Project: Immersidata Management System

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❖ Description:

The main objective of this project is to address the challenges involved in modeling 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. Generally, immersidata are: 1) multidimensional, 2) spatio-temporal, 3) continuous data stream, 4) large in size and bandwidