Intel's Vision Of Sports Immersion

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Abstract

Intel is exploring the technologies required to make sports immersion a reality within the next few years. Our vision is to develop a new application category that delivers highly interactive and personalized sports content to the client. This valuable content will drive a range of novel uses, ranging from Webcasting personalized sports highlights to integration with reality-based games.

Our goal is to develop the "ultimate" fantasy sports experience. To accomplish this, we will combine compelling live sports event content, sophisticated semantic video processing and 3-D rendering.

A VISION OF SPORTS IMMERSION

Intel's vision of personal sports immersion is full motion, 3-D, real time, trans-port independent, interactive sports entertainment based on live athletic events. This technology ultimately will allow the client (end user) to access virtually unlimited depth of information and viewing options while a sports event is being broadcast from anywhere in the world.

We call this "pull entertainment" because the clients will pull from the event the unique data that they desire. These data include video and query-based textual information about the event.

For example, what if you could…

- Replay of a goal being scored, but see it from any angle of view that you select — and see it in 3-D.
- See a wide range of game statistics on the performance of your team or favorite player, in real-time using simple query language.
- Keep track of players' movements to review how a goal score play was set up.
- Select a player on the live video and continuously highlight him or her throughout the game and obtain detailed player profile information on-demand.
- Assemble personalized highlights of one or more sports events, based on the specific types of events that you want to see.
- Eventually, play a 3-D, interactive simulation or game based on actual players using performances from real games, called reality-based gaming.

Currently, video broadcasts and Webcasts of sports events offer limited interactivity for the client. The levels and options of interactivity are predetermined by the vendor.

Sports immersion will transcend these limitations. It will become a new type of entertainment experience that features highly personalized interactivity. A client will enjoy the "what if" examples mentioned previously, as well as options not yet conceived.

First generation applications

There are examples of early glimpses into sports immersion technology. For example, Orad Hi-Tec Systems Ltd., based in Israel, has developed a first generation technology called

"virtual sports Webcasting," based on their VirtuaLive* video system. They demonstrated this technology during the 1998 World Cup soccer events and with Premier League soccer matches that same year.

Sports.com deployed Orad's video clips on their Website. Soccer enthusiasts around the world could view the clips using Orad's VirtuaLive Console™ player, which has controls similar to that of a VCR remote.

Figure 1 depicts a generic type of controller. Using this controller, the client can search for a particular scoring event on a menu. Then, the event can be replayed. As this technology evolves, the search and viewing options of the player will reflect the increased amount of data available to access.

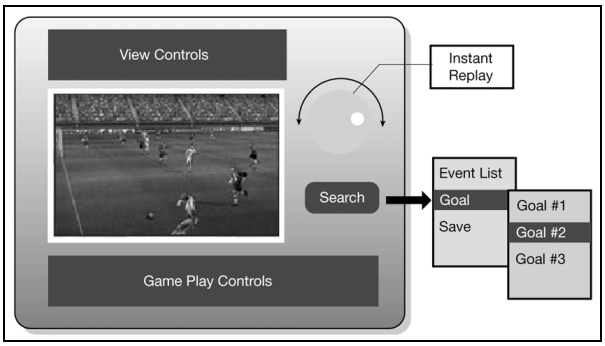

Figure 1

INTEL'S MODELING ARCHITECTURE

Development of this modeling architecture is in its early stages, so an in-depth exploration of the elements and processes is not available. However, the following covers the basics from video to production to server/broadcast to client participation.

Live video data from the sports event are generated from cameras positioned around the stadium. A tracking module processes the input video to generate 3-D coordinates for the players, ball and officials. The 3-D coordinates place each object with respect to real-world coordinates in the field of play and stadium, such as the field boundaries, goals and stands. The data are streamed to an analysis engine, where event detection and event modeling occur.

Figure 2 shows a system diagram that illustrates the sequence of processes that occur as live data are generated. The data flows from the live event through analysis and production levels to the end user device, such as a computer, television or game console.

