to Village Voice.

Murtaugh's research is based around automatism, the creation of art through free association. Murtaugh's model, the Automatist Storytelling system,

presents the user with an array of stories based on the web of relationships they have.

The model presented in the Automatist Storytelling system is similarly content-driven and decentralized (to the philosophical ideal of automatism). Structure and meaning are considered emergent properties of the storytelling process. Rather than there being a central "conducting" process, sequencing decisions result from the interacting effects of individual material presentations [Murtaugh, 1996, p.15].

By incorporating the user's presence into the progression of the story, the automatist storytelling system decentralizes its control over what is or is not a meaningful story thread. The term used for this process is "emergent functionality", where the behavior of the interface is dependent on the complex relationships between the stories in the system and the user's choices in interacting with them.

Relationships between different stories are not boolean under this idea. Instead, the overall level of similarity across all the dimensions of the story content is valued. Every story in the system would be continuously reactive to that which is selected. The means by which these stories are connected would be made visually apparent based on how the interface reacts. Automatist storytelling systems use what are called spreading activation networks [Maes, 1995] where modules are activated or inhibited based on how they relate to previously selected modules. The graphical effect on the interface module is directly proportional to its level of activation or inhibition.

Murtaugh theorizes that interactive stories need to demonstrate certain properties to be effective. These are:

1. Narrative intention: the point of the narrative, or in the case of an interactive narrative, the viewer experience over one or many segments.
2. Narrative immersion: concerns how well the narrating functions as a background element to the narrative, silently conducting its construction.
3. Narrative structure: relates to the form, shape, and rhythm of the narrative.

4. Narrative response: How does the viewer influence the narrative?
5. Narrative guidance: the fundamental challenge of providing narrative structure and responsiveness while preserving narrative intention and immersion. [Murtaugh, 1996]

Storytelling projects

Jerome B. Wiesner: A Random Walk through the 20th Century

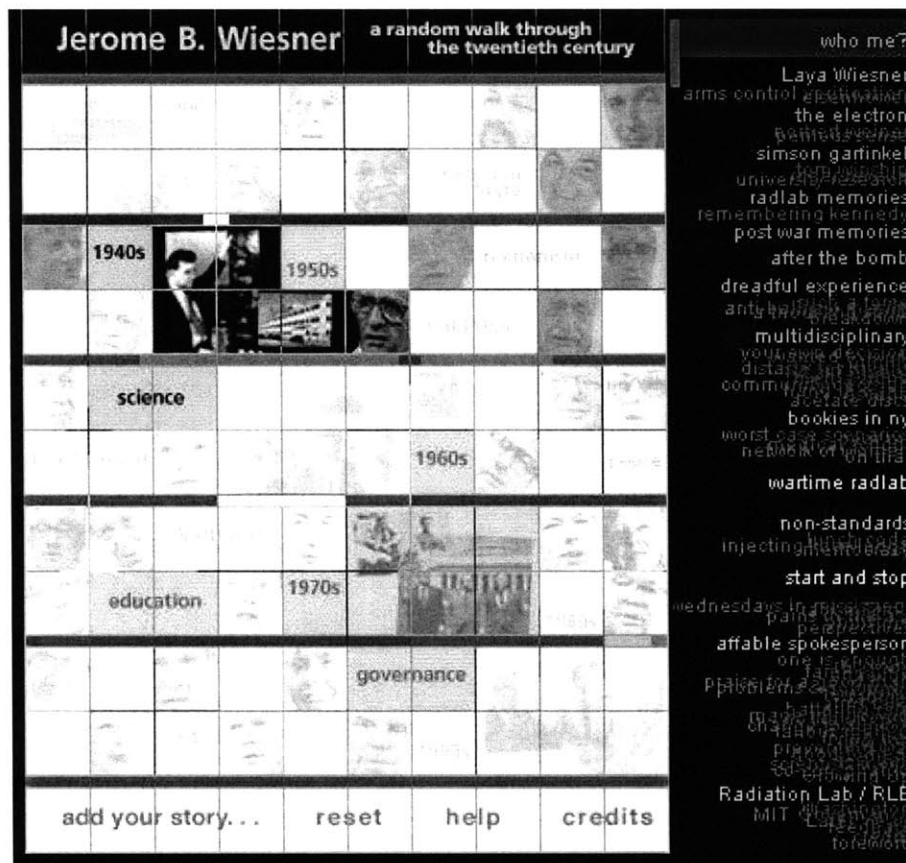


Figure 1: Project Interface
 (<http://ic.media.mit.edu/projects/JBW/JBWJava.html>)

Murtaugh applied his theories about automatist storytelling in the design of this project, which I refer to as "Random Walk" in the rest of this thesis. The goal of this project was to create a portrait of Wiesner, a former president of MIT, using a diverse collection of discrete media elements including filmed interviews, articles, and photographs. He refers to these elements as "clips".

Random Walk provides the viewer with multiple routes of access through the life of Wiesner. Every video clip in the system has been annotated with a small number of keywords. The system allows the viewer to browse based on those keywords; as the user watches a video clip (having selected it by clicking on a thumbnail), a number of related media elements and keywords illuminate, suggesting possible paths for the interactive story. The system also maintains an overall sense of browsing history, tracking the clips and keywords chosen since when the user first logged onto the system. The “suggested” clips and keywords are dependent on not only what the user is watching, but also the overall structure of the story.

The successes Murtaugh achieved in the above project serve as the model for the Village Voice system, which I introduce in detail in Chapter 4.

North End Chronicles

The North End Chronicles explores a related question of how to design an interactive system around a variety of community-centered video stories. Based on a set of footage shot in Boston’s primarily Italian North-End neighborhood, this system created real time collages suggesting alternative video clips as any individual video was being viewed.

I envisioned dynamic collage as a continuous, changing blend of images – it would reflect the way our perception works. . . Dynamic collage would offer a way to order information intuitively: grouping images together, without having to define in words, why or how they are related [Tsarkova, 1997, p.39].

This project hearkens to the Russian formalist film aesthetic of a story being nothing more than an aggregate of individual pieces. A film is then not shot, built up from the separate strips of celluloid that are its raw material. The collision and interactions between these elements are what gives the piece its power [Pudovkin, 1928].

Unlike the North End Chronicles or Random Walk project, the mechanism I employ to link the stories in Village Voice is a community-designed ontology. I introduce pertinent research in this field next.

2.3: Ontology: Representing the social fabric

In this section, I:

1. Define the term ontology and explain how I use it in this thesis,
2. Discuss state-of-the-art projects in knowledge representation.

Definitions and explanation

The hypothesis that this thesis investigates is whether a localized ontology can facilitate the dissemination of stories into the community that created them.

I use Uschold's definition of ontology as an explicit representation or structure of knowledge [Uschold et al., 1995]. Ontologies can be used to describe physical processes, educational fields, or in the case of Village Voice, the discourse of a community.

Ontology can be seen as a conceptual map where the links between individual pieces of knowledge are delineated. An assumption researchers in this field make is that knowledge is without meaning unless it is contextualized. The specific nodes in the structure need to be understood along with the links that tie them together.

Roger Schank explains that through ontology, we make sense of the world. Information that we encounter is understood through our own internal "data structures", which he calls scripts. Scripts, to Schank, are our own implicit organizations of knowledge retrieved from the world we inhabit [Schank, 1999].

The following projects focus on the goal of developing a structure to represent knowledge. These are relevant because ultimately Village Voice is an attempt to extend this field by approaching ontology with an anthropological focus on a local culture and its stories.

Ontology projects

CYC

Developed by the Cycorp company, CYC is one of the largest knowledge representation databases that exists. Its goal is to construct the foundations of basic common sense to relate all the pieces of knowledge within the system. This involves a massive mélange of terms, rules, and relationships. CYC is organized via CycL, a representation language based on first-order predicate calculus.

`#$Happiness happily (quantity)`

The enjoyment of pleasurable satisfaction that goes with well-being, security, effective accomplishments, or satisfied wishes. As with all #\$FeelingTypes, this is a #\$Collection -- the set of all possible amounts of happiness one can feel. One instance of #\$Happiness is "extremely happy"; another is "just a little bit happy". Note: Obviously there are no real units of measure for this quantity, ways of objectively measuring the amount of happiness possessed or gained or lost, etc., but still this has proven to be a useful way for Cyc to represent and reason with emotions. E.g., one can have a rule that says that most people have a greater "amount" of happiness at their wedding than at their high school graduation, etc. There are functions, such as #\$LowAmountFn, which take a #\$PrimitiveType (such as the instances of #\$FeelingType) such as #\$Happiness and return as their value a certain-sized amount of that feeling; e.g., (#\$LowAmountFn #\$Happiness) is an expression whose value is a positive but small amount of happiness, and that in turn will be an instance of #\$Happiness (and also will be an instance of #\$Feeling). #\$FeelingTypes organize into a lattice; e.g., there are several more specialized forms of #\$Happiness that are present in Cyc's ontology, such as #\$Elation, #\$Delight, #\$Triumph-TheFeeling, etc.
guid: bd58b500-9c29-11b1-9dad-c379636f7270
direct instance of: #\$FeelingType
direct specialization of: #\$FeelingAttribute
direct generalization of: #\$Elation #\$Cheerfulness
[<http://www.opencyc.org/>]

Every term in this system is given a context, which is indicated by the placement of the term in a space with an id, instances, specializations, and generalizations [Guha and Lenat, 1990]. Instead, of thinking of the context as a particular node in the ontology, the context is considered as a region of intersection across an n-dimensional space. The result is a sophisticated but complicated representation scheme. Cyc's logic-based approach toward ontology has helped me think about the level of complexity I should take in my approach toward Village Voice. It helped me conclude that an overly complex representation scheme may sacrifice its communicability across a community.

Open Mind Common Sense Initiative

The Open Mind Common Sense project (<http://commonsense.media.mit.edu/cgi-bin/search.cgi>) is an attempt to provide computers the millions of pieces of ordinary knowledge that humans know as "common sense." Marvin Minsky, in Society of Mind, defines common sense as:

Common Sense: The mental skills that most people share. Common sense thinking is actually more complex than many of the intellectual accomplishments that attract more attention and respect, because the mental skills we call "expertise" often engage large amounts of knowledge but usually employ only a few types of representations. In contrast, common sense involves many kinds of representations and thus requires a larger range of different skills [Minsky, 1986, p.327]

Because of a need to maximize user participation, this project asks web users to submit common sense statements in English, rather than in a representation language such as CycL. This project attempts to build a representation for all the common sense statements that are submitted through its use of natural language processing algorithms.

One of the first questions we faced in this project was how to represent the common sense knowledge acquired from people. There have been many disagreements in artificial intelligence over this question. . . Others have argued that more "concrete" representations, such as stories

or descriptions of situations, are the right way to represent commonsense knowledge. . . Still others have argued that much of common sense is less about "thinking" than it is simply routine behaviors that operate using less explicit types of knowledge, for example the kind of knowledge we use to walk around. Our view is that when it comes to common sense thinking, diversity is the secret to success. It is not so much a matter of choosing between such representations as it is a matter of finding way for them to work together in one system [Singh, 2002, p.6].

Village Voice builds on the successes of the Common Sense project. Instead of using a computer system to construct ontology as a function of logical relationships, Village Voice focuses on the articulations of a community. The major difference is that Village Voice does not use natural language processing.

Story-based Indexing

Roger Schank's Agents In The Story Archive introduces the idea of a story as a unit of knowledge. This project required the assembly of a set of stories, a characterization of their linkages, and an association between the story and several pre-created computerized agents. For example, a story about the United States' invasion of Iraq, could be linked to the History and Economics Agents, but not the Philosophical or Psychology Agent, depending on what is actually conveyed in the story. Indexing based on the story fragment is appropriate because Schank argues that story is ideally suited for transmitting knowledge.

We understand events in terms of events we have already understood. . . Knowledge, then, is experience and stories. . .The understanding process involves extracting elements from the input story that are precisely those elements used to label old stories in memory [Schank, 1990, p.44].

Self-designed ontologies

Joseph Novak and Albert Cañas have been responsible for some of the advances in the field of learner-created knowledge models. Their projects focus on Concept Maps (CMAP). Concept Maps are based on the idea that true learning involves the learner to construct relationships between the new

information he or she acquires and that which is already possessed. The focus is to instruct the subject to explicitly map out the relationships within a certain process or object that is being studied.

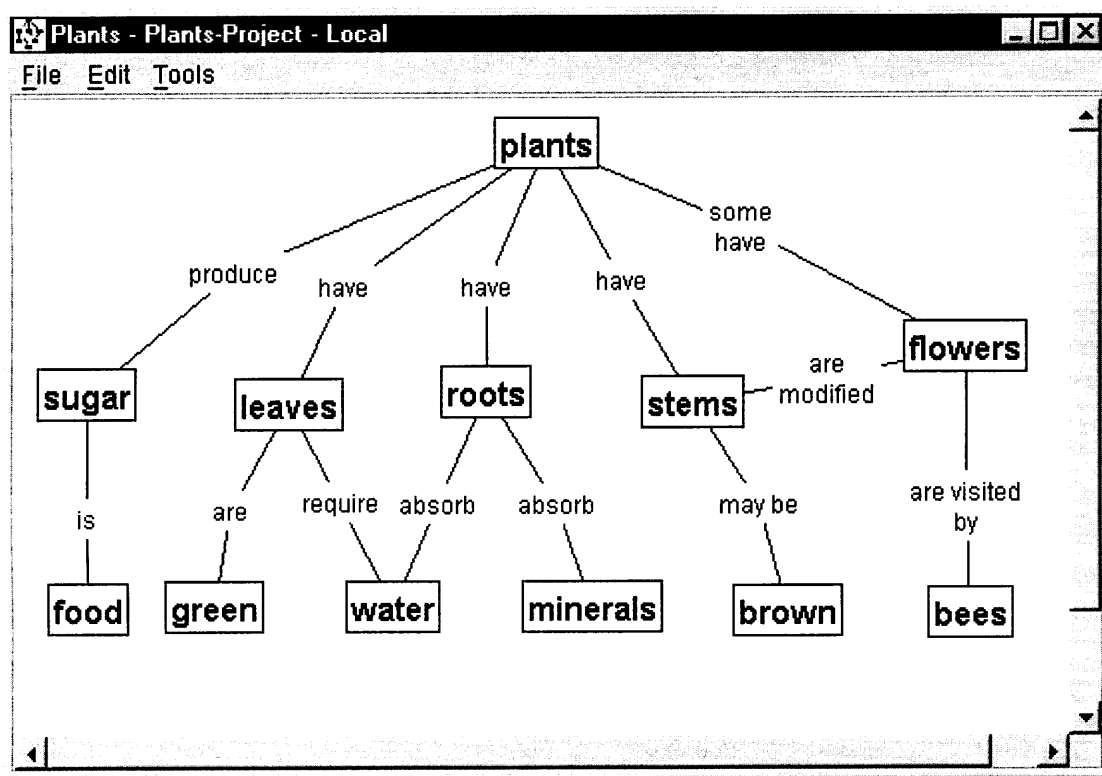


Figure 2: A concept map representation of plant [Cañas et al., 1999]

Subjects were found to have a deeper understanding of the concept of “plant” after following these steps, particularly when subjects were involved in critiquing each other’s work. The experimenters argue that there are two reasons why Concept Maps augment knowledge: first, because learning is structurally organized, and second, because a general understanding of epistemology is realized by the subjects [Cañas et al., 1999].

Village Voice directly applies the successes of Concept Maps to the domain of community. In Chapter 4, I explain this process in detail.

In the next two chapters, my focus will shift entirely to Village Voice, and the approach I have taken toward engaging a community to share its knowledge, values, and issues through the form of story.

Chapter 3: Methodology

In this chapter, I discuss the steps that allowed me to build a system to represent local Somali stories. These include:

1. My efforts in India, and the how they have framed this thesis.
2. An introduction to Somalia: its geography, history, and culture
3. An introduction to the Somali community in the Boston area
4. The means by which I introduced Village Voice to this community
5. An analysis of where the Somali community stands relative to McMillan's definition of community
6. The process of garnering stories to populate the Village Voice system.

3.1: Efforts in India: First-person stories

Originally, Village Voice was designed for the village of Tikavali, as part of the Media Lab Asia Initiative. Tikavali was chosen because of the long relationship it has had with the Jiva Institute, a NGO partner of the Media Lab Asia. Tikavali is a small village about two hours from Delhi. It has close to 3000 inhabitants and is largely agrarian. Because of certain infrastructural projects in the region, however, this means of subsistence has been endangered. The role of story in this region is undeniable. Derived from local and religious traditions, villagers in Haryana have used story to articulate their experiences, beliefs, and desires for years.

Social fragmentation in Tikavali is significant. The variables of caste, class, gender, religion, and age serve as barriers between Tikavali's residents. This has had an effect on the community's interdependencies, shared values, and mutual trust.

I wanted to test whether I could use a technology to mediate the common thread of story in Tikavali. For one month (Sept and Oct '01), Jiva trained villagers to use video to create stories. We collected these stories with the goal of incorporating them into a system that could represent them relative

to community issues and experiences. For example, I present the following two stories, loosely translated from the Hindi version by my partners at Jiva:

Story 1

My name is Anoop I am 17 yrs. old. I left studies after third grade. I am a potter by occupation and caste/community. Our financial condition have never been good, reason being that my father who was a scooter mechanic/repairer used to be unwell. He had T.B. Most of the time he had to be in hospital. Whatever income he earned, used to get spent on his treatment. I was also growing and could understand the situation. Therefore from the very age of 8-10 years I started accompanying him at the repair shop. I learned the repair work by assisting my father for about 5-6 years. After that he died (i.e. 2 years back). My mother also died following my father 's death (1 and a1/2 years back) as she was suffering from Cancer. As a result two sisters and we three brothers are leading a life of orphans. Now I have got a mechanic shop in the village itself. I have to pay Rs.250 per month as the rent of the shop. Though the workshop is not running very well but still I believe something is better than nothing. I don't know what my future has for me because I really never think about it. I can dream or plan for future only if I am contented with my present. But the present fight for livelihood never let me think in this direction. Therefore I don't have any thought/plan/dream for my future. Maybe if I would have been well off today then I could have planned something about my future but not in a such a situation as I am. I don't know what the future has in store for me.

Story 2

My name is Rahidan and I belong to a Muslim family. I was born in village Sakras Ferozpur Jirka in district Gurgaon. I am now about 70 years old. As a child I grew up like the other children of the village and worked in the fields as a laborer. My father had a little land so I helped the family members to farm the land. When I was 20 years old, I got married to Hasnu of Barko village of Gurgaon district. When I went to my in-laws house we had no land for farming, so we worked on fields belonging to other people or worked as laborers.

First-person stories and reactions

We collected 30 stories in this first incarnation of Village Voice. Most of these stories tend to be presented in the first person. This helped me think about the different types of video stories community members could create. Stories not only could take the form of first-person interviews, but also could depict the story visually. It also raised some questions including: How effective is a community story that is solely made up of first-person testimonials? Is testimonial more effective as a mechanism of storytelling than stories that use their visual quality to show the other people, places, and events of the

community? Answering these questions is beyond the scale of this thesis, but such questions informed my approach toward teaching video storytelling with the Somali community.

From the collection of these stories we found a number of common issues around which Village Voice could structure its content. Looking at these two stories alone, there are a number of issues that could benefit each story creator as well as the community at large. For example, Anoop can learn from Rahidan what it is like to work as a laborer, which is one career option he is considering. He also is given the ability to look into the future, and gain a sense of what responsibilities he may face if he ever decides to start a family. Rahidan, too, can learn from Raju's story what some of the issues may be for her children, and perhaps better understand what it is that may cause her to "not get along with her children".

In this first attempt, I found great value in the process of engaging villagers to create their own stories. It was clear that building a representation in community-terms for these stories could be the key to building a system that could share narratives across the community. Outside of the "literal" connections between the stories, the process of engaging a fragmented village community to produce stories is an empowering one as demonstrated by many projects discussed in Chapter 2.



Figure 3: Image from a community-created video story in Tikavali. The story, which was set at a community gathering, helped us introduce Village Voice.

To implement this project, I needed a more immediate solution than the Tikavali project could provide in terms of distance, communicability, and community cooperation. The creation of an ontology would be the output of a significant amount of fieldwork, rapport building, and patience in my introduction of the project. I would need to work with a local community that I could visit repeatedly, teach a number of video story classes with, and work iteratively to elicit an evolving ontology. With this in mind, I sought out the Somali Development Center (SDC) in Jamaica Plain, Massachusetts. In the next two sections, I briefly introduce Somalis and their ancestral culture, and the community in Jamaica Plain.

3.2: Somalia: Geography, History, and Culture

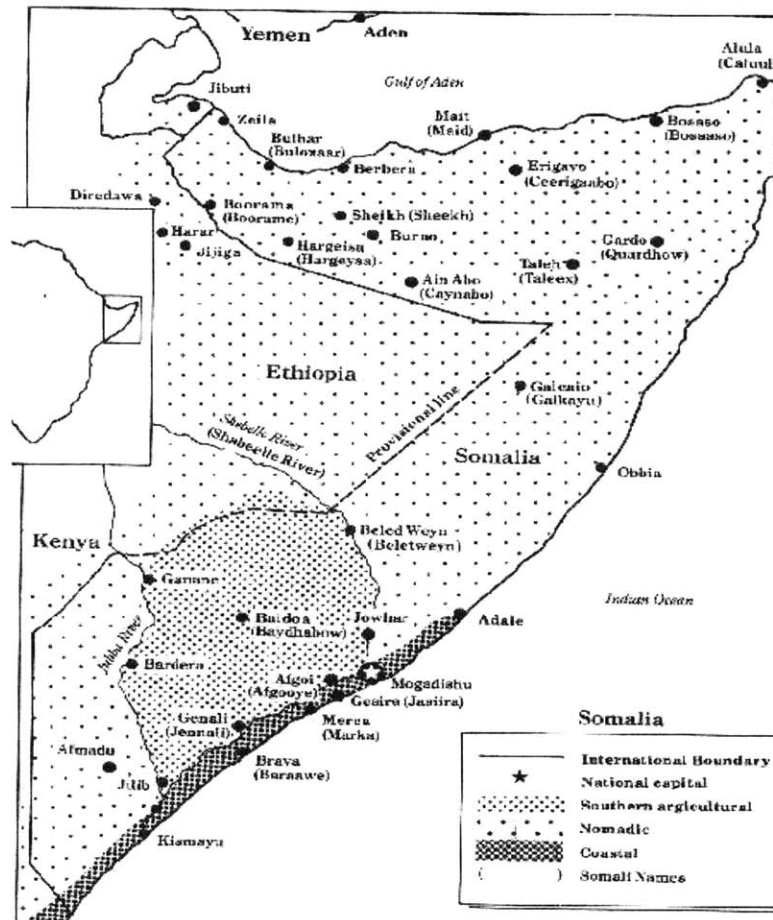


Figure 4: Map of Somalia [Source: Somalia in Word and Image, p. 4]

Somalia, which lies on the eastern coast of the African continent, is a country of nearly five million. Its history dates back to 1400 B.C. when a unified civilization was first considered identifiable with the region. Modern Somalia is made of multiple zones/socioeconomic complexes: the northern region, the middle area between the Shabelle and Juba rivers, and the coastal regions. These three regions vary culturally. In general, while the northern region is primarily pastoralist, the middle and coastal regions are more heterogeneous economically and ethnically. What is primarily identified as Somali culture in the west, however, stems from the northern region's dominance.

