

Learning on Location with Cinematic Narratives

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ABSTRACT

This paper describes a narrative-centered approach to learning using location-aware mobile devices, with theories of learning as the basis for a system that utilizes techniques from the cinema. Theories of learning are introduced to explain how narrative can inform learning in mobile scenarios. Location-aware technology is then described, focusing on one recent project. Last, a prototype system under development is described.

Categories and Subject Descriptors

H.5.1 [Information Interfaces and Presentation]: Multimedia Information Systems; H.3.1 [Computers and Education]: Computer Uses in Education;

General Terms

Design, Experimentation, Human Factors, Theory

Keywords

Mobile technologies, learning, narrative, cinema, location sensing

1. INTRODUCTION

The value of narrative in learning has long been well recognized, predating even the written word. Narrative helps to structure knowledge and aids in remembering and imparting knowledge. Narrative-based learning has, in recent years, received increasing attention in the classroom and other learning environments. Simultaneously, technologies to aid in story creation and telling have gained wide popularity, notably digital still and video cameras, and weblogs or “blogs” and their variants including “moblogs” and photoblogs. This research attempts to bring computer-assisted narrative into the real world with a narrative-based, location-aware learning application.

2. LEARNING ON LOCATION

Summarized below are some particular aspects of narrative learning relevant to mobile scenarios, which inform the prototype.

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2.1 Benefits of narrative learning

Technology aside, narrative in any form can be complex and explorative. This can be seen as an advantage. Following [7], a learning environment that places narrative at the center can benefit learning in the following ways:

2.1.1 Co-Construction

Constructivist approaches to learning seek to place the learner at the center of learning activity, having the learner create knowledge actively. This is opposed to traditional behaviorist approaches that place emphasis on the tutor and the delivery of information. Co-constructivist approaches engage multiple learners, with the locus of meaning-making and knowledge production in their collaborative activities.

2.1.2 Exploration

An intelligent narrative learning environment can engage learners in active exploration of the narrative by placing them in the narrative's setting and in characters' roles. These forms of exploration can help learners create meanings from the narrative.

2.1.3 Reflection

Helping learners to reflect on what they have learned enables a sort of meta-learning, illuminating the very processes by which they learn. Narrative, and its re-creation and refinement in reflection, plays a central role in memory by providing an organizing structure for knowledge.

2.2 Activity Theory

Activity theory is a general framework for how people learn which stems from a materialist, cultural-historical perspective. It regards human activity as its primary unit of analysis, but places importance on tools that mediate activity and learning. Hence it is frequently applied to technology-enhanced learning.

The very concept implies that people are agents who act with motivations and goals – whose activity is directed at something. Tools mediate between the subject and goals, and play a social role in helping people to both internalize (learn) and externalize (share) knowledge. The nature of this internalization and externalization is determined by context, and a person's development is seen to be a continuous process in which conscious actions become subconscious operations, driven by motives and goals. Subconscious operations can later become externalized when, for example, knowledge is shared with others.

Tools are themselves seen to be socially and culturally shaped. The theory distinguishes between technical and psychological tools, the latter (including computers) used to influence the self or others. As applied to technology-enhanced learning, activity theory views human-computer interfaces in the context of action, stressing the social and developmental context of computer use.

2.3 Trails

A powerful mechanism for learning has been postulated by Peterson and Levene [8], and elaborated in [2,10]. They use the notion of a hypertext trail to describe how learners follow a more or less linear path through a knowledge ecology – whether a set of web pages, a physical space, or a narrative.

A trail is composed of individual “learning objects”. This is a concept used in e-learning, describing discrete, self-contained pieces of knowledge. But the power of the trails concept is that it can be applied to the physical world, regarding things such as artifacts in a museum, books in a library, or landmarks in a city as “non-digital learning objects”. In a narrative, individual scenes can be treated the same way.

Trail recording enables personalization. In a learning context this means tailoring the delivery of information based on what a learner knows and where they have been. In a narrative, this means dynamically changing the path of a story based on the reader’s navigation; some early efforts at hypertext narrative and interactive cinema have experimented with this.

