Interactive Multimedia Investigation of Experimental and Simulated Data Sets Using Dynamic Multi-Menus

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A detailed industrially-based multimedia case-study is considered, featuring experimental and simulation dough-kneading data-sets. Multimedia environments and novel interaction techniques are employed, creating flexible implementations, whilst dealing with large and densely interrelated data. Direct data-comparison across valid combinations is actioned, through Multi-Menus. Voiceover-streams and multiple navigation-paths are characteristic features. Multimedia environment-level retiming supports synchronised presentation of non-uniform animations, reducing re-rendering times. Through Multimedia environments, direct system-updates are practical, whilst data-duplication is avoided. Such implementation enhances the presentation impact-factor of the work. As such, the system supports intelligent interrogation, that itself, may lead to heightened awareness and meaningful interpretation of the data. This complicated interactive rheological investigation, aided via Multimedia technology, spans across various parameter spaces. These include geometric, fluid-type, speed, depth and stirrer-shape adjustments. Whilst the resulting systems fulfil base-level presentation requirements over various media, the same systems may be used for further data-evaluation.

Keywords: interaction; navigation; multimedia; Multi-Menus; content-evaluation

Case Study: Dough Kneading

The main objective of this work and the Multimedia System (MMS) it has generated includes the demonstration of navigation flexibility through the vast content-domain of the selected case study. This is achieved by creating a multimedia visualisation system for the complete, direct and meaningful presentation of the associated data, enabling interactive interrogation and illustration of the key factors that affect the process of dough kneading. The choice of a fully programmable Multimedia-development platform for the Internet (Macromedia Director MX 2004) prevented presentation deficiencies and limitations introduced with proprietary software. The development of Multi-Menus, an interaction structure that provides advanced automated and user-defined interaction with the underlying data, offers the ability to present results comparatively, from case to case, or via interactive mode-switching, a highly desirable presentation characteristic. This implementation is a valuable tool for the comprehension of parameter variation, and consequent affect upon the associated flow or process under consideration.

Ultimately, MMS data integration ([7]), [19]) has enabled effortless navigation through the vast volume of information, dispensation of data-duplication, and interactive comparison of experimental and simulation animations, within a single MMS frame. Interaction with animations is implemented through user-interface options. In addition, the MMS may be programmed to simulate common interaction modes, as cited in the literature [8]. The flexibility, demonstrated in Multimedia environments (MME) and rigorous system-design for large data sets, is based on the uniqueness of the data and their interrelationships.

Considerable interest is evident in this applied case-study, from the computer-science perspective. Here, various requirements are exposed. The sheer size of data, introduces storage/retrieval limitations, particularly as non-linear access is supported by the end-system. Synchronous display of multiple streams results in system/network-bottlenecks, particularly as delivery over Internet communi-