A Cultural Computing Approach to Interactive Narrative: The Case of the Living Liberia Fabric

D. Fox Harrell[†], Chris Gonzalez[*], Hank Blumenthal[*], Ayoka Chenzira[*], Natasha Powell[*], Nathan Piazza[*], Michael Best[*]

[†] Massachusetts Institute of Technology
77 Massachusetts Avenue, 14N-207
Cambridge, MA 02139

[*]Georgia Institute of Technology
Atlanta, GA 30332

Abstract

This position paper presents an approach to computational narrative based in cognitive linguistics and sociolinguistics accounts of conceptual blending, metaphor, and narrative, multimedia semantics, human-centered interface design, and digital media art practice. In particular, as a case study, we describe the *Living Liberia Fabric*, an AI-based interactive narrative system developed in affiliation with the Truth and Reconciliation Commission (TRC) of Liberia to memorialize a fourteen-year civil war. The *Living Liberia Fabric* project is led by Fox Harrell and executed in the Imagination, Computation, and Expression (ICE) Laboratory at Georgia Tech. The system exemplifies a *cultural computing* approach (grounding computing practices in a wider range of specific cultural traditions and values than those that are privileged in computer science). [11, 13]

1 Introduction

Content, or a "story," is often understood as that abstract information that can be narrated through a material form. Accounting for story content is a challenge because of the highly context-sensitive nature of construing and interpreting the meanings that make stories relevant to listeners. Such subjective issues are often not seen as amenable to computational approaches, hence some researchers in computational narrative often focus on constructing formal grammars for narrative rather than on creating computational approaches oriented toward providing meaningfully salient, cultural, and aesthetically motivated systems. Story content is usually seen merely as that information that instantiates a particular narrative form.

In contrast, the approach taken here (1) develops a cognitive/computational framework that focuses on providing narrative structure, variation, interaction, and narratives based upon culturally specific content [12], and (2) constructs a method for eliciting those cultural narratives and the values, metaphors, histories that they are rooted in. This narrative content, gathered using ethnographic methods and composed using principles from interactive narrative research, is then annotated to describe its semantic content in a manner that can be used by Harrell's GRIOT system to select multimedia assets and to generate narrative text according to thematic and visual

constraints imposed by algorithms based on insights from theories of conceptual blending and metaphor from the field of cognitive linguistics. [10, 14]

2 Theoretical Framework

The approach to computational narrative here is based on a tightly integrated interdisciplinary framework. Research in *interactive narrative* and *sociolinguistic accounts of narrative* aids in adding causal and temporal structure to users' interaction allowing for users' explorations to result in rhetorical effects such as presenting contrasting ideological perspectives [4] and different thematic content [9] and focusing on *narratives of personal experience* [15, 17]. Research in *HCI for Development* aids in designing for economically-marginalized stakeholder groups [2, 3]. *Cultural computing* [11] and *user/value-centered design* [7, 8, 20, 21] practices provide foundations for rooting our designs in traditional culture and ethical concerns and asserting interpretive goals aimed at ideological change.

3 Case Study: The Living Liberia Fabric

The *Living Liberia Fabric*, built using Harrell's GRIOT system for composing interactive multimedia discourse, is an interactive, web-based narrative supporting the goal of lasting peace after years of civil war (1979-2003). It utilizes a West African-based GUI metaphor that arose through a combination of empirical fieldwork and research into cultural needs, values, histories, and aesthetics.

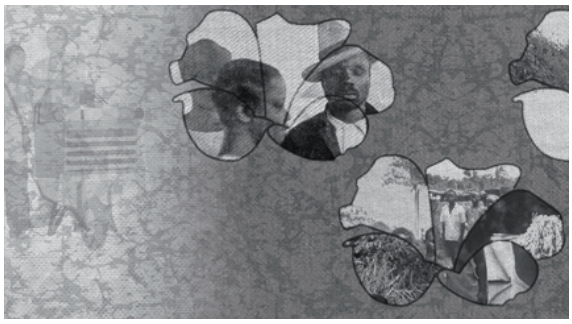

Figure 1: The initial interface contains clickable images of stakeholders that determine the narrative theme. Subsequent fabric-inspired patterns contain videos, images, and related assets.

3.1 Research/Development Process

Our process encompassed historical background research, a review of peace museums and memorials (virtual and physical), user analysis, scenario-based design, needs assessment, stakeholder analysis, requirements assessment, and iterative design, prototyping, and development.