Approximately one million Somalis now live scattered around the world, most within the neighboring Islamic world of North Africa and the Middle East. However, there are rapidly growing communities throughout Europe and

North America. Particularly, in 1990, as a result of civil war, the numbers of refugees in the United States skyrocketed, increasing by roughly 200% since that period [Putnam and Moor, 1993].

Somalia has traditionally been a clan-based society. As early as the 12th century, scholars have determined that certain clans were established in their present territories. This clan system is generally a mercurial process: clan politics play a major role in the power hierarchy throughout Somali history. Generally, male councils are responsible for making community decisions. Most Somalis claim to be egalitarians. Women play a strong role in the economic sector, both in the agricultural labor as well as urban business. However, in many ways, women are still treated quite conservatively, particularly sexually. Not only are women still expected to remain virgins until marriage, but they also are often subject to female circumcision at an early age [Putman and Noor, 1993].

From this point, until the 16th century, Islam became the dominant faith of Somalis, and remained the major force until the mid-1800s when the Italians, English, and French colonized the country. In 1960, Somalia became a unified, independent country when the English ended their occupation.

For all Somalis, the family is the ultimate source of personal identity. Somali historian Charles Geshetker writes:

When Somalis meet each other they don't ask: Where are you from? Rather, they ask: Whom are you from? Genealogy is to Somalis what an address is to Americans [Putman and Noor, 1993, p.14]

The larger clan is the outer shell of the family concept for Somalis. These hierarchical groups are said to originate with a single male ancestor. A primary division within Somali clans exists between the Samaale and Sab. The Samaale, the primarily nomadic group, are divided into a number of sub-clans, and live throughout Somalia as well as neighboring Eastern African

countries. The Sab, on the other hand, are largely sedentary, and more strictly pastoral.

Finally, it is useful to discuss the ways in which Islam is manifested in Somali culture. Among Somalis, there is a strong tradition of *tariqa*, or religious orders associated with Sufism, a mystical current in Islam. As primarily Sunni muslims, Somalis tend to adhere to the orthodox teachings of the Prophet and his "Community", while in doctrine they follow the Muslim jurist ash-Shaafi'ii. However, there is a rift between these philosophical beliefs and their absolute strict following in all forms of Somali everyday life. For example, in terms of questions of inheritance, the legal law tends to be followed more closely than the absolute Shaaite doctrines.

In the stories that populate Village Voice, these themes of Somali culture manifest themselves. From stories about the Koran, the role of women, children, and reflection on a now war-torn country, browsing Village Voice exposes the fascinating way in which the Somali culture has framed the lives of these refugees in the Boston area. Before I dive into the stories and the system, I introduce this local refugee community, and tell the story of how my work with it has proceeded.

Oral histories

The role of story is significant in Somali cultural history. Story has mostly been presented within the form of poetry, the most developed art form from traditional Somalia.

Poetry serves as the ultimate expression of Somali cultural realities, often mixing objects and relationships in ways that may seem odd to the Westerner.

A young man compares his tender feelings for his beloved to a camel's feelings for her young: "I am afflicted with the trauma of frustrated love as a camel whose baby has been unjustly separated from her," and a mother

warns her daughter to be faithful in marriage by saying, "Only camels enjoy being milked by two men at the same time. Anything else of the female kind shared by two men loses its luster" [Putnam and Noor, 1993, 19].

Indeed, to the Somali, poetry traditionally has been a living art affecting almost every aspect of life. It has been a principal medium of mass communication, playing a role similar to that of the press and television in Western societies. The written alphabet only made its appearance in Somalia in 1972, and even with the entrance of basic technologies into Somalia, the dominance of poetry has been unquestioned.

As poetry is not a specialized art, and rather a statement of the entire range of realities for Somalis, it merits study what the effects of the transplantation to the United States would have on this traditional form. While this question is beyond the scope of this thesis, with Village Voice, I can study the effectiveness of alternative media, video, for storytelling, and its resonance with the local Somali community. This media is video and computation.

Somalia and the Internet

There is a Somali presence on the Web, and it deserves mention. SomaliNet (<http://somalinet.com>) is a web portal that offers relevant services such as news, yellow pages, discussion boards, chat rooms, matrimonial service, to its users. It is dedicated toward the maintenance of Somali culture through the web medium. While most of the site's visitors are of Somali origin, volunteers who run the site claim that many people researching or just interested in the state of Somalis around the world, take time to visit the site. All these services are free. Many people in the local community with whom I worked pointed this site out to me, and explained that it is by far the strongest online portal for Somalis living across the world.

3.3: Introduction to the Boston Somali community

The Somali refugee community in the Boston area, is concentrated amongst a few pockets in Jamaica Plain, Roxbury, Revere, and Charlestown. The

population of this group has expanded over the last five years, from about 3000 to 5000 [Yussuf, 2001]. Refugees span a variety of ages, however, because of the mercurial nature of some of the programs that brought Somalis to Boston, a number of families have been broken up in the process. Refugees today are victims of a civil war that has torn apart these families and decimated a once thriving culture. Resettlement is a potentially traumatic event for many of these refugees, with a markedly different educational, monetary, and social system that characterizes the United States.

There are only a few major hubs around which Somalis traditionally gather. Most important seems to be the Somali Development Center (SDC), on 205 Green St. in Jamaica Plain. Since 1996, the SDC has been a hub for educational and social services for the growing Somali community in Boston. SDC was established and funded by a small group of Somali-Americans who originally came to the United States to obtain higher education. The SDC has some specific goals for all Somalis in Boston, regardless of their immigration status.

(SDC) helps Somalis (and other African communities) in Boston, to obtain the basic resources, services, information and skills needed to build productive and self-sufficient lives in a new land. While strengthening the Somali community by promoting mutual assistance, cultural identity, and leadership, SDC fosters the ability of Somali individuals and families to advocate on their own behalf and participate constructively in the larger community" [Yussuf et al., 2000, p.1].

The specific services SDC offers include:

- Housing: search assistance, advocacy, interpretation, and translation
- Basic adult literacy program
- Youth programs: after school and mentoring programs
- Newcomer orientation and acculturation program
- Legal assistance: immigration, citizenship classes, welfare, etc.
- Health: women's issues/health care access
- Resources information: cable television program, community lectures, etc.

A number of other institutions exist for the purpose of preserving Somali culture in Boston, most of which are in the Jamaica Plain/Roxbury region. These include the Sagal café, restaurant, and computer literacy center, the Butterfly Somali crafts store in Roxbury Crossing, and the Somali Sunni Muslim mosque. My experiences with this community have been centered around the SDC, however, as it is the institution that introduced me to the larger community, and the one I continue to know best.

3.3: Building rapport

I was first introduced to the SDC through a friend who is a volunteer afterschool tutor at the center. I was amazed with the friendliness of the people whom I met, many of whom were very curious to meet me because of their love of Indian film(!). I introduced myself as a graduate student at MIT interested in using video to document the experiences of people in the community with the purpose of allowing each other to identify their shared issues, challenges, and experiences as recent immigrants to Boston.

This objective first seemed a bit intangible to the SDC leadership. How could a community that lacked bandwidth benefit from such a technology? And why would this technology be necessary in a geographic community that was already quite centered around its social institutions? I found all these valid questions, which Village Voice could help me find the answers to.

The project was well received from the start. There were obvious needs that this project could fill for the SDC. Most among them was the situation with incoming refugees. One of the priorities of the SDC is to work to integrate these people with the existing Somali community, and ultimately with the basics of living in Boston. A technology that could introduce new members to issues and associated stories of the community would help the process of acclimation. In addition, building a tool that could document the unique culture of Somali-Americans could help future generations be connected to their traditions, and reflect on how they have changed over time. Finally, the

SDC was interested in using the different video stories gathered by project to present thematic programs on their weekly cable access television show in the area. While not as interactive as using the technology, this would certainly release the stories of the community based on the themes specified within the ontology.

A variety of SDC members had indicated to me that the center faced some significant problems. For example, the clan heritage with which many Somalis identify has been a significant stumbling block in the center's efforts to try to build a unified community that can benefit from the programs it offers. Is it possible to use technology to remind Somalis of this heritage yet still show that these refugees are one clan, together living in Boston? More generally, I am curious about the role of technology to facilitate the adjustment of a new community to an outside culture.

I knew little about Somali culture before first going to the SDC, and have enjoyed the sometimes disorienting experience of getting to know these people. This project has made me think about what it must be like to move to a completely foreign culture, and the difficulties of maintaining culture and identity given the departure from its home country. It has given me the excitement to explore a new language, learn about a fascinating culture of storytelling, and continued respect for the Muslim religion.

I became involved with the community first as a tutor and mentor for teenagers. This involved bi-weekly visits to the community center and other Somali institutions, where I would work on different subjects with these kids. I found it sometimes difficult to teach these kids certain concepts because the textbooks were all written in English, which they knew to varying extents. Over time, this helped me meet more people within the community (such as these kid's parents), and learn more about how the community operated in general. I feel like I became a familiar face, and eventually Somalis whom I had met would go out of their way to warmly greet me.



Figure 5: The citizenship classes at the SDC, taken from a community created video story. This image shows the room in which community leaders typically meet.

I found the tutoring process very difficult at times. The curriculum that the kids were expected to learn from assumed the standard educational background of an American high-school student. However, because of the war and their transplantation from Somalia, many of the kids speak broken English. The civil war continues to impact all facets of Somali infrastructure, and parents often were forced to not send their children to any school at all. Besides these barriers, I found these kids willing and eager to engage me in all sorts of conversations, and occasionally committed to their homework. In general, various Somalis have told me that they feel more comfortable working with me on these projects because I also come from an immigrant family. There is a lot of curiosity that Somalis have about the experiences of Indian-Americans, and while my family's situation is certainly different, the issue of cultural adaptation amongst many different immigrant communities is undeniable.

Abdi Yussuf, the leader of the SDC, introduced me to many different activities and events that were going on in the community. The documentation within Village Voice is reflective of my growing familiarity with the community, and the openness the Somali people began to feel toward my project. Included in the footage, are private house parties, detailed footage of the Somali store at Roxbury crossing, conferences of local elders discussing the future of Somalia, local mosques, etc.

After an initial period to establish familiarity and support for my project, I began to take steps to create the content to populate the storytelling system I was designing. First, I began to shoot community events on video. These spanned the citizenship classes, lunch at Sagal after attending the Mosque, and small music concerts. I found this complicated at first. A number of Somalis were clearly uncomfortable with me toting a camera around, even after asking them if it was ok for me to film them. I was asked several times if I was Muslim, particularly by the elderly women, and when I answered that I was raised Hindu, was told that they could not be video taped.

The issue was clearly a lack of cultural permeation, as confirmed to me by several community leaders. Even if it were understood that I was involved in a project to help the community, an outsider with a digital video camera was difficult to adjust to. I could find very little demographic or anthropological research related to Somali refugees in the United States, let alone the Boston community. This made Village Voice, an even more exciting project to me because of the possibilities it could offer for a new approach toward community research that could unite modeling, visual anthropology and multimedia.

3.4: Community characterizations

In Chapter 2.1, I introduced McMillan's four essential criteria that constitute a community. To introduce Village Voice, it was important to consider how the Somali community meshes and extends this definition.

Spirit: There is a definite sense of emotional safety, and a need to preserve this amongst Somalis in Boston that I have met. Safety and fear are terms that have come up repeatedly in my discussions with them about being a refugee in the United States. There is a feeling that without the structure of institutions such as SDC, the boundaries and sense of belonging for Somalis here would be in question.

