INTERACTIVE STORYTELLING AND ITS ROLE IN THE DESIGN PROCESS

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Abstract. Projects of ever increasing complexity and size have incited the need for new and robust design methodologies and tools in an effort to manage complexity, lower costs, ascertain quality and reduce risk. Technology convergence through the growing availability of networked computers, rapid progress in Computer Aided Design (CAD) and information management have encouraged the undertaking of even more complex designs that demand high degrees of interaction, collaboration and the efficient sharing and dissemination of information. It is suggested that interactive storytelling and interactive design (Rafi and Karboulonis, 2001) techniques that use non-linear information mapping systems can be deployed to assist users as they navigate information that is structured to address localized needs as they arise. The design process is a collaborative effort that encompasses diverse knowledge disciplines and demands the management and utilization of available resources to satisfy the needs of a single or set of goals. It is thought that building industry specialists should work close together in an organised manner to solve design problems as they emerge and find alternatives when designs fall short. The design process involves the processing of dynamic and complex information, that can be anything from the amount of soil required to level lands - to the needs of specific lightings systems in operation theatres. Other important factors that affect the design process are related to costs and deadlines. This paper will demonstrate some of our early findings in several experiments to establish non-linear storytelling. It will conclude with a recommendation for a plausible design of such a system based on experimental work that is currently being conducted and is reaching its final stages. The paper will lay the foundations of a possible path to implementation based on the concept of multi-path animation that is appropriate for structuring the design process as used in the building industry.

1. Introduction

The design process can be seen as a structured process within which actions or events (of processing information or production on site) will occur relevant to their location in the timeline. Certain events can only commence or conclude depending on other related events. It is proposed that the existing order enables the transformation of the design process to become non-linear and interactive with regard to the sharing of information and dissemination of knowledge. Interactive Storytelling media management specifies the mode or communication channel open for interaction and supply of information as required. The requested information can vary and depends on an individual's knowledge, experience and timeframe. Ultimately the processed information can become a new input to the system. Such a system would be designed to handle information that was stored in small, meaningful sections that in turn would assist navigation and the construction and authoring of large knowledge databases.

The multi-path structure can be organised with specific templates employing appropriate interfaces for the construction industry people. Such systems require people to key-in data and provide other textual information in addition to appropriate CAD files, video clips, audio data, Flash or Shockwave and VRML files for visualisation purposes. The data input should bind to the specific category of information and structure as defined by the software. The software engine will then structure the contents as requested or required by the user. Navigation within these information space requires certain "**problem-'choice of solution'-solution**" equations such as cascade correlation in Sarle's reports (2001). The input, which can be in the form of a problem statement, will be pushed forward for a specialist to analyse and define a possible solution. For them to understand the problem, they need to be given certain guidance by the specialist and be provided with just enough information to satisfy their query. This analytical environment is equivalent to multi-path storyline that is becoming the de-facto standard for web streaming animation content.

In multi-path storyline, a user is provided with a set of problems (objectives, goals, action-lists), that he or she needs to bring to a conclusion within a pre-defined set of parameters as laid down by the programmer or the software engine. The user starts the process by making a choice and following a path that will take him or her to another scene where more choices have to be made. Making a choice is equivalent to taking a path through the story. If the user was to decide on a choice, the user could be taken to another set of problems to consider.

This suggests that the story might end differently for individual users but also that the same users may choose different paths next time they make a query since they are now more knowledgeable or because new information and paths have been added by specialists since their last visit. It is worth noting that while individual users may pursue the same goal, the paths taken are likely to be different and will depend on their current level of knowledge and experience. Therefore more experienced users will take shorter paths thus saving time where inexperienced users may benefit from choosing longer paths in the search of their goals. The fact that experienced and inexperienced users or users from different backgrounds are able to navigate the same information set at their own pace and speed is an attractive proposition.

If the metaphor is to be developed for the construction industry, we can see construction specialists navigating the same sets of information while adopting different approaches and reaching the same results and goals through shorter or longer paths. It is acknowledged that there will be a need for the periodic updating of the collected knowledge and this is a topic that requires further research.

2. The Experiments

The experiments content structure is developed in UML (Unified Modeling Language) style flowchart to maintain, define and track attributes, processes, results, events and choices (conditional statements). The flowchart allows many inputs in which each input is given an identification (ID) to be associated with certain category of users and specific individuals. The processor needs to understand the policy associated with a certain user. User queries to the database also require information concerning the user's identity, requirements, data ownership, system flow, last data usage, last location within the system flowchart and last process or action that the user has put effect on the system.

