

Encode the Cinematic Knowledge into Knowledge Base for DMP

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1. Introduction

DMP (Digital Movie Producer) is a digital filmmaking technique we are researching that can automatically translate a verbal screenplay into a relevant motion picture with various visual effects like real image, three-dimensional animation, or augmented reality [1]. An experienced filmmaker should use techniques far more expressive than the simple presentation of spatial arrangements. We are building such a knowledge base that will enable DMP to work as *film director*, *cinematographers*, *film & video editor*, and *sound editor* available to presenting the filmic visual-audio effects using the large range of techniques *mise-en-scène*, *cinematography*, *montage*, and *sound related to image*. This cinematic knowledge base system works as an automated tool in generating a digital movie.

We employ a traditional AI approach to knowledge base encoding, that is to acquire and represent the knowledge, then build a reasoning system [2] [3]. In the short description of our work on this subject, we will focus on incorporating Artificial Intelligence (AI) planning techniques of camera work in digital movie making.

2. Film Craft and Theory

We search for a common theme in the partial descriptions of what have actually been observed to occur in filmmaking. Figure 1 shows the areas represented in the cinematic knowledge base relative to film director, cinematographers, film & video editor, and sound editor.

One particular source of information that has been suggested as being informative about the acceptability or otherwise of certain forms of dynamic scene is cinematography. In film and video production the cinematographer sets the camera shots and decides what camera movement is necessary for a scene. The following are the camera elements in any scene:

- Field of View
 - Extreme long shot
 - Long shot
 - Medium shot
 - Close-up
 - Extreme close-up
- Lenses
- Transitions
- Camera Angle
- Camera moves

- Panning and Tilting
- Dolly shot and tracking shot
- Crane shot
- Lenses
- Zoom Lenses and the Vertigo Effect
- Depth of Field Effects

Titles	Job Responsibilities
Film Director	All ingredients that contribute to the final motion picture: Creative aspects, Orchestrating the action in from the action & dialog, Control of camera position & movement, Sounding, Lighting.
Photography or Cinematographer (1) Director	Lighting the set, Framing the picture, Shooting the film.
(2) Camera Operation	Anything that happens through the camera lens: Composition, Focus, Camera movement.
Film & Video Editor	Selects and assembles film/video footage to create a story in accordance with the director's vision.
Sound Editor	Edits sound, dialog, music and sound effects in synchronization with the picture

Figure 1. Careers in Filmmaking

A dolly is a small wheeled vehicle piloted by a dolly grip that is used to move a camera around in a scene. A dolly shot is a move in and out of a scene, i.e., the movement is parallel to the camera lens axis. A tracking shot is a movement perpendicular to the camera lens axis [4].

3. Knowledge Represent

In order to let DMP operate the program, we must supply a description for the system to present common sense film knowledge. Implicational representations, the role of montage, provide a basis for the inferential processing needed for the viewer to construct the narrative as the events unfold before them, and hint at their role in providing affective tone to the experience. Only implicational representation contains the schematic models that correspond to the viewer knowing ‘why’ the events happen, and what they ‘mean.’ There are nine main types of shot, in terms of their function:

- Establishing shot
- Close up
- Reaction shot
- Cutaway
- Eyeline
- Eyeline match
- Jump cut
- Manipulation of time
- Parallel action

The sources we have chosen for our cinematic knowledge are represented using language we have defined. For instance,

CoA: A shot’s *center of attention* is the character that is the focal point of a particular shot.

LoI: The *line of interest* is a straight line the direction of the gaze or movement of CoA.

UiF: One film convention dictates that the CoA should remain *un-occluded in the foreground* of the shot.

Scenes may have dialogue with action, dialog without action, or action without dialog. We will only consider the last classification of scenes here to avoid the difficulties with the natural language recognition.

The knowledge base is composed of information about the moviemaking domain like this. It describes solid objects, spatial relations, temporal relations, shots, scenes, cameras, sounds, light and colors. Then based on the knowledge base, a reasoning system can be built to plan how to structure the mise-en-scène, cinematography, montage, and sound.

4. Design of Planner

The plan is design as a software agent in Fig 2, which communicates with other functional modules such as animator or editor in the DMP system. It includes a collection of sequential behaviors for the camera and characters, e.g., character named A is followed by character named B after entrance:

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(Sequence
  (full-shot (entrance Room))
  (Enter A Room)
  (Enter B Room)
)
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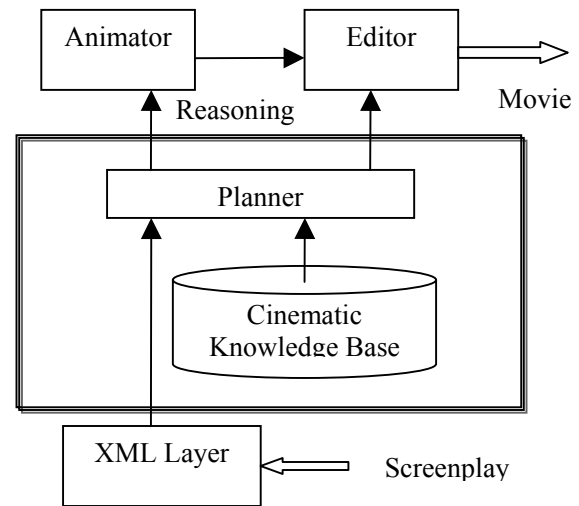


Figure 2. Architecture Diagram of the Planner

5. Conclusion

Though its major part is motion control of objects, computer movie making also uses cinematographic technique to map moods (happy) of characters and scenes (exciting). While previous approaches to cinematographic realization have focused on specific techniques and idioms in the automated animation problem, more and more researchers begin to encode animator’s theme and intention when designing each of the shots. This is our direction of the future research.

In addition, blending knowledge in different areas means a new work, not just converge them simply. We must be careful enough to design knowledge base by considering all of the necessary data from the beginning.

Reference

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- [4] John Lasseter, "Principles of Traditional Animation Applied to 3D Computer Animation", Computer Graphics, pp. 35-44, 21:4, July 1987 (SIGGRAPH 87).