Meaning making and knowledge building occur not only in the creation of a trail itself, but when a learner goes back to revisit, reflect, reorder, and share the trail. Peterson and Levene envision a mobile “experience recorder” which saves a learner’s trail and enables this post-trail editing. New technologies such as sensors and location-aware mobile devices enable the automatic recording of trails in the physical world through non-digital learning objects. A narrative-based learning perspective adds the scaffolding for the creation of meaning and knowledge.

2.4 Multimodal Discourse

With constructivism, activity theory, and trails as a theoretical base, we must consider the pedagogical differences between the various modes – visual, aural, textual, spoken, haptic and so on. These modes are differentiated from media – the physical or technological means to carry them.

Multimodal analysis [5], drawing from semiotics, does not regard the written word as a privileged mode, but acknowledges that image, sound, arrangement, framing and performance can be at least as powerful. Indeed, contemporary society is often seen to be increasingly privileging the visual over the textual, with complex visual literacies emerging.

However, this approach does not regard all modes equally, recognizing, for example, that the textual and oral are inherently linear and exist in time, while the visual is instantaneous. It also distinguishes between production, distribution, and consumption. For example, musical notation, a lesson plan, a computer program, a script – none of these are complete experiences, yet they contain knowledge to be disseminated or performed.

3. LOCATION TECHNOLOGY

Mobile technology now enables the creation of multimedia stories in real time, virtually anywhere. The development of location-

based services – in which a user’s geographic or positional location is utilized in targeted information delivery – has been accelerating for the last few years and commercial applications are now coming to market. Many recent and current projects have employed location sensing for various applications, some focused on narrative [3,6], and some focused on learning [9,11].

3.1 Urban Tapestries

Urban Tapestries was developed by Proboscis, a London-based artists’ studio, and also includes as partners the London School of Economics and several hardware companies. While not directly involved in the project’s creation, we have helped evaluate the system. Using location-aware mobile phones and handheld computers, the system enables users to create and view multimedia stories tied to precise locations in central London.

The first trial took place over nine days in December 2003, with users borrowing a device for two hours at a time to explore a portion of central London augmented with an 802.11b mesh network, which served content and triangulated locations. Handheld computers were used with Flash-authored client software, but only text entry of data was enabled at the time.

The second trial was in June 2004, this time with users retaining a device for a month, to use when they pleased in a larger area of London. The device in this case (a Sony Ericsson P800) had a relatively large screen, built-in camera and microphone, and stylus for writing, allowing fairly easy creation of content. Location sensing was done by Orange, the mobile phone service provider.

In Urban Tapestries a user’s location is automatically represented to them on a detailed map, and users’ paths are represented as colored trails. The tapestry metaphor is tied to narrative, suggesting that stories can be interwoven in a fabric atop the city. This is reinforced by the use of terms such as threads, knots, stitches and pockets. A pocket is filled with user-created content (text, audio and/or images) and can be opened by any other user.

The general concept is to build community memory. An important distinction is made between place and location. Much of the current techno-hype around location-based services focuses on precise coordinates of specific devices, implicitly associating a device with a single person, treating them one and the same. Urban Tapestries adopts a more social focus, one contingent less on coordinates than on human relationships. Place, as opposed to location, is seen as subjective, invisible, and fluid. A wireless network, for instance, transcends physical boundaries, and places in a city are defined by how and where people travel and gather. Urban Tapestries attempts to make this definition explicit by locating place in the data, not in the world. Locations are the basis for stories, but spaces become places only when they are populated and endowed with value by people.

Many users said that the technology caused them to re-experience the city with heightened sensory awareness. One wrote, “It’s almost like walking around in a book of short stories, except you can feel, hear, smell and see the same things that the other authors of the pockets and threads did.” [4]

Technologies such as mobile phones are often said to isolate people from their surroundings. Urban Tapestries attempts to counter this by awakening device users to their physical surroundings, linking them with social narratives tied to places.