An event acts like a noun. It is dependent on a verb and a user action and a response to complete its function. An event can only function when a process is having an effect on it. An event can pass information to a carrier, an instance of itself, a process and to be stored and forwarded at a later time according to the timeline, availability and request. An instance can be an exact replication of the original copy. An instance can be a subset only containing minimum information, as the system feels adequate for the user to continue navigating the system to achieve his preset goals. User behavioral patterns can be seen as the user manages an expected content structure which itself proposes the user's navigation style and preferences. The system needs to compare and conclude the path in which the user navigates to obtain the intended information or to complete certain tasks.

A universal pattern for most common navigation and data usage type needs to be identified early for the system to compare and use this information before assisting users. If the user navigates through the system in a manner familiar to the system, the system will establish the universal pattern as its reference. The system will use this to compare and clarify the effectiveness of the current user approach. This will be kept in a container that has the object's identifier code (e.g. a map of user walkthrough), media file header and instances.

3. The Events Structure

The main structure of the system represents a pipeline with different types of rings (of different insulation and materials) that carry information. The layering insulation acts as a filter to control information movement between rings and the ring itself (a container of specific media type, data type and functions). The information complexity, ownership hierarchy and length are the elements for defining their location. The core structure includes private data, a huge media file, complicated data types and low usage rates. Availability of objects in the information pipes to the user are decided by object ownership (unless if granted via administration presets or being defined by the object owner), task logical paths within the system and goal logical paths within the system. Logical paths are well suited for the user and the system's requirements. The system pre-programmed logical flow includes real-time processing and preset algorithm for the most common processes. The system is designed for the users to note a series of events for the effective use of interactive storytelling in a design process. This includes the followings.

1. System setting A will establish user history, previous setting/preferences, previous pattern and compare with current task.
2. System setting B will identify the user's previous location within the system, his path, last visited node, last usage of information, previous contents in his carrier and his achievements.
3. System setting C will check the possibilities for groups collaborative solutions depending on current users and terminal used.

4. System active configurations will prepare the system to create instances, and lay the most economical, popular and most used path by current user. The instances created will then be grouped and be made into families of information. If families were to have long-term relationships, the system will suggest a close and static connection with each other. Few high-bandwidth materials and resources will be made available and customised for long term users.

All grids will remain similar to any application. The data container can rotate, move and flex to gain new equilibrium and to function properly. Once the user states his responsibility, function within the system, task associated with him directly (and indirectly as seen by the system), event currently in progress, event of his interest and goals, the system will compute and propose a scheme. This will help the user to quickly find a way through the system and solve the problem or manage the right quantity and quality of information. The system will then broadcast the scheme throughout the network waiting for response and query. If the collective response for this broadcast is higher and relevant, the system will establish a common path for the user to start navigating and using the system (within the limitation as being defined for security and functionality purposes) (figure 1).

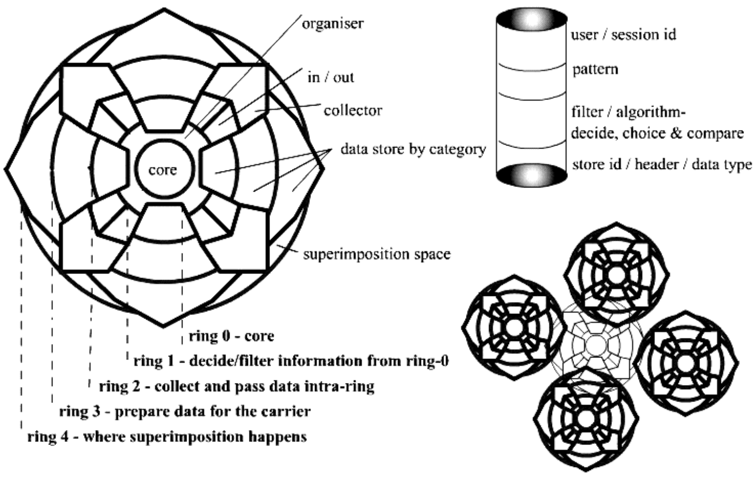

Figure 1. Shows the ring configuration.

