



IMSC
Integrated
Media Systems
Center

INTEGRATED MEDIA SYSTEMS CENTER
A National Science Foundation
Engineering Research Center at the
UNIVERSITY OF SOUTHERN CALIFORNIA

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Data Management: VIEW-AIMS
(Video Interaction Enhancement With AIMS)



BRIEF DESCRIPTION OF TECHNOLOGY DEMONSTRATION

The main objective of the AIMS project is to address the challenges involved in managing the multidimensional sensor data streams generated within Immersive Environments. We call this data type, immersidata, which is defined as the data acquired from a user's interactions with an immersive environment. As a sub-project of AIMS, VIEW-AIMS emphasizes on challenges of user interactions in immersive environments. To facilitate natural interactions, users in immersive environments can perform the command through hand gestures. The main challenge is to extract in real-time a meaningful atomic motion and then recognize the motion by comparing it with a known library of motions.

With VIEW-AIMS, we demonstrate our pattern-isolation and pattern-recognition techniques. This demonstration provides a prototype video browser, where users can operate the system with hand gestures. VIEW-AIMS gathers continuous immersidata streams from the 2 gloves and 2 trackers. After extracting meaningful command from these data, the application can manipulate the media player based on the recognized command.

UNIQUE OR DISTINGUISHING CHARACTERISTICS RELATIVE TO STATE-OF-THE-ART

- Real-time recognition techniques
- Isolation techniques which can extract a meaningful body motion from a continuous sensor data stream

APPLICATIONS

- 2020 classroom where students and teachers can interact in an immersive environment
- Any immersive environment applications which require interaction between users and computers

RECENT HIGHLIGHTS, LEVEL OF DEVELOPMENT, UPCOMING MILESTONES

- May 2002: ASL Recognition System, where the system can recognize American Sign Language (ASL) signs.
- March 2003: VIEW-AIMS: A Windows application where users can manipulate the media player with body motions.
- May 2003: Integration of VIEW-AIMS with mBase from FXPAL
- Medium term plan: Improve the recognition rate by employing different recognition techniques

UNDERLYING TECHNOLOGIES

- Weighted-sum Singular Value Decomposition (SVD): This similarity measure can compare an input pattern to the members of a known vocabulary.
- Mutual information based heuristic for isolating the action sequences over continuous sensor data streams.
- Dynamic Time Warping (DTW): This technique computes a non-linear mapping of one pattern onto another.

LIST OF PUBLICATIONS, REFERENCES, URLs

- C. Shahabi and D. Yan, "Real-Time Pattern Isolation And Recognition Over Immersive Sensor Data Streams," presented at The 9th International Conference On Multi-Media Modeling, Taiwan, 2003.
- C. Shahabi, "AIMS: An Immersidata Management System," presented at VLDB First Biennial Conference on Innovative Data Systems Research (CIDR2003), Asilomar, CA, 2003.
- C. Shahabi, L. Kaghazian, S. Mehta, A. Ghoting, G. Shanbhag, and M. McLaughlin, "Analysis of Haptic Data for Sign Language Recognition," presented at 9th International Conference on Human Computer Interaction, New Orleans, 2001.
- C. Shahabi, L. Kaghazian, S. Mehta, A. Ghoting, G. Shanbhag, and M. L. McLaughlin, "Understanding of User Behavior in Immersive Environments," in *Touch in Virtual Environments: Haptics and the Design of Interactive Systems*, M. L. McLaughlin, J. Hespanha, and G. Sukhatme, Eds., 2001.
- <http://infolab.usc.edu/VIEWAIMS/>
- <http://infolab.usc.edu/AIMS/>
- <http://infolab.usc.edu/>

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IM: Video Interaction Enhancement With AIMS (VIEW-AIMS)