Ontology-Driven Interactive Visualization of Film Production Complexity Using a Visual Language

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ABSTRACT

Early, effective director-producer communication enables detection of resource-demanding film production requirements so that a workable production plan can be formed. Traditional communication tools are limited to articulating standard production elements as lists. Yet, production complexity can be affected by latent variables with indirect impact which remain unarticulated. An ontology-driven, interactive visualization system is proposed for exposing production complexity. The system is built upon a visual language for recording directorial choices, employed for system input. By exploiting Ontologies, the visual input is analyzed in real-time and semantic metadata are extracted representing production complexity with focus on latent variables. The metadata are transformed back into an aggregate visual form which combines with the visual input, creating useful synergies. In this way, the system creates a collaborative virtual workspace facilitating director-producer communications. A real-world deployment and an evaluation demonstrated the system’s advantages over traditional tools.

KEYWORDS

Complementary Visualizations, Data Transformation, Director Notation, FilmMaking Ontology (FilMO), Knowledge-based System, Knowledge Representation, Meta-modeling, Semantic Metadata, Visual Metadata

INTRODUCTION

Every contemporary film production involves complex shootings, re-shoots, extensive on-set rehearsals, etc. These procedures are cost-demanding in that they are time-consuming, often requiring expensive technical equipment and human resources. Thus, a realistic budget and a feasible schedule are crucial for ensuring the sustainability of the production, and by extension, of the entire filmmaking project (Honthaner, 2010; Jones, 2003; Tomaric, 2008).

In order to arrive at a successful production plan, effective communication of the director’s film planning choices to the producer during pre-production is essential, especially in cases where those choices impose resource-demanding production requirements (Tomaric, 2008). The director needs to convey his/her creative choices to the producer clearly and thoroughly so that the producer can determine production requirements for every scene, possibly negotiate simplifications with the director for the more challenging shots, and then translate those requirements into working hours, salaries, equipment rentals, anticipated shooting days, etc.
Current practices that serve director-producer communications in production preparation include non-visual and visual tools. Filmmakers use primarily non-visual aids, such as script-breakdown and shot-lists, in order to communicate the project planning and for organizing a shoot (Tomaric, 2008). A script-breakdown is a screenplay analysis in which production requirements are articulated as lists, used in budgeting and scheduling the production. Similarly, a shot-list is a description of each shot with a clear indication of the frame, the characters involved, actor and camera movement, as well as an indication of equipment necessary to achieve the desired result. Both techniques deal with standard production elements, such as technical equipment, cast, or crew, which are directly translated into production costs. However, neither explicitly addresses more latent production-related variables, which indirectly encumber the production by imposing additional complexity, entailing unanticipated costs and delays. Characteristically, Honthaner (2010) notes that a producer must learn to “read more than what is on the page and anticipate needs that aren’t [sic] specifically spelled out”.

Pre-visualization tools have been used widely by directors since the 1930’s, mainly storyboards and floorplans (Begleiter, 2001; Katz, 1991; Tumminello, 2005). Directors need visualization primarily to get a visual image of the film that initially exists only in their imagination, to better understand its structure, but they also use these tools to communicate their ideas to others, in particular to the producer, who identifies and assesses production requirements. Storyboards depict key elements of shot composition, and suggest actor placement, shot size, camera angle and lighting. Often storyboards include arrows to indicate actor movement across the frame. Floorplans depict the placement and movements of the camera and the actors. However, as both techniques produce static images, they inherently lack the ability to adequately represent motion, timing and camera-actor interactions, all fundamental filmic notions. Advances in CGI technologies lead to more advanced pre-visualization aids, namely animated storyboards and animatics. By employing animation, these tools overcome their predecessors’ inadequacies in depicting timing and motion. Nevertheless, they are expensive and time-consuming, and so they are used only in high-budget productions. More importantly, only a subset of the information presented by pre-visualization tools (whether traditional or digital, static or animated) is relevant to production planning, and this information is not presented by those tools in aggregate form; instead, it lies scattered and mostly in implicit form that needs to be uncovered by the producer (Honthaner, 2010). As such, pre-vis tools can be used for production planning only as auxiliary aids together with the non-visual tools.

To address the above-mentioned deficiencies of existing communication tools, the authors propose FilmProdViz, an ontology-driven, interactive visualization system which aims to facilitate production planning by visualizing production-related information in a way that exposes the production complexity of artistic directorial choices. The purpose of the proposed system is not to produce a final production plan. Regarding budgeting, equipment rental costs, crew hiring rates and several other running costs may considerably vary according to conditions5. At the same time, a producer is bound to have a good knowledge of the relevant market. Thus, leaving this task to human experience and expertise seems more practical than developing a generic cost-estimation model. Besides, according to interviews with professional directors and producers conducted during the ANSWER project6 (Yannopoulos et al., 2009), film productions tend to go off budget not because of cost miscalculations but because of shooting delays7. On the other hand, clarity in director-producer communication can facilitate negotiations about how to allocate the budget and help schedule the challenging parts of the production more carefully, thus resulting in saving time, money and resources. Existing communication tools suffer from their inability to articulate the production complexity of the director’s conceptualization of a film, often obliging directors to do additional preparation (Jones, 2003). Not only does the accumulation of individual production elements fail to be fully expressed, but so does the underlying