This chapter appears in the book, *Managing Multimedia Semantics,* edited by Uma Srinivasan and Surya Nepal
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Chapter 16

Emergent Semantics from Media Blending

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ABSTRACT

The computation of emergent semantics for blending media into creative compositions is based on the idea that meaning is endowed upon the media in the context of other media and through interaction with the user. The interactive composition of digital content in modern production environments remains a challenging problem since much critical semantic information resides implicitly within the media, the relationships between media models, and the aesthetic goals of the creative artist. The composition of heterogeneous media types depends upon the formulation of integrative structures for the discovery and management of semantics. This semantics emerges through the application of generic blending operators and a domain ontology of pre-existing media assets and synthesis models. In this chapter, we will show the generation of emergent semantics from blending networks in the domains of audio generation from synthesis models, automated home video editing, and information mining from multimedia presentations.

INTRODUCTION

Today, there exists a plethora of pre-existing digital media content, synthesis models, and authored productions that are available for the creation of new media productions for games, presentations, reports, illustrated manuals, and instructional

materials for distance education. Technologies from sophisticated authoring environments for nonlinear video editing, audio synthesis, and information management systems are increasingly finding their way into a new class of easy to use, partially automated, authoring tools. This trend in media production is expanding the life cycle of digital media from content-centric authoring, storage, and distribution to include user-centric semantics for performing stylized compositions, information mining, and the reuse of the content in ways not envisioned at the time of the original media creation. The automation of digital media production at a semantic level remains a challenging problem since much critical information resides implicitly within the media, the relationships between media, and the aesthetic goals of the creative artist. A key problem in modern production environments is therefore the discovery and management of media semantics that emerges from the structured blending of pre-existing media assets. This chapter introduces a model-based framework for media blending that supports the creative composition of media elements from pre-existing resources.

The vast quantity of pre-existing media from CD's, the Internet, and local recordings that are currently available has motivated recent research into automation technologies for digital media (Davis, 1995; Funkhouser et al., 2004; Kovar & Gleicher, 2003). Traditional authoring tools require extensive training before the user becomes proficient and normally consume enormous time to compose relatively simple productions even by skilled professionals. This contrasts with the needs of the non-professional media author who would prefer high level insights into how media elements can be transformed to create the target production, as well as tools to automate the composition from semantically meaningful models. Such creative insights arise from the ability to flexibly manipulate information and discover new relationships relative to a given task. However, current methods of information retrieval and content production do not adequately support exploration and discovery in mixed media (Santini, Gupta, & Jain, 2001). A key problem for media production environments is that the task semantics for content repurposing depends upon both the media types and the context of the current task. In this chapter we claim that many semantics based operations, including summarization, retrieval, composition, and synchronization can be represented as a more general operation called, *media blending*. Blending is an operation that occurs across two or more media elements to yield a new structure called, the *blend*. The blend is formed by inheriting partial semantics from the input media and generating an emergent structure containing information from the current task and the source media. Thus the semantics of the blend emerges from interactions among the media descriptions, the task to be performed, and the creative input of the user.

Automated support for managing the semantics of media content would be beneficial for diverse applications, such as video editing (Davis, 1995; Kellock & Altman, 2000), sound synthesis (Rolland & Pachet, 1995), and mining information from presentations (Dorai, Kermani, & Stewart, 2001). A common characteristic among these domains that will be emphasized in this chapter is the need to manage multiple media sources at the semantic level. For sound production, there is a rich set of semantics associated with sound effects collections and audio synthesis models that typically come with semantically labeled control parameters. In the case of automatic home video editing, the control logic is informed by the relationships between music structure and video cuts as described in film theory to yield a production with a particular composition style (Sharff,

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