A user is normally provided with appropriate bandwidth and limited sequences to ensure effective navigation in the system and view multimedia presentations and other resources that aid in making a decision. The user may also select the proper viewing/viewable ratio based on the level of complexity. Multimedia documents in the system are made available in the form of static images, video clips, CAD drawings, vector drawings, 3-dimensional, VRML images, animations, colour schemes, building materials, spreadsheet documents, data only documents, audio files, sensor data and real-time web-cam footages. These documents are archived based on categories, functions and be made ready for sequential viewing via filters and transitions as users made selections and navigated through the system paths.

A user has the freedom to choose between various paths and choices that will eventually lead to a goal or a subset of another task/path. A path is a collection of objects (process, sub-process, task and other elements concerning finance, building materials, and other resources usages, management and physical entities.) which have been chosen by the system from various forms of information within and/or stored outside the system. Following through the path helps the user to compare options and simplify the 'problem-solving'. Selecting the simulation approach will guide within a few limited options to solve the current problem through forecast of output/result supposedly created by this decision.

An optimised path can be suggested by the system for the user's perusal. This optimisation can be based on the Ant algorithm. The logical flow or pattern is indeed a record of specific behaviour or a collection of behaviour. This behaviour constitutes primarily of choice-case problem solving for processes, sequences of tasks most suitable (economical aspect, practical aspect, safety aspect, client requirement, regulations control and environmental aspects) to start and finish processes.

The system architecture for this experiment includes a series of components i.e. a database (SQL), processing software (PHP), query, retrieval and display applications (javascript-enabled browser/Macromedia Flash) and a customisation application. It comprises of a data locator and container. In the data locator the function is activated when the system starts broadcasting the user settings. The data locator will conclude upon the system's response and query. The data locator will leave a trail (pheromone trail-based on ant system) for the system to use as a guide for later use. The data container is a single unit cell that contains the basic data (of specific to its container's function and status) and relative data header (that define connection, linkage type and path, to other containers). Data containers are usually being grouped together to form a small family of information. The next neighbouring family can contain mostly relative and instances of farther apart containers. This family relationship can change upon requirement, request and user specifications and goals. This will operate based on the following rules:

The system will identify and compare with the most common pattern to the problem currently introduced by the user. If it fits, the signal playbacks the scenario. Alternatively, the user can track and analyse the preferences and actual problem settings. Certain problems can involve emotional response, habitual practice and other sensual data not included in the system (figure 2).

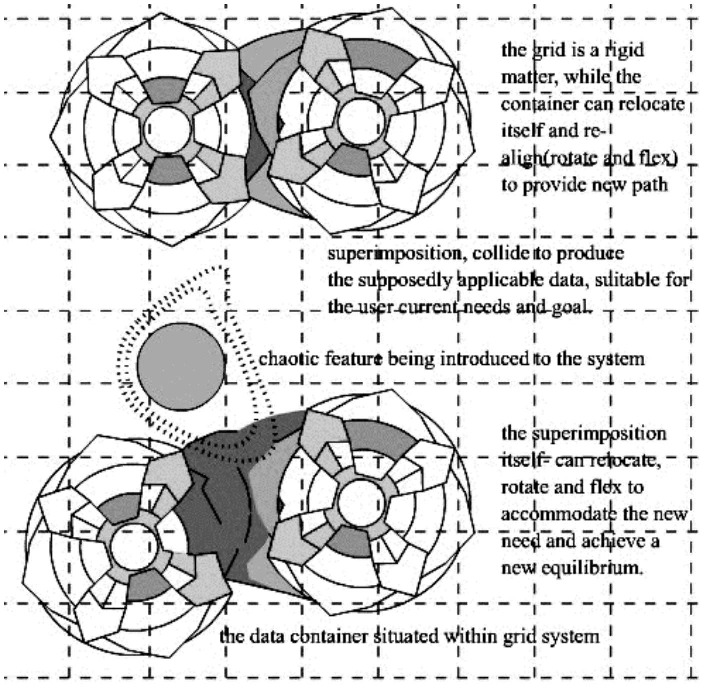

Figure 2. Show the possibilities of pattern.

4. Conclusion

This paper has outlined the mechanics that enable an intelligent and self-learning system capable of providing solutions to users' queries according to specific rules and structure stored within the system, as well as through typical methods most commonly used by users practiced within the scope of the system. The requested information can vary and depends on an individual's knowledge, experience and timeframe allowing users to traverse different paths that best suit their profiles.

To aid the design of the system this text has presented the design process as a structured process within which actions or events will occur relevant to their location in the timeline. It has been shown that a strong and well-informed structure enables the controlled enlargement of the underlying databases as well as the ability of the system to automatically track and suggests the appropriate navigation.

References

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