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A Visual Language to Characterise Transitions in Narrative Visualization

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ABSTRACT

We use a taxonomy of panel-to-panel transitions in comics, refined the definition of its components to reflect the nature of data-stories in information visualization, and then, use the taxonomy in coding a number of VAST challenges videos from the last four years. We represent the use of transitions in each video graphically with a diagram that shows how the information was added incrementally in order to tell a story that answers a particular question. A number of issues have been taken into account when coding transitions in each video as well as in designing and creating the visual diagram such as, nested transitions, the use of sub-topics, and delayed transitions.

Index Terms: Storytelling, Narrative Visualization, Transitions, Panel-to-Panel Transitions, Comics.

1 INTRODUCTION

Oxford Dictionary defines a transition as "the process or a period of changing from one state or condition to another". This basic definition can be applied to several contexts including storytelling and information visualization. Transitions control detailed changes and progression in any story. For example, scene transitions in films, and panel-to-panel transitions in comics [3, 4]. Storytelling through information visualization, whether the story is delivered by a direct narrative or explored interactively by users, consists of a chain of actions that trigger a transition from one event to another. As a result, the story unfolds smoothly and gives a sense of continuity. Due to the variety of data that can be visualized and used in storytelling through information visualization, controlling progression in data-stories can be complex. While there are studies and rules of graphical representations suitable for different data types and patterns, the choices of transitions an author/designer has to communicate a message, and tell a story are much more complex, sometimes requiring the use of several visualization techniques, and/or a combination of conflicting views or facts. The extent to which different types of transitions have been used to tell stories with data through information visualization is little represented in the literature. Hence, further studies to cover this aspect of narrative visualization are required. Looking at some characteristics of transitions across other more mature domains of visual storytelling, such as films and comics, could be highly beneficial to address the issue of transitions in storytelling visualization. A review of literature also reveals that much of the work on transitions in information visualization has focused more on technical/graphical techniques used, rather than on the placement of these transitions within a story, and their role in narrative construction [1, 2]. The aim of this work is to explore, and characterise the transition types used to tell stories through information visualization. This was done by qualitatively coding the dataset of VAST challenge videos over the last four years based on the McCloud taxonomy of transition types in comics [3, 4] after refining the model and redefining its components.

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2 MCCLOUD TAXONOMY OF PANEL-TO-PANEL TRANSITIONS IN COMICS

For comics, McCloud proposed taxonomy of transitions from one panel to another [3, 4], consisting of six types: (1) Moment-to-moment: "a single action portrayed in a series of moments". (2) Action-to-action: "a single subject (person, object, etc.) in a series of actions". (3) Subject-to-subject: "a series of changing subjects within a single scene". (4) Scene-to-scene: "transitions across significant distance of time and/or space". (5) Aspect-to-aspect: "transitions from one aspect of a place, idea, or mood to another". (6) Non-sequitur: "a series of seemingly nonsensical, unrelated images and/or words" [3, 4]. This taxonomy allows an analysis of the process of telling a story in a visual medium through the use of a combination of pictures and words. It can be argued that communicating data-stories through information visualization consists of the same basic elements, pictures (visual representation) and words (annotations/vocals). However, information visualization has one more important component that impact on story development: it is a highly interactive medium. McCloud's taxonomy of transition types is nonetheless relatable to storytelling through information visualization, as interactivity still occurs in a sequential manner, with one action at a time leading to the next event.

3 REFINEMENT OF MCCLOUD TAXONOMY, AND CODING PROCESS

We started with the task descriptions of VAST challenges. In each description, we identified the components of the transition types (subjects, moments,etc.) based on our definition of these elements (see below). Thus, we have a consistent understanding of some initial story components among the video submissions for each challenge. We transcribed the videos, recording the time of the beginning and the end of each sentence, as well as the beginning and the end of the whole video. We worked through each video transcript in the same way, identifying the components of the transition types. As we went through each transcript, we segmented the story into smaller units. Each story unit contains a piece of information. A story unit is represented by usually a sentence or more, depending on the completion of the meaning that accompanies/follows a visual. The story unit may also contain one or more of the transitions components. In addition to the video transcripts, we took visuals into account when coding the videos. This had an effect on coding, particularly in case of Aspect-to-Aspect transition, which means looking at the data using different views, representations, or tools (similar to "a wandering eye" around a place or something in comics [3]). Next, we identified the transition types between story units. Our definitions of the transition types in the context of information visualization were as follows:

Subject-to-Subject Transition: A subject is an entity/actor that does something (an action) in the story. This is similar to the values of a variable in statistics. Example here might be an employee, or an IP address. A subject-to-subject transition occurs from a subject or type of subjects in one story unit to another subject or type of subjects in the next story unit (if the transition is not delayed).

Action-to-Action Transition: Here we differentiated between two types of actions. Type 1 relates to how the participant/analyst(s) interacted with the data/tool. For example, "filter out IP addresses".

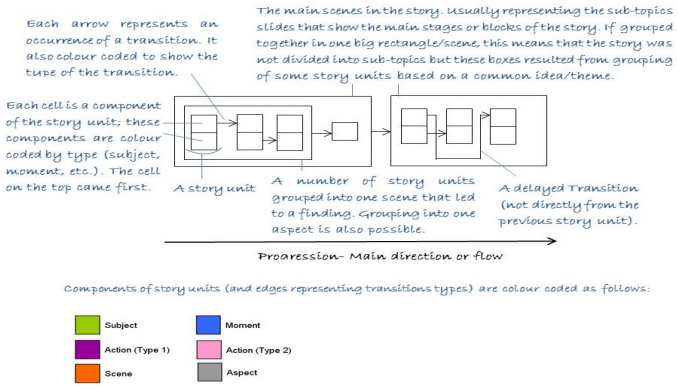

Figure 1: The Visual Encoding of the Story Components and Transition Types in Each VAST Challenge video.

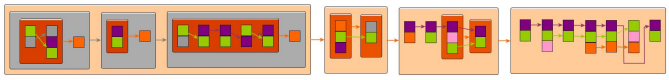

Figure 2: A Transition Diagram showing nested grouping of aspects in the first part. (Submission: VAST 2009- MC2- giCentre, City University London)

Type 2 relates to actions that represent part of the data/scenario. For example, "employee A left his office". An Action-to-Action transition occurs from an action in one story unit to another in the next story unit (sometimes the Action-to-Action transition delayed by two or more story units. See Figure 5).

Scene-to-Scene Transitions: Scenes in general provide some kind of compression or conclusion. Therefore, if a video was divided explicitly into a number of sub-topics (usually representing stages of addressing the task) each sub-topic was considered a scene. A Scene-to-Scene transition thus occurs between any two sub-topics (a series of transitions may occur between smaller story units inside those scenes). A group of story units that lead to a finding is also considered a scene, as is the finding or conclusion. A Scene-to-Scene transition occurs between a number of steps or story units that are grouped based on common idea/topic and the finding or conclusion drawn from this group.

Aspect-to-Aspect Transition: An Aspect-to-Aspect transition occurs when the applications, views, techniques, or visual representations are changed from a story unit or section to another in order to look at data from different angles. For example, between map view and timeline. In some cases, a number of story units are grouped together into one aspect. For example, in Figure 2, the first part of the story was describing three main applications developed to arrive to the answer, each of them enable some actions, exploration, and gaining specific insights that contribute to the whole story and final answer.

Moment-to-Moment Transition: A moment is a point of time in the story. For example, "at 10am on 17th May". A Moment-to-Moment transition occurs between two story units, where the difference in time between two different moments in each story unit is very short.

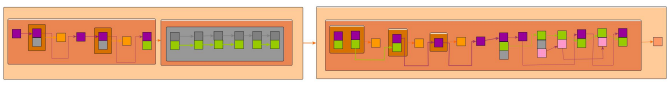

Figure 3: A Transition Diagram showing the occurrence of an Action-to-Action transition between two actions that represent part of the data/scenario (Action Type 2). (Submission: VAST 2011- MC2- University of Konstanz)

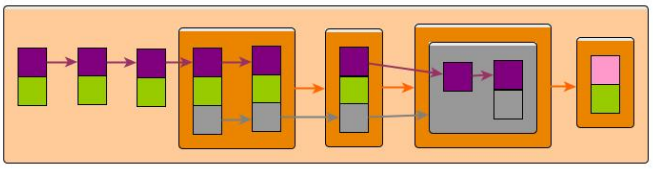

Figure 4: A Transition Diagram showing the occurrence of a Scene-to-Scene transition between a group of story units and the finding/conclusion drawn from this group. (Submission: VAST 2010- MC1- Georgia Institute of Technology)

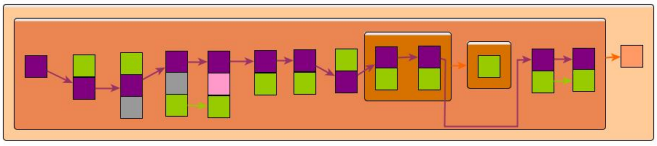

Figure 5: A Transition Diagram showing a delayed transition and emerging of finding at the end of a long series of actions. (Submission: VAST 2011- MC1- giCentre, City University London)

4 Visual Encoding, and Sample Diagrams

The transitions used to tell a story in each VAST challenge video are fused into a single diagram. The visual encoding of each diagram is shown in Figure 1. Sample diagrams are shown in Figure 2 to 5.

5 Conclusion, Discussion, and Future Work

We used a taxonomy of transitions in comics, refined it, and apply it to a number of the VAST challenge videos. The diagrams created give a picture of how each story was told and how information was added incrementally. Although all the VAST challenge videos have not been coded so far, some observations can already be seen. For example, in Figure 5, findings emerged after a relatively long series of actions, while in Figure 3 there were immediate findings after fewer actions. Furthermore, our visual encoding of transitions shows how different components, including visualization, are used in story telling process. For example, how interaction (Action Type 1) impacts on story progression, and how alternating between different techniques (Aspect-to-Aspect transition) is used. The next step after coding the videos is to look at all generated diagrams and analyse them by investigating different factors, such as the nature of the task/data, award winners, etc. The coded diagrams could also be useful to design by encouraging the use of the techniques that lead to a specific path or series of transitions that the designer wants the user to take when constructing a story by interactively exploring a visualization.

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