Trust: Similarly, without the order and belief in it that without the order provided by local institutions, Somalis in Boston would not truly be a community.

Trade: The collaborative processes of working together in the after school tutoring centers, or in citizenship classes demonstrate a clear mutual dependence. Outside of these planned events, Somalis seem to have the need to unite in their social and cultural lives. Proof of this is that the community lives in geographical “pockets”, facilitating their interactions.

Art: A “shared history” is apparent in the common culture, poetry, and music of the community. Constructing an art for the community as it exists in the United States, is still a work in progress, given the mix of cultural influences this community experiences. Projects such as Village Voice open the potential to stimulate community art through the sharing of story.

3.5: The creation of stories

After two introductory months, it became clear that I needed to involve members of the community to lead the project. This would allow the project and its purpose to be better communicated to the entire community, while facilitating the search for potential story creators. I began to introduce the project to the kids I was tutoring, elders in the citizenship classes, at the

local high school (English High School) where the Somali teenagers of the area went to school, and via the weekly cable-access television show.

It took a short while, but the efforts paid off. First, I met Saida Mohammed, a 19-year old who runs the SDC's mentoring program, and is currently a student at the Massachusetts College of Pharmacy. Deeply passionate about her community and the need to articulate its changing physical and cultural environment, Saida was an ideal first partner in this project. Because of her links to many high school students whom she mentors, and her role in the Somali College Students group that meets roughly every week at the SDC, I soon met many prospective story creators.

Because of equipment constraints, we settled on seven regular story creators in the community, all of who were between 15-20 years old. I tried to recruit more adults to make stories as well, and have made some successes in getting feedback on the project, but am still waiting for video stories from them.

First, I introduced the participants to the technicalities of the video camera along with some thoughts I had on film and story. My goal was not to impress any ideology on the story creators, but rather to show the variety of means by which stories could be told even through video. The workshop curriculum, which can be found in Appendix A, was based on the following goal:

I would like all the workshop participants to recognize that they and others tell stories all the time, to have a sense of how to capture a story (stories that are spoken and stories that are created by capturing a visual sequence).
[Srinivasan, Appendix A]

I tried to approach this goal by alternating between practice and critique. These discussions included the technical topics of panning, zooming, sound, and lighting considerations, and more subjective feedback where participants would discuss the power of each other's practice stories. The first exercise

was to have participants use video to film a story of their choice. The second and final exercise was more explicitly filmic. Its task was to capture a visually rich sequence. The idea of this exercise, I explained, was to think about how to film a phenomenon that contained some sort of motion (that needn't necessarily be physical). We decided to practice on the banks of the Charles river and film a small regatta that was occurring during the day. It was interesting to see the level to which the video stories had evolved over the course of the day. Filming a regatta did not necessarily entail merely focusing on some sailboats, or needing to continuously run the camera. Rather, the videos made were focused yet more cognizant of the larger atmosphere, including people, zooms on the water, panning on the shores, etc.

The story creators I have worked with are Muse Mohammed, Saida Mohammed, Aziza Munye, Hodan Farah, Abdullahi Mohammed, Haroun Farah, and Salayman Dual. I have asked two of the story creators to write a short paragraph about each of themselves to introduce themselves:

Salayman Dual

I am Salayman. I am a freshman at English high school in Jamaica Plain. I am from Somalia. I like to play sports like soccer and basketball. All Somali kids are interested in sports but we do not have someone to help support us. in general, we need help with support.

I have lived in America for 2 years. My family sent me a visa from America when I was in Somalia. I like this video project because you learn how to use the camera, and making a lot of friends and it can remind you about your community.

Harun Farah

My name is name is Harun. I am 18 years old. I am from Mogadishu, the capital city of Somalia. I play soccer, basketball and dance for fun.

My best friends are Salayman, and Aziza, who are both making videos for this project. the Somali community in Boston helps each other, and we go to the center for help with school and homework. We get summer jobs from the community.

I am interested in this project, because it is so fun to learn video skills. this project helps the community see each other in different ways.

After the workshop, I gave very few instructions to participants except to focus their stories on issues that are relevant to them as Somali immigrants in Boston. I tried to give them some ideas about possible stories, while encouraging them to still focus on whatever issues they wanted. My suggestions included:

- A discussion about cultural artifacts: old photo albums, clothes, crafts, music
- Role of the family and how it might have changed. What are the dynamics in their family across generations?
- What are your dreams? How do you express through a self-made story?
- How do you view your Somali culture in America? Has it been easy for the community to adjust?

Over the next couple of weeks, I occasionally checked in with the story creators, to catch up on what they had managed to film, problems they were encountering, and how they were finding the process.

The next challenge I faced was to build on the results I had achieved in the fieldwork to create a system that could serve as a voice for this community of refugees.

Chapter 4: Implementation

This chapter will provide the details behind the creation of the Village Voice prototype. In this chapter, I

1. Discuss the process by which an ontology design was elicited.
2. Explain how stories are associated with the ontology
3. Give a walkthrough of the Village Voice prototype
4. Provide details of the system's architecture

4.1: Ontology design

Over a month, 50 stories were collected from the seven story creators.

I wished to use these stories to stimulate the design of a representation, or ontology, that could illustrate the intersecting issues of the community. My goal was to engage the community in the reflective process of creating an ontology that could articulate the relationships between relevant community issues. As issues in the community would change, the community could redesign this representation through future ontology design meetings.

Here I present the methodology and result of our initial community ontology design:

Date of workshop: Thursday, April 11, 2002

Background: 50 stories created by community members were collected, and uploaded to the Village Voice system in Quicktime 5.0 Format. I converted these stories to a VHS tape for the meeting because the SDC lacks the computer resources to access the Village Voice site. The story creators had created approximately two hours of video footage by this point.

Presentation: We had divided up the workshop into two sessions, both of which were attended by many of the same participants. The first presentation took place in the morning after the citizenship class, and the second took place during the traditional tutoring sessions, after school for

some of the younger participants. The two sessions went from 11 AM – 1 PM and 2:15 – 5:00 PM. Each session had about 20-30 participants.

Setup: Approximately 80% of the videos were in Somali, and had only been roughly translated for me. Many of the participants, particularly older members, did not speak any English as well. For these reasons, two leaders of the SDC helped me lead the workshop. They are Abdi Yussuf, current director of the SDC, and Abdul Hussein, the founder of the SDC and owner of Sagal Café and Enterprises.

Goal Explanation: Abdi and Abdul asked me to give them some examples of ontology so they could explain it to the community. I concluded on an approach of explanation through example. I showed them a variety of different ontology projects, including CYC, Concept Maps, and Open Mind. Abdi and Abdul concluded that they would explain the ontology to the participants by asking them to discuss community priorities and the relationship between these.

Stories, reflection, and decision-making: Each session began with an explanation in Somali to remind participants about the purpose of the project. The movies were then shown on the VHS tape, and participants were encouraged to pause, stop, or repeat the video at any time. They were instructed to do this whenever they felt an issue that was relevant for their community was revealed in a story. During the pauses, the community would discuss the videos they were watching and craft a part of the ontology diagram on the white board in the front of the classroom.

The question of following tradition versus adaptation to being in America dominated the discussions participants had during the workshop. Elders would express consternation over the direction their kids had taken. One elder woman implored, "These kids don't have the respect for authority we did at their age. Look at the language they use. What has happened to what the Koran has taught them?" Some teenagers, on the other hand, while

remaining quiet when elders were in the room, would tell me that while they had great pride in their heritage and religion, felt a need to fit in with their peers at school, and to follow the opportunities being in America has allowed them.

Particularly spirited arguments came up when movies related to women and sexuality, and generational issues were viewed. Even the older and deeply religious participants, were very divided on the question of female circumcision, which is performed on approximately 98% of Somali girls. Some participants argued that their move to a more democratic and diverse country should force them to reconsider such practices, which cause health problems and are invasive to women. Others, however, said that rejecting these traditions were insulting to their Somali Islamic heritage.

During these discussions, the community would come to a consensus on whether an issue that had come up should be included in the ontology. For example, one story was set at a Somali youth party. It showed teenage men and women dancing together dancing to hip hop music. The idea of a youth dance party without Somali music was disagreeable to some of the participants because of its disrespect to the Islamic taboo of pre-marital relationships, while most of the youth at the meeting argued that one could have a pre-marital relationship without being disrespectful to Muslim culture. During this discussion, the participants decided that issues of religious tradition, sexuality, and generational differences were relevant to the ontology. These topics were then added to the ontology and linked to each other on the white board.

The process of using these stories to allow the viewers to articulate their opinions ended up being the key to the design of the ontology that emerged. The fact that certain issues raised such discussion brought to light how relevant they were to the overall community, and allowed community members to flag them as relevant to include in the ontology. Over the course

of the meeting, we went through several iterations, as different participants would offer input and sketch the consensus of issues on the whiteboard. The drawn structure changed multiple times in the process, as the community members reflected further on the issues that united them.

The structure that emerged from the design meeting is shown in Figure 6:

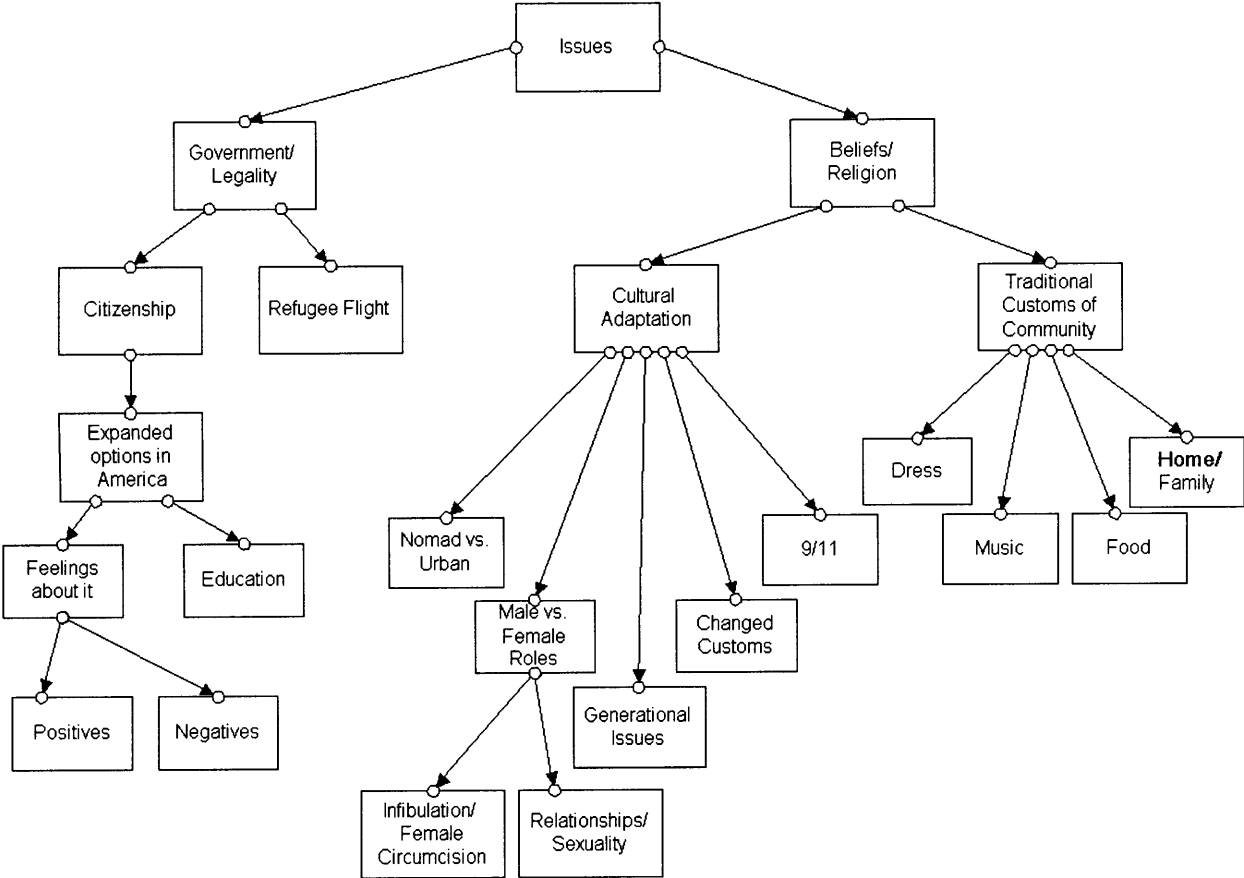


Figure 6: Somali Community Ontology

Every community issue listed in the above diagram is called a “node” in this thesis. The above ontology is a tree-like structure, where all nodes are considered a “part-of” the parent to which they are directly linked. The question I next faced was related to integrating this ontology into the Village Voice.

