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Synopsis and Response Paper of Software Architecture for Immersipresence by Alexandre R.J. Francois

An immersive and interactive application requires on-line processing and the mixing of multimedia data, such as the audio and video and the live input data from interaction sensors. According to the various requirements, the integration of different techniques is a complex and difficult task. This paper describes a software architecture, SAI, for designing, analyzing and implementing applications by performing distributed, asynchronous parallel processing of generic data streams. It not only provides a universal framework for different algorithms, but also satisfies some desirable software engineering qualities, such as efficiency, scalability, extensibility, reusability and interoperability. The basic concepts and major components are explained in the paper in detail. Six cases, including MuAS.RT, the one that relates to music analysis, are discussed to exhibit the functionality and evolution of SAI.

To implement a complex and large system, the design and specification of the overall system structure become significant issues. A major challenge is the choice of an appropriate style since an architecture style is ideal only for some applications and inapplicable for others. SAI proposes a new architecture (components, connectors and constraints), with the extensible data model (cell and source) and hybrid processing model (shared repository and message-passing), realizing many different kinds of real-time interactive multimedia systems.

Six practical, useful, and enjoyable cases each implemented using SAI are included in this paper. Some critical issues concerning implementations are discussed. For example, two types of parallelism of processing are discussed in real-time video segmentation and tracking projects. The synchronization and synthesis of various input data sources are emphasized in the handheld mirror simulation project. Details of interactions are also described through the interactive animated graphics project. According to the purpose and function provided in these cases, these projects can offer well-developed/developing basics which will benefit future research in many areas.

Overall, the research project is quite comprehensive. Innovative concepts are proposed and examined through implementations. The most impressive part of the work is the case studies, which employ the SAI architecture to solve various practical problems efficiently. Additionally, these topics are quite interesting which make the concepts appealing and comprehensible.