The nature of the device, however, still tends to restrict it to a single user. Only once during the trials was a device used by two users at a time – a team approach that created shared experiences and memories, and also placed a human actor in each scene, strengthening the force of the narratives they created.

The informational content in *Urban Tapestries* is deliberately unstructured and open-ended. So there are individual stories about particular places (some historic, some contemporary), and there are individual users' narrative trails, encompassing pockets tied together with threads to form trails from one place to another. There is some provision for post-trail editing, as users can change the content and location of pockets and move them from one thread to another. But the system is not specifically intended for learning; the focus is on public authoring and sharing of stories. So there is no guiding narrative, or incentive to create or read explicitly educational or narrative content.

4. PROTOTYPE

For our primary purpose – learning – *Urban Tapestries* is too unstructured. While much was learned about particular places and many stories created, a more explicitly learning-centered approach requires a more focused goal orientation. The use of a central narrative could offer strong learning potential. An effective way of providing this is by introducing cinematic conventions.

4.1 Cinematic influence

Cinema captures life for the screen – whether real lives or escapist fantasies. By its nature it frames, compresses, and simplifies experience. With conscious detail to location, scripting, lighting, sound, framing, editing, and special effects it can render a narrative in infinite ways. Most cinema elicits the viewer's emotions, and therein lies its power, and its potential for learning.

Using cinematic methods to teach is not new; what is proposed is allowing learners to use the powerful tools of cinema, augmented with context-aware technologies, to create educational content. This approach adheres more to constructivist style, and also serves as media education by showing first-hand how these cinematic techniques can be used to inform and influence.

4.2 Reality, redefined

A participant in the first *Urban Tapestries* trial stopped for a coffee break. "My mind started drifting and I was eager to start writing a fictional story about the people entering the café, to be picked up as a thread by someone else on another day, a rambling fictional story of a real place." [4]

His idea was not pedagogically motivated, but he was inspired to create a narrative – one that is collaborative and tied to a place. Does fiction have a place in learning?

There are certainly many uses of fiction in learning – most obviously in the teaching of literature and creative writing, but also in parables and analogies; in mathematical "word problems" and scientific explanations ("If you could see in the infrared spectrum..."); and in all types of guided play. More generally, imagination is nourished as part of healthy development.

In movies and television, of course, fiction dominates (reality TV notwithstanding). Even documentaries employ techniques of fiction, if not outright fictional re-creations. Conversely, even overtly fictional narratives often have something to teach, whether

Woody Allen's musings about human nature or David Lynch's tales about the dark underbelly of suburban life. Fiction's basis in fact is what helps the viewer identify with and comprehend it. Fact, in turn, tends to become increasingly fictionalized over time as history is repeatedly adapted, forgotten, found, and reinterpreted in the context of the present.

Thus it would be foolish to build a system such as the one proposed without recognizing its powerful potential for creating the imagined as well as the real. A digital lens on a particular place, for example, allows a user to transcend time, seeing the past or an envisioned future. It can see through walls and imagine the lives of others. Technological capabilities now allow not only augmentation but real-time distortion of reality in myriad ways.

Even historical narratives require dialogue that will have been long lost; the accuracy of reconstructions is always variable. We rely on the script to dictate the balance of fact and fiction. It imposes a minimum amount of structure upon a production – enough to communicate learning goals, but not too much to stifle imagination. Individuals using the same script are assumed to be mutually aware of the mix of fact and fiction in a particular script.

4.3 Technology on location

In this system, the pedagogical notions of actors, agents, and authors are made literal – it emphasizes the "acting" in "interacting". Much of cinema transports the viewer somewhere else, and the viewer in turn suspends disbelief to escape from reality. Location sensing technology, however, can place cinema in the world, spreading the experiencing of a story out into spaces. As opposed to the passive, primarily cognitive world of the movie theater, the creation of cinema involves bodies and movement – emphasis is more on performance than playback.

Location sensing links a narrative to place, and can dynamically update a script. Technology enables not only the tracking of location but motion, action and orientation. This adds another dimension of input to mere image capture. Video input, for example, can be used for motion capture as well as image capture. By tracking a camera's orientation and tilt, a system can know not only where the camera is but in which direction it is pointing.

Setting encompasses not only location but context. For this it is possible to harness real-time data both local and remote – information about location, weather, proximity to other actors or things, news, or transport information. A live link to the Internet also means that a story can be broadcast, or conversely that a script can be updated dynamically by a remote user or users. It also means that the script can be personalized as in e-learning systems, including dynamic, trail-based ones [10].

4.4 Scripting spaces

All of this might be interesting even without pedagogical intent. But the power of narrative lies not in technique or technology but in the story. Story is tied to its settings, and takes form in the script. In cinematic convention, settings are where scenes take place. In a script, this can have specific historical intent (events occurred in particular places), or can be completely fictional.

There are precedents for using scripts instead of lesson plans in education, and their use is increasing, particularly in technology-enhanced learning. The persuasive power of a cinematic script, though, is that it contains emotional cues – it tells people how to act. As mentioned, even historical stories contain an element of fiction, as actors explore the feelings felt by people involved in

past events. The type of high-tech street theater proposed here engages learners to explore characters' feelings; when combined with conscious reflection this can make for effective learning.

4.5 On location

A cinematic script, like a computer program, is a set of instructions or rules; it is "experience design" in a broad sense. But in digital form, a script, once created, need not remain fixed. It can serve as a framework for activity but can change dynamically based on input from the location, from sensors and other live data, from remote or local human input, or a personalization system. With all these possible elements, a script more resembles orchestration than sheet music.

A script thus can serve as a live capture mechanism, recording the location trail, plus input from sensors and other data feeds. In Urban Tapestries a trail corresponds to an device's movements; by tying location to narrative, the device is not associated with a person but is treated more broadly as a story capture mechanism.

In the current prototype, which runs on a laptop with attached camera, the narrative is depicted as a trail, but one that need not be followed in linear fashion. Scripted dialogue is displayed as subtitles below the live video feed, again turning the recognizable passive experience of watching a movie into an active one of capturing. If the actor reads the scripted lines verbatim, then this also functions as traditional subtitles during viewing.

4.6 Post-production

Post-production is a process of editing, digesting, presenting and re-representing knowledge – all of which play a role in reflective meta-learning. The captured images and trail information can be compared against the intentions laid out in the original script and storyboards, and can be used to evaluate learning. The script, as a record of all the captured data, is as much a part of the created product as the movie. Thus it can be "published" along with the movie. Post-production need not end – movies can be shared in completed form, or as raw materials to can be re-edited by others.

5. CONCLUSION

The system proposed here bears some conceptual similarities to Barry's common sense camera [1]. In this case the camera is endowed not with common sense but context awareness, linked to narrative. It is not limited to documentaries, but opened up to allow all cinematic genres and conventions. To allow for maximal human imagination, the computer is relegated to capturing and processing data. It may be of value, though, to have suggested advice from experienced directors .

In activity theory, the knowledge we create is mediated by the artifacts we use and the social contexts in which we use them. The tools affect a learner's approach. For example, knowing that your location is constantly being tracked affects your movements. Acting in the role of a character, or director, of a cinematic production causes you to perform in certain ways, follow certain conventions and act within a certain framework. The knowledge that your actions are being broadcast live on the Internet, or that you are in constant communication with others, makes you particularly conscious of them. Conversely, the availability of data from the Internet in real time, on location, can alter the script and/or trail at any time. Knowing that a trail is being

automatically created, and that it can be revisited and edited later, also affects your experience.

Related to this is the fostering of a creative mindset. An artist, writer, or film director views and interacts with the world with a certain creative focus which is informed by specific goals – the creation of a painting, a book, or a film. An effective learning system can inspire this type of creativity by making learners into creators.

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