4.2: Associating a story with the ontology

Before discussing the interface, I explain the process by which stories are associated with the community ontology.

I instructed the story creators with the basics of iMovie. As digital video cassettes were brought to me for submission, the story creators would use the editing software to extract stories from the cassettes, and convert them to the Quicktime 4.0 format. The story creators were then instructed to annotate these stories according to the ontology, using the story "upload" page (See Figure 7). In the below page, the branches of the ontology tree can all be expanded so that each node can be annotated by clicking on its associated check box. The story creator is also asked to select the Quicktime file, and an associated thumbnail for the upload.

Upload a movie clip.

Issues:

- government/legality
 - citizenship
 - expanded options in america
 - education
 - feelings about it
 - positives
 - negatives
 - refugee flight
 - beliefs/religion
 - cultural adaptation
 - nomad vs. urban
 - male vs. female roles
 - infibulation/female circumcision
 - relationships/sexuality
 - generational issues
 - changed customs
 - 9/11
 - traditional customs of community
 - dress
 - music
 - food
 - home/family

Upload movie file:

Title:

Description:

Author:

Upload thumbnail file:

Figure 7: Video story upload page. Every node in the ontology tree is made available for story annotation.

The story creator can decide to annotate his or her story with as many of the ontology nodes as he or she wishes. These annotations determine the association between the story and the ontology. In section 4.4, I show how a story's annotations can be changed by the author.

Village Voice has been made publicly available on the web (<http://village-voice.media.mit.edu>). As stories are submitted from the upload page they are included in the database.

4.3: Search page

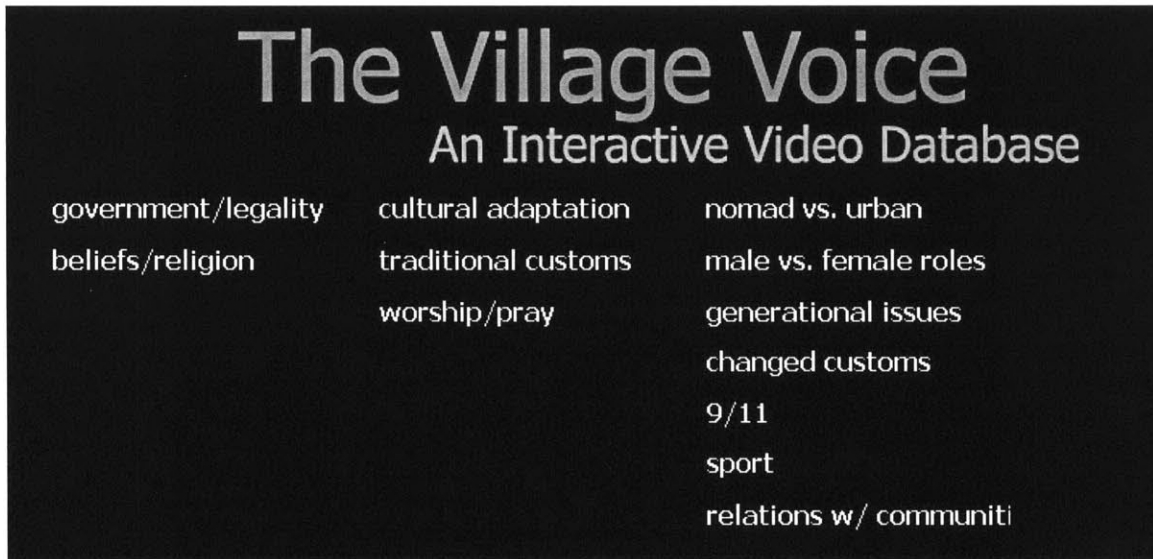


Figure 8: Village Voice Search Page. This page shows one major branch of the community-created ontology.

Village Voice is entered via a "search" page, shown in Figure 8. This page is organized hierarchically, according to the tree-based design of the ontology. The user can select multiple nodes from the tree that he or she is interested in watching stories about.

There are two colors of text on this page: white and yellow. The yellow text (at the bottom of the page) reflects the nodes that the user has selected to browse stories on. In Figure 8, these are citizenship, refugee flight, and sexuality/relationships. The white text (in the center of the page) reflects the ontology tree, from which can select an additional node to browse on by clicking on it. Finally, the user needs to click on the search button to reach the browsing page, which expresses the relevance of stories in the system to the topics chosen by the user.

4.4: Browsing collage: Interacting with stories

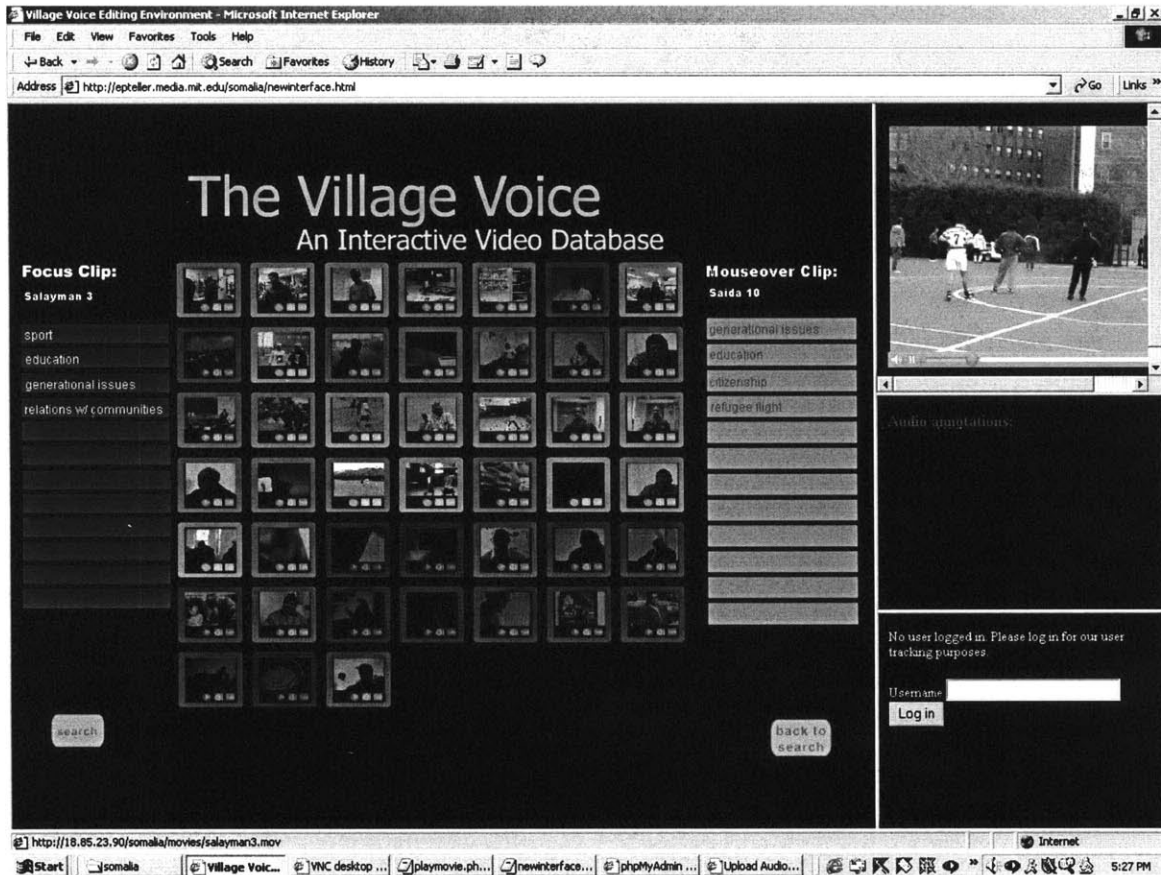


Figure 9: Browsing collage page

Much of my inspiration for the browsing page design comes from Murtaugh's implementation of the Random Walk project. Murtaugh uses the visual variables of illumination and size to convey information about the user's browsing status. I simplify this approach for the purpose of showing the clusters of stories that originated when browsing. The page displays the thumbnails of all the video stories in the database, which are loaded when the system is initialized.

The browsing page is designed to give the user a wide range of information about the different video stories, while conveying their relationships to each other.

As seen in Figure 9, the thumbnails are illuminated to varying levels. This is reflective of how closely each thumbnail corresponds to the terms the user decided to search on in the search page. A brighter illumination indicates a closer match with the search query.



Figure 10: The focus story and its relationship to the collage. The selected story is highlighted in pink, and the other stories in the collage are shown with different levels of illumination depending on their similarity to the focus story.

The story that best matches the query is known as the focus story, whose thumbnail has a pink-colored border. Once the browser is loaded a user can change the focus story by clicking on any other thumbnail in the collage. This changes the illumination of all the other thumbnails in the interface based on how closely their annotations match those of the new focus story.

The user is now presented with a number of options. These include:

Thumbnail Options



Figure 11: Story thumbnail. The three buttons on this thumbnail (from left to right) allow the user to stream the video story, view all its audio annotations, and upload an audio annotation of his or her own.

The story can be played by selecting the play button, which is the leftmost of the three buttons below the thumbnail. This will stream the video in a frame to the right of the collage.

Users can also record their reactions to any story that they view. These reactions can be uploaded as audio file to Village Voice by selecting the Talk button below the thumbnail. This will open a page, as shown in Figure 12.

Upload Audio Annotation for "Muse 9"

Name this annotation:

Annotation by:

Upload file:

Figure 12: Audio upload page. This page appears when the upload audio annotation button (see Figure 11) is selected.

Finally, the user can listen to the audio annotations associated with any story. These can be loaded by clicking on the middle of the three buttons under the thumbnail.

Searching on ontology nodes

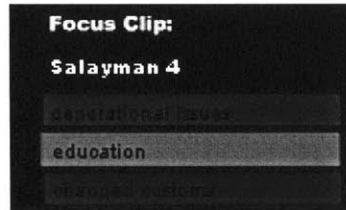


Figure 13: Focus story annotations according to the nodes of the ontology. This box is shown to the left of the browsing collage.

The user can concentrate the browsing collage to focus on a subset of the nodes of the ontology that the focus story has been annotated with. This is done by selecting any number of nodes from the focus story annotation box, which is found directly to the left of the browsing collage.

At any time, the user can leave the browsing page to go back to the search page, by clicking on the "back to search" button on the bottom-right of the page.

Clustering algorithm

Village Voice finds stories that "best" match a user's search queries or browsing choices based on its clustering algorithm. The level to which a story matches the browsing choices is revealed in its level of illumination, or alpha value. Alpha values range between 0 and 1, and are directly proportional to the score calculated below.

In this algorithm, I introduce the terms "branch nodes" and "end nodes". A story's end nodes are the ontology nodes with which it is explicitly annotated. A story's branch nodes, however, are not only the nodes with which it is annotated, but all the nodes on that story's branch of the ontology tree. For example, if a story is annotated with the nodes "Nomad vs. Urban" and

"9/11", its end nodes would be the two nodes, but its branch nodes would also include their mutual parent, "Cultural Adapation".