Liberia recently has emerged from a fourteen-year civil war and one recommendation of the TRC is to memorialize that process. The following references were key references in understanding this context and aim: (1) *Truth and Reconciliation Commission Final Report (unedited)*. (2) *Oral Narratives. The Mobile Story Exchange System* (MOSES) a Georgia Tech project, developed to collect oral narratives in rural areas of Liberia, led by Michael Best (who suggested the idea of a Liberia memorial in early meetings, and provided valuable experience and connections) and Monrovia-based project manager John Etherton. [1] We also licensed interview footage from an award-winning documentary film directed by Gini Reticker. [19] (3) *Field Study: Atlanta Friends of the Liberian TRC*: We conducted semi-structured interviews a focus group to learn about the experiences and opinions of diaspora Liberians. (4) *Guest Speakers Commissioner Massa Washington*, journalist and member of the Liberian TRC; *Tom Flores*, Director of External Relations for the Initiative in Religion, Conflict, and Peace-Building at Emory University, and *Peter Nehsahn*, author of a memoir collection by victims, survivors, and ex-combatants.

During our iterative research/development phrase, two subgroups were assigned. Group I created a TRC report-derived stakeholder analysis and assessment of memorial narrative goals. Group II focused on understanding traditional cultural memorialization and assessing how to facilitate local understanding memorialization events.

3.2 Implementation

Implemented using Harrell's GRIOT system, the project consists of a Flash client to handle graphics with a LISP server to handle semantics. Implementation details can be found in [12, 14]. GRIOT is a platform for authoring interactive narratives, poetry, and related multimedia works. GRIOT uses an algebraic semantics-based representation of concepts used to provide metadata for multimedia assets and to provide an ontology describing thematic content relevant to an interactive narrative work. User interaction can then drive the composition and layout of multimedia assets and the generation of narrative text.

3.2.1 GRIOT Multimedia Composition

Graphical assets are video and image data files. These assets are described on the server side using semantic annotation. This annotation describes the imagic (visual, e.g., saturation or color content), diagrammatic (structural and media conventional, e.g., duration or media type), and conceptual (e.g., relevant stakeholders or themes) content of the tiles. When assets are clicked, subsequent potential assets are selected. Based upon which asset is selected, subsequent assets will be selected based upon a matching algorithm that can weight the relevance of imagic, diagrammatic, or conceptual metadata in order to compare the complete metadata of any asset via structure mapping.

3.2.2 GRIOT Text Generation

User input is used to select relevant information from a set of ontologies, called "theme domains," that contain sets of axioms about a particular theme. These axioms consist of binary relations between typed constants that are used to represent conceptual spaces (from conceptual blending theory). These spaces are integrated using a conceptual blending algorithm called ALLOY, and the result is mapped to simple natural language output. This generated text is integrated with text fragments called "phase templates" that are selected according to an automaton called an "Event Structure Machine."

4 Concluding Reflections and Future Work

There are two primary contributions presented here – new methods and a new theoretical framework to ground those methods. The first contribution is a set of methods for producing computational narrative grounded in cognitive science and empirical study of the social and cultural needs and values of stakeholders. The focus is enabling the *subjective* construction of ontologies, creation of a GUI metaphor, and conducting of asset collection based upon the results of the empirically determined, culturally situated story content. The method that we undertook, and computational approach exemplified by GRIOT, can generalize to a range of narrative forms not limited to those recognized as traditional Western narrative.

The second contribution relates to the cognitive linguistics foundation for this work. Cognitive linguists have described the hallmarks of narrative imagining – event stories, action stories, parable, metaphor, metonymy, force dynamics, and more [5, 6, 16, 18, 22-24] – modeling these building blocks for narrative has resulted in an extensible

framework that has been used in a variety of projects ranging from interactive poetry games to the serious and sobering topic of civil war in Liberia. This is a cognitive-computational substrate upon which specific cultural forms narrative can be built. While conceptual blending theory has been criticized for post-hoc and overly broad explanations, it provides appropriate grounding for GRIOT's algorithms for composing and generating multimedia content within a narrative structured according to user needs, interests, values, feelings, and more.

Finally, objectively assessing the quality of computational narrative work is an issue rife with controversy due to the subjective nature of storytelling. Rather, we would propose a framework for *interpreting* such systems based upon criteria from the fields of software studies, literary and cultural studies, and cognitive poetics. This would entail studying whether user's ideologies have been changed or reinforced by such systems (e.g., via pre- and post-interaction psychological inventories as in Best's previous work and critical discourse analysis), and comparisons to interactive narrative works that have been accepted into the canon of electronic literature and digital media arts.

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