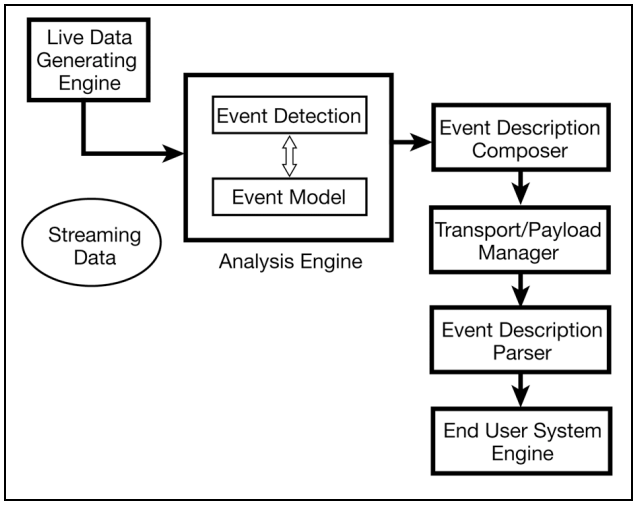

Figure 2

The modeling architecture is key to this technology. Some actions by the players can be interpreted automatically by the event detection engine. This includes player and ball movement within the field boundaries, as well as basic entity relationships.

However, certain actions cannot yet be reliably interpreted automatically by the engine. This requires human intervention. An operator must view the video and annotate it with assigned actions. At this point the model becomes "instantiated" with that additional data. For example, the operator would see a kick on the video and add the detail of it being a kick by the player's right foot. Automatic detection only would indicate ball contact

with this player and ball movement away from the player, but not the details of the action.

Eventually, automatic event detection and modeling architecture will improve so that an operator no longer is needed to add semantic events, such as types of kicks, fouls and other details. This advanced level of detection is necessary to bring the immersive sports experience to live event broadcast.

Soccer has been considered a viable sport to test the early generations of immersive sports technology. But all other major sports also are candidates for this technology. For each sport, a hierarchical model must be developed.

To gain an understanding of how this technology is applied to a sport, consider the example event model shown in Figure 3. It represents a hierarchical event model for American football. The general breakdown of the sport, on the left, identifies key categories of information. The example model on the right is a specific application of this approach to a particular football game.

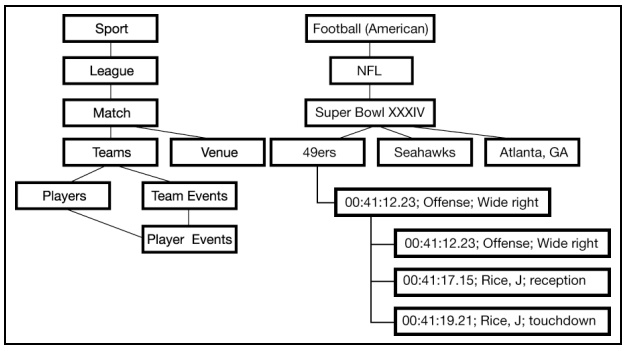

Figure 3

Adding value to content

An instantiated model of a sports event is an entirely new type of content and a valuable property. Once a sports event is recorded this way, it can be repurposed in any number of ways on a wide range of platforms.

The content could be used by networks to provide enriched live television broadcasts. And because the content includes a database of statistics and event information, game developers could create new types of reality-based entertainment.

Sports immersion content also offers flexibility with respect to the delivery plat-form. Content could be delivered via television, cable, DVD, CD-ROM, the Web or a game cartridge.

CONCLUSION

Our vision is a new way for sports enthusiasts to experience a broad range of sports and compliment broadcast television coverage of sports events. It's a way for everyone to get become a participant, not just a passive viewer.

With Intel's vision of sports immersion, everyone will be able to get into the game!

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Orad Hi-Tec Systems Ltd.
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