The algorithm is presented in pseudo-code form. There are two cases, the search version where nodes are selected to search on from the search page, and the browse version where a story thumbnail is clicked on, causing all the other stories to react accordingly.

```
var max_score = 0;
//max_score variable, initialized to zero is the variable that stores the score of
// the story that best matches the user query.

for each story
    var x = its branch nodes;
//goes through each story and identifies its branch nodes: nodes of the entire
//tree branch: sets all these nodes equal to variable x

for each story {
    if(search version) //search case
        var y = end nodes that are selected on the search page;
        //identifies story's end nodes: sets them equal to y

    elseif(browse version)
        var y = end nodes from the story that is clicked on
        //identifies story's end nodes: sets them equal to y

    var z = x ∩ y;
    //sets the var z = to the intersection between the query and each
    story's end nodes
}
    var story_score = z;

    //the story score variable is the score assigned to each story in the
    //database, it represents how closely the story matches the user
    //query.

    if(story_score < max_score)
        do nothing
    if(story_score > max_score)
        max_score = story_score;

//the above four lines define max score: max_score is defined as the highest
//story_score

for each story
    var percent_score = story_score/max_score;
```

```

var story_alpha_value = percent_score/100;

//percent_score converts the story_score to a percentage. Story_alpha_value
//is the end illumination value

```

4.4: Village Voice: System architecture

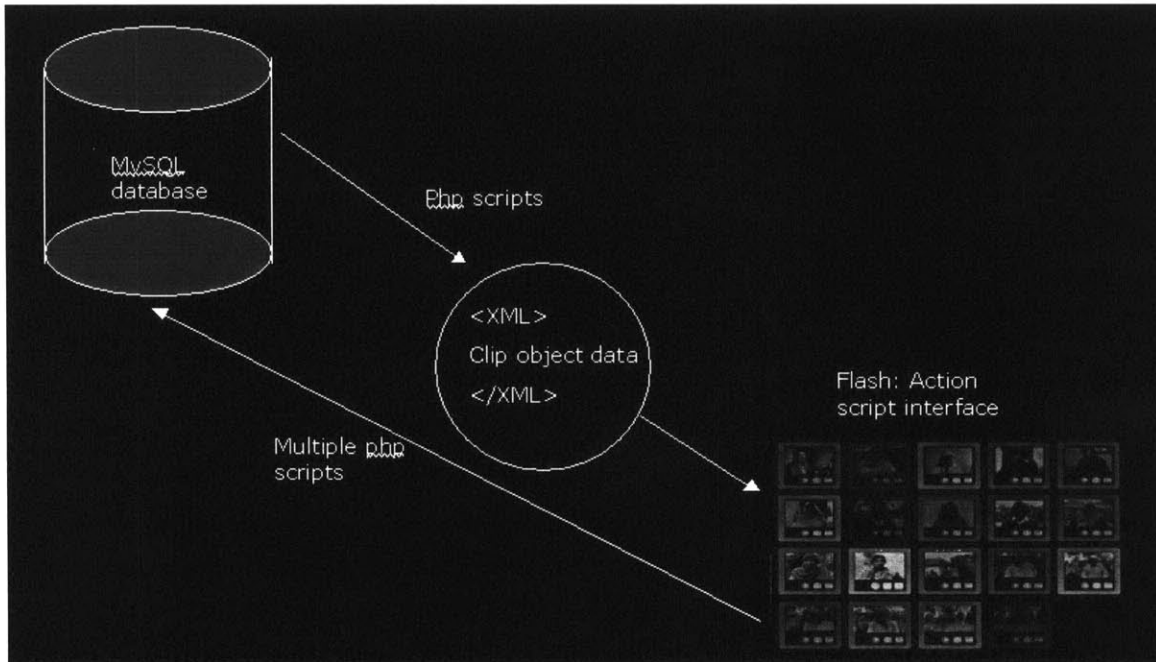


Figure 14: Mapping the relationships between system components. The Action script interface communicates with the MySQL database via PHP scripts that interpret and send XML object data.

The diagram shown in Figure 14 is the relationship between the database, the server-side scripting language to relate the data to the end user (PHP), the object in which the data is described to the interface (XML), and the flash-based Village Voice web page (authored in Action script).

Database

The ontology is represented as a set of MySQL tables. The relationships between nodes is expressed in the following table:

id	child	relation	parent
8	education	part-of	new options in USA
3	government/legality	part-of	issue
4	citizenship	part-of	government/legality
5	new options in USA	part-of	citizenship
6	feelings about it	part-of	new options in USA
7	refugee flight	part-of	government/legality
9	beliefs/religion	part-of	issue
10	cultural adaptation	part-of	beliefs/religion
11	nomad vs. urban	part-of	cultural adaptation
12	male vs. female roles	part-of	cultural adaptation
13	female circumcision	part-of	male vs. female roles
14	relationships/sexuality	part-of	male vs. female roles
15	generational issues	part-of	cultural adaptation
16	changed customs	part-of	cultural adaptation
17	9/11	part-of	cultural adaptation
18	traditional customs	part-of	beliefs/religion
19	dress	part-of	traditional customs
20	music	part-of	traditional customs
21	food	part-of	traditional customs
22	home/family	part-of	traditional customs
23	positives	part-of	feelings about it
24	negatives	part-of	feelings about it
26	worship/pray	part-of	beliefs/religion
27	sport	part-of	cultural adaptation
28	relations w/ communities	part-of	cultural adaptation

Figure 15: Ontology-relationships stored in MySQL table

Each node in the localized ontology is identified by its id number, which is shown in the leftmost column in Figure 15. Stories are annotated in a separate table based on the aspects of the ontology linked to them by the story creator.

movie_id	attribute
1	8
1	15
1	22
14	15
12	16
12	21
12	22
13	8
13	23
14	16
14	28
14	20

Figure 16: Table storing video story basic data. This table links each video story, represented by an id, to an ontology node, represented by an attribute number.

The table in Figure 16 shows how Story 1 is linked to attributes 8, 15, and 22, for example. These linkages are constructed from the story upload page that was previously discussed.

Server Side scripts and Object representation

The glue that links the Village Voice interface and movie upload pages to the database is a set of PHP scripts. In total, Village Voice uses nine PHP scripts. These are:

- hierarchy.php**: script that loads the ontology hierarchy from the database onto the search screen
- searchAll.php**: script that sends the selected queries from the search page, ranks the stories, for display in the Browsing collage
- changeOntology.php**: changes the database when new additions to the ontology are made.
- rescore.php**: rescores all of the clips when a story thumbnail is clicked
- research.php**: scores of the movies based on nodes selected to search on from the focus story table (Figure 14)
- audioLinks.php**: returns links to all the audio annotations associated with a story, triggered when the middle button under the thumbnail is clicked on.
- playAudio.php**: streams the video story when the play button under the thumbnail is clicked

uploadAudioSpecific.php: upload form to add an audio annotation about a specific story, triggered when the "talk" button under the thumbnail is clicked

upload.php: page on which story creator can upload a story, or change its annotations

To associate different annotations with the story, I decided to represent each story as a data object containing a title, audio reactions, the video file, thumbnail, and a set of nodes in the ontology to which it corresponds. A useful way of capturing this object so that it can be passed cleanly from the database via PHP to the Flash interface is by describing it in XML.

```
<?xml version="1.0"?>
<Stories>
<Story>
<title>Vices in Village</title>
<ID>13</ID>
<MovieFile>RekhaYounger</MovieFile>
<Thumbnail>RekhaYounger</Thumbnail>
<attribute4>unemployed</attribute4>
<attribute5>unstable employment</attribute5>
<attribute6>degree</attribute6>
<attribute7>youth</attribute7>
<attribute8>information</attribute8>
<attribute9>drinking</attribute9>
<attribute10>family tensions</attribute10>
<attribute11>homemaking</attribute11>
<attribute12>isolation</attribute12>
<attribute13>information spreading</attribute13>
<spacer1></spacer1>
<spacer2></spacer2>
<spacer3></spacer3>
<spacer4></spacer4>
<spacer5></spacer5>
<spacer6></spacer6>
</Story>
</Clips>
```

This type of "markup" has been effective for representing the data of the story, because it allows each piece of data associated with a story to be looked at separately. Attributes can be added or changed, without having to change any other aspects of the object, for example. It is also useful because Action Script has several methods that allow it to easily parse an XML object. Instead of having to parse a set of data for a thumbnail file, for example,

Action Script can be instructed to only consider the <Thumbnail> tag for any operations that might be done.

Now that Village Voice has been introduced, I spend the next chapter studying the validity of my hypothesis.

Chapter 5: Testing and evaluation

In this chapter, I present an evaluation of the Village Voice's ability to disseminate story in the Somali community of Boston. I present results of my testing, which has had quantitative and qualitative components.

5.1: Experimental methodology



Figure 17: Keyword version used as the experiment control. This is a list of spoken words, from which the user can retrieve community video stories.

I designed an experiment to test Village Voice's use of ontology versus a keyword-based representation [Salton, 1968]. In the keyword version, I selected the five most frequently spoken words in each story, and annotated each of the stories in the system with these. The keywords were identified by the story-creators, who kept a histogram of the words that were spoken in their stories and gave me a list for each story. This list did not include "noise"

words such as “is” or “and”, which are without significant meaning. Because most of the stories were in Somali, the community’s input was critical in creating the control for this experiment. We also translated Village Voice into Somali so all the conditions would be replicated.

As in Village Voice, in the keyword version, words can be selected as the basis for story search. Browsing is also possible in the same way. The only difference is that this version groups stories based on whether the story is annotated with the same keywords. No clustering is done based on relationships within the ontology.

Over one week of testing, 30 subjects were tested, all of whom were Somali immigrants living in the Boston area. I asked each subject to sign an informed consent form, which assured them that the study was anonymous.

Quantitative

Each subject was asked to browse Village Voice and the keyword version for as much time as they wished, with a minimum of three minutes. Before using either version, the subject would log in to the system with an anonymous name so that I could monitor which sequences of stories the subject browsed, how long he or she stayed logged on, and how many stories were played. The audio annotation feature of the system was not completed when testing was conducted, so this was not measured.

After using the system, I conducted a survey, found in Appendix B, which asked the subject to rate each of the two versions, according to twelve questions. This data was also accumulated for analysis.

Qualitative

Along with the tracking data and survey ratings, an interview was conducted. The interview asked subjects about how representative they felt each version was of their community, and whether they felt such a technology was valuable for the Somali community.

5.2: Quantitative results

Tracking results

This data shows the mean and standard deviation values (across the 30 subjects) of the number of stories browsed, number of stories played, and time online for the keyword (KW) and Village Voice (VV) versions. The values for time online are expressed in terms of seconds.

	Mean value	standard of deviation
KW time online	263	205.36
VV time online	967	891.39
KW # clips browsed	2	0.697
VV # clips browsed	7	2.719
KW # clips played	1	0.433
VV # clips played	3	0.788

This data shows a higher engagement for subjects across-the-board with Village Voice. In general, subjects spent a lot of time studying the interface and not interacting with it heavily, as can be seen by the rather small number of clips played or browsed on in either version. Many subjects mentioned to me that they would have browsed in more detail if they were more used to the system and technology, in general.

I present the story of one subject, who browsed the system for 10 minutes. This subject was first exposed to the keyword version, and spent his time selecting words from its search page (see Figure 17), viewing the browsing collage and then going back to the search page. In the approximately 3 minutes that the subject used the keyword version, only once was a clip played, and no browsing was done from the browsing collage itself. The ontology version shows a different behavior. Seven stories were played, and the data shows that the subject clicked on multiple thumbnails on the browsing collage. Overall, the subject was more engaged with ontology version over all three of the data variables around which calculations have been taken. It appears that the ontology version inspires more browsing

activity from the browsing collage page, and that the clustering of stories in Village Voice enables subjects to perceive more connections between stories.

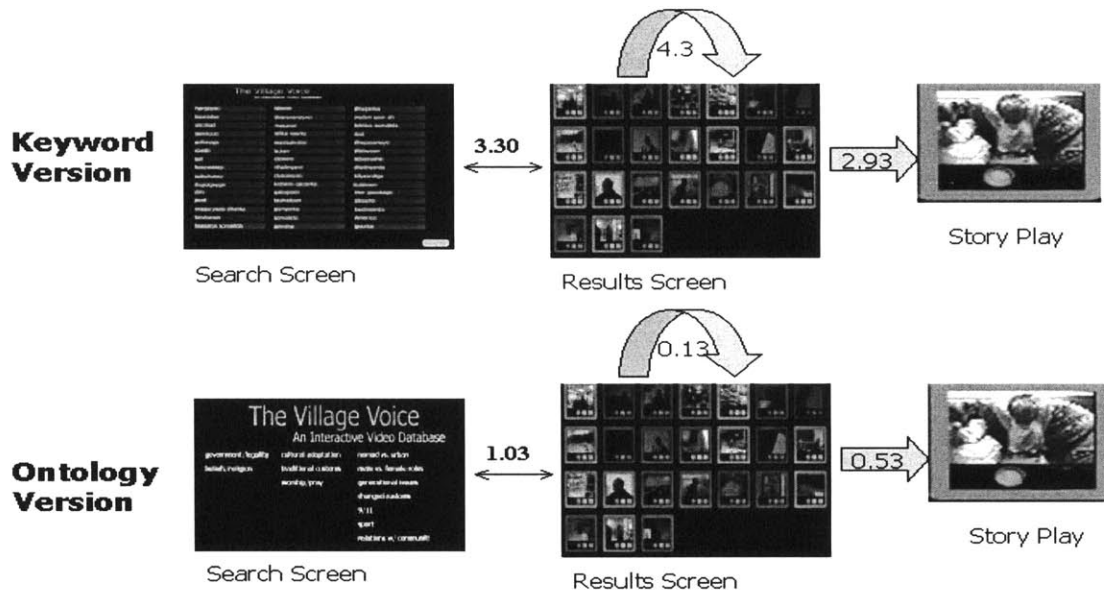


Figure 18: Browsing patterns of users in two versions. The numbers above indicate the number of times/session a subject would move between the components of the system

Figure 18 illustrates the average browsing behavior across tested subjects. The numbers above are the average number of times/session that the subject goes between the various components of the system in each version. It demonstrates a tendency amongst subjects to iteratively browse within the browsing collage, play more video clips, and not have to reinitiate their search by returning to the search page.

In Appendix C, I have attached diagrams that show the relative levels of engagement of all 30 subjects in terms of the three criteria (time online, clips browsed, clips played) listed above.

To assess whether the differences between these means is statistically significant, I have conducted a t-test. n , in the below table, is the number of subjects, or 30.

	t-value	Degrees of freedom 2(n-1)
Time online	4.15	58
Number clips browsed	9.7	58
Number clips played	8	58

For a degree of freedom between 50 and 60, the t-distribution table shows values of

	P<.05	P<.0025	P<.001
t-test value	2.660	2.915	3.232

All three t-values from the experiment (4.15, 9.7, 8) have t-values greater than the 3.232, value, which means that there is a less than 1% chance that the difference between the means of the keyword and Village Voice versions is due to chance. This allows me to conclude that in terms of user-tracking there was a clear preference for Village Voice.

Survey data results

This data shows the responses of the 30 subjects to the 12 questions I asked in the survey. For each of the questions, I asked subjects to provide me with a score ranging from 1 to 10, 10 being the top score.

Question	VV mean score	VV standard of deviation	Keyword mean score	Keyword standard of deviation
1	8.777	0.751	6.385	1.061
2	8.120	1.013	6.043	1.296
3	8.629	1.547	7.391	1.233
4	8.846	0.554	5.750	1.764
5	9.083	1.316	7.090	0.294
6	9.739	0.915	8.095	0.995
7	8.826	0.491	6.818	0.906
8	8.380	0.740	7.095	0.995
9	8.363	0.657	8.047	0.973
10	7.956	1.021	8.045	0.998
11	7.940	1.671	7.681	1.783
12	8.000	1.0954	7.619	1.596

There is a clear preference amongst subjects toward the Village Voice, at least in terms of the mean scores of their survey answers.

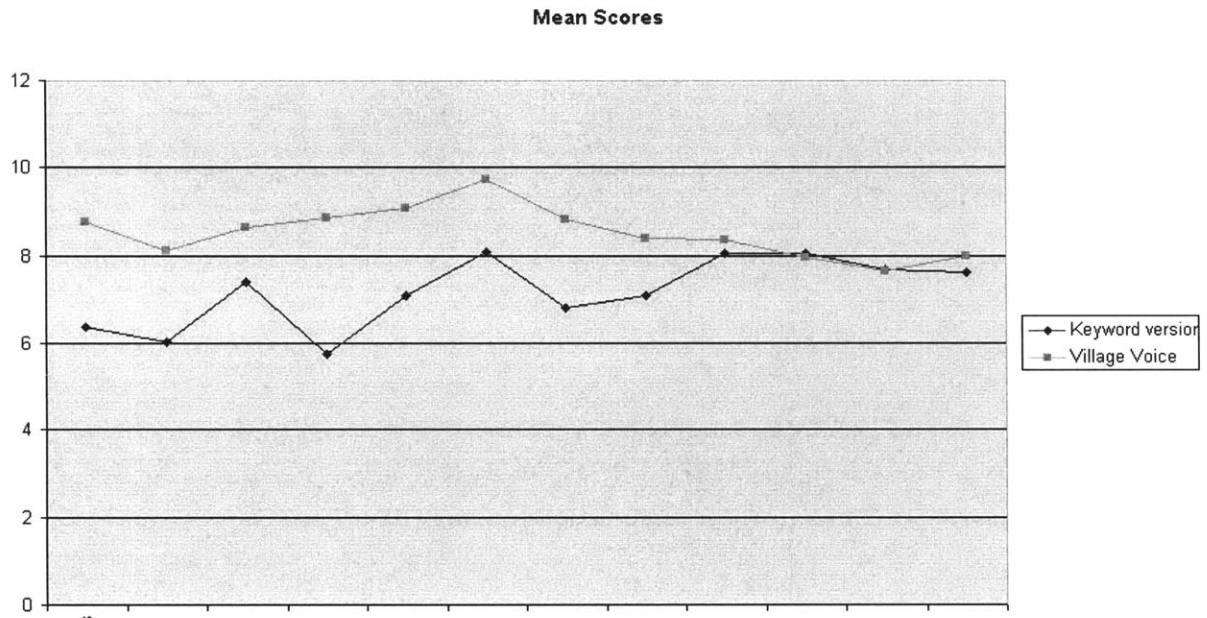


Figure 19: Mean scores from the survey data

I have also conducted a t-test on this data. This brings the following values (n is 12 below):

Question number	t-value	Degrees of Freedom 2(n-1)
1	6.105	22
2	4.186	22
3	2.074	22
4	5.555	22
5	4.900	22
6	4.032	22
7	6.457	22
8	3.438	22
9	2.890	22
10	3.602	22
11	-0.038	22
12	0.652	22

For a degree of freedom of 22, the t-distribution table shows values of

	P<.05	P<.0025	P<.001
t-test value	2.819	3.119	3.505

Ten out of the twelve above questions (83%) show a less than 2.5% chance that the preference toward Village Voice is due to chance.

5.3: Interview results

To add some depth to the results of the experiment, I present some of the main findings from the interviews. I present the two main interview questions, along with some paraphrased answers:

Question: Which of the two versions did you feel represents these stories and your community better, and why?

Answers: Overwhelmingly, subjects preferred the Village Voice, ontology-clustered interface. Out of the 30 subjects: 25/30 preferred Village Voice, 2 preferred the words, and 3 were undecided. A sample of responses included.

- The first, keyword version, only shows the words that are said. But those words are used in lots of different ways in the videos, and not necessarily in a way that allows us to understand what the video has to do with the word. It is more important to understand to look at the videos and how they are related to issues in our community
- The second version shows how all the issues in our community are related to each other. The first keyword version just shows a video using the word citizenship, for example, but doesn't allow me to see videos about refugees, and Somali politics, which are both important similar issues. The combination of citizenship, refugees, and government shows our situation much more than any of these three individually.
- As our community changes over time, the second version can show how our priorities and issues have changed.
- More videos are illuminated in the second version because more links are allowed between stories. Then different stories can be accessed more easily.
- Some of the videos that portrayed a certain issue in the community were silent, or didn't have words spoken that would link it to the issue.

These videos wouldn't be included in the browser under the keyword version.

- With the second version, outsiders can understand our issues as a community. Our culture is a combination of these issues, and the words said in the first don't indicate the nature of our experiences.

As these comments show, the response was overwhelmingly positive toward the Village Voice ontology-based interface. The only common criticism voiced about the second version was its difficulty of use. Requiring a user to search based on annotations at multiple levels of a tree-like structure was not as simple a process, in many people's minds, as viewing a simple list of words that could be selected from.

Question: How effective do you feel this system is as a representation of your community? In what ways do you feel this system is or is not useful for the Somali community here?

Answers:

- This project is important because it gives us a chance to see what are the main priorities overall in our community.
- (Village Voice) is useful for us and for outsiders. It gives outsiders a chance to see what is happening in our community, so they can understand and work with us better. But it is important for us too, because our community is growing apart and we need to understand what it is that unites us.
- Before I saw (Village Voice), I did not know that there were so many discussions about religion, and women's rights that people in our community were having. It makes me feel like I can add my opinion to this now.
- This project will take a long time before it can be used in our community. Not only do we lack Internet access at home, but very few of us are familiar with computers. I believe that after some time I will be able to use this computer system very easily
- (Village Voice) gives a full picture of our community without any biases. There are little kids, elder people, men, women, and different attitudes in this system.
- It is important that all aspects of our community be really represented for this system to be accurate. Not all the important people in our community are represented in these stories.

5.4: Evaluations

The t-test values from the user-tracking experiment indicate that Village Voice's incorporation of ontology encourages the subject to access the stories of the system more thoroughly. This is seen across the data related to time spent, stories played, and chosen sequences. It is also corroborated by the survey data, which shows a significant difference in user engagement between the two versions of the storytelling system.

The data indicates a tentative engagement among community members toward either version. I learned during the interview that this was due to a lack of familiarity with the system. However, it is clear that Village Voice has inspired a greater engagement with the subject. It would be interesting in the future to test how community members would use the audio annotation feature.

The interviews have allowed me to better understand the nature of the experiment data. These discussions have shown that representing stories relative to the community allows the system to connect issues more effectively. If issues such as technology-access are addressed, these results point to the effectiveness of localized ontology.

Chapter 6: Conclusions and future work

This thesis has demonstrated how localized ontology can contribute to the field of community publishing. It has shown a successful process of engaging a community of Somali refugees to design a representation to share the stories they create, and reflect on the role of ontology with a technology that could archive the new issues that they face in the Boston area.

I have observed that ontology can become a dynamic structure that can model a community, and that it can encourage individuals to frame their experiences in terms of relevant community themes. Testing has shown it to be a model that can allow stories to be disseminated more effectively than the traditional index of keywords that are spoken. As the community changes over time, it can use ontology to contemplate where it has been, and where as it attempts adjusts to life in the United States while maintaining its traditional culture.

Murtaugh's work in decentralized narrative has been a model to this thesis. I conclude that the incorporation of community-created stories adds a level of richness to this approach that makes Village Voice an engaging technology. Basing the unfolding of these narratives around the community ontology opens up the possibility for them to be disseminated more effectively than the traditional index of keywords that are spoken.

I believe that this work can continue to be advanced in a number of directions. Some questions that still need to be answered include:

- The ontology in Village Voice is an evolving structure, and dependent on the continued reflection of the members of the community. It is worth researching whether there could be a way of generating new incarnations of the ontology without having to periodically call community meetings. If the ontology is also based around the browsing patterns of community members, would it continue to be an effective representation of the community?

- No testing was done on the audio annotations functionality that Village Voice makes possible. It would be useful to understand how community members could use this feature.
- Members have indicated that they would like Village Voice to help them acquaint new refugees with the community. Is ontology a useful mechanism of conveying the stories of this community to an “outsider”?
- In the current implementation of Village Voice, the story creator is responsible for explicitly annotating and uploading his or her submissions. Automatically linking these annotations to user reactions would be worth studying.
- I had decided to only use the visual variable of illumination to show the clustering of stories. It would be worthwhile to study whether other attributes, such as size, or color, could better inform the user’s ability to use Village Voice.

This thesis has demonstrated the value of using communication technology to connect geographically and culturally-defined communities. Village Voice has shown that connecting the stories of a Somali community provides an opportunity to focus on the questions, values, and aspirations that unite it.

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Appendix A: Storytelling workshop syllabus

Number of attendees/given workshop: 15 (at most)

Equipment: Three DV cameras, possibly some kind of projector or television from which all 15 participants can view

Goals of Workshop: Two hour workshop: I would like all the workshop participants to recognize that they and others tell stories all the time. I also would like participants to think about how to create a video story about their community. This includes stories that are spoken and stories that are created by capturing a visual sequence.

Timetables: 10 am – 1 pm. Two breaks

Introduction session (30 minutes)

Teach the video equipment (30 minutes)

(BREAK 15 minutes)

1. Exercise (1-1.5 hours) Goal is to shoot an camera-edited visually rich sequence. Break up into rolling groups of 2 or 3. Have the groups shoot a sequence, and return with footage. In discussion, discuss shots and sequences. Discuss some of the issues of videoing people. Consider how to capture action, and that the camera needn't be necessarily on. Have the group critique each other's work.

2. Discuss Somali community and the issues with shooting video in this community (30 minutes)

Appendix B: Survey Questions

Please rate on a scale of 1-10 (10 is the best possible score, and 1 is the worst)

- 1.-Overall, I am satisfied with the story-viewing experience
- 2.-Overall, I am satisfied with the amount of time it took to find stories in the database
- 3.-Overall, I am satisfied with stories viewed
- 4.-Overall, I am satisfied with how easy it is to use this system
- 5.-I am able to complete my task quickly using this system
- 6.-Overall, I am satisfied with this system
- 7.-It was easy to learn to use this system
- 8.-I believe I became productive quickly using this system
- 9.-On-screen messages provided with this system is clear
- 10.-The information is effective in helping me complete the tasks and scenarios
- 11.-The interface of this system is pleasant
- 12.-I like using the interface of this system

Appendix C: User-tracking diagrams

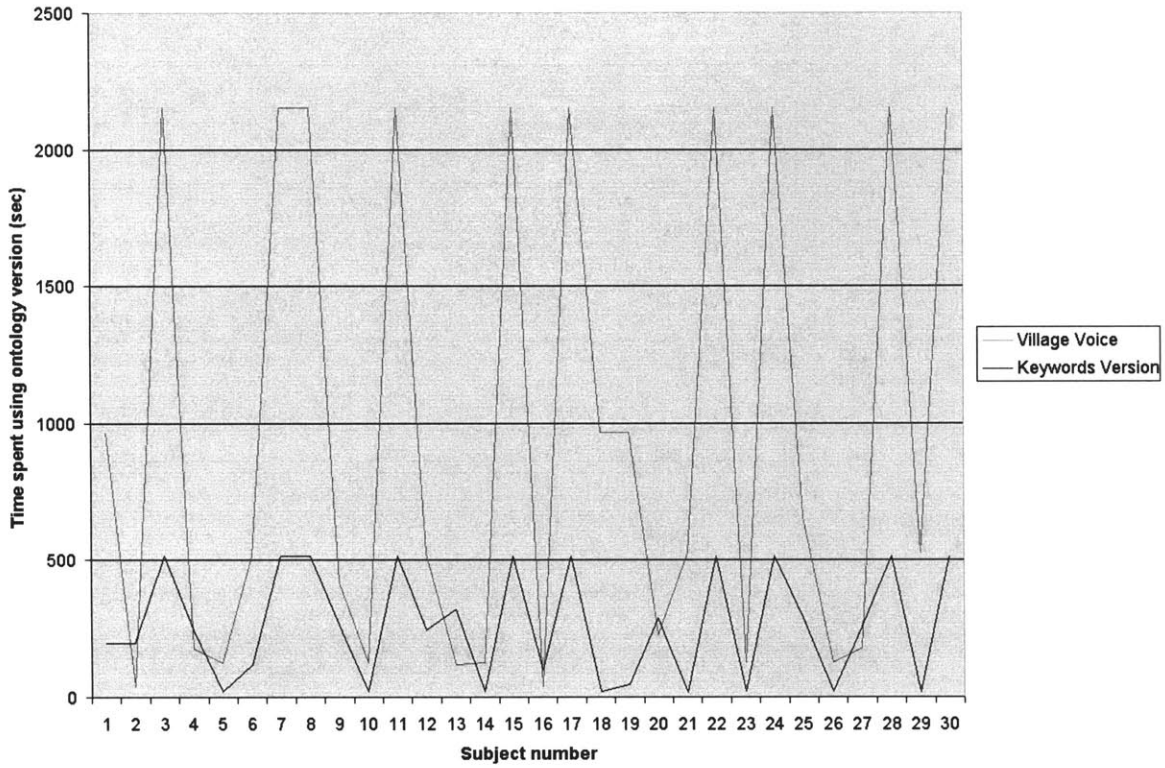


Figure 1: Relative levels of time online in keyword vs. Village Voice

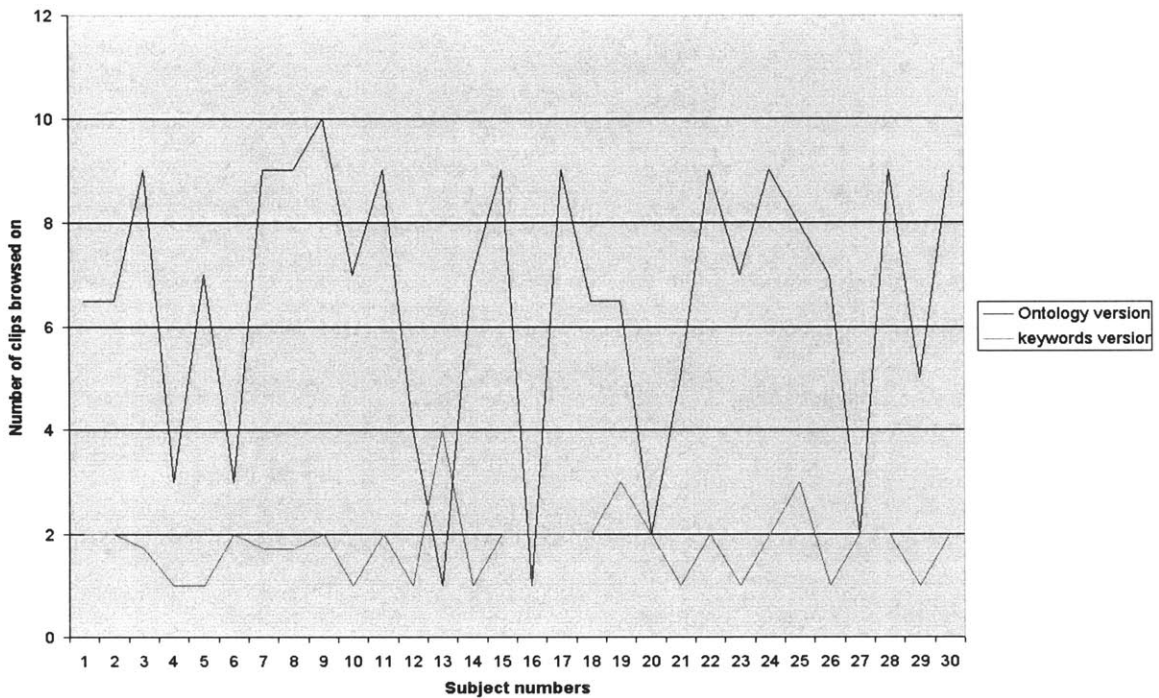


Figure 2: Number of clips browsed in the keyword and Village Voice versions

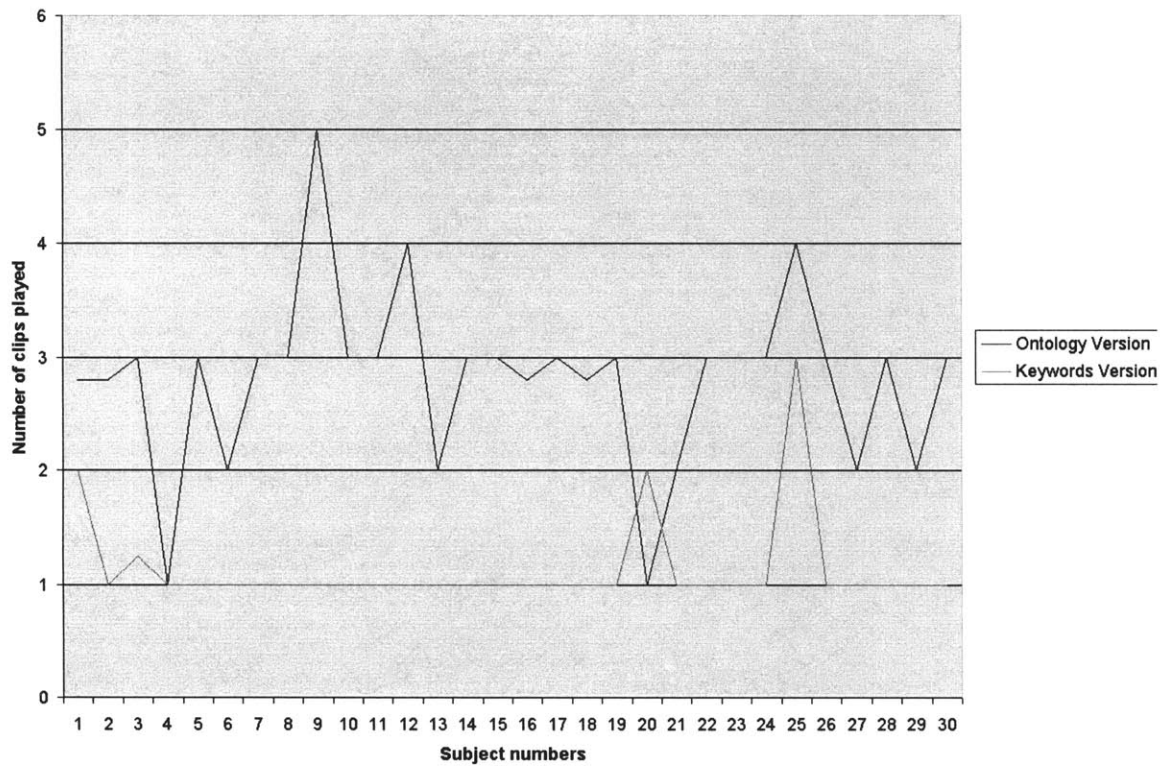


Figure 3: Number of clips played in the keyword and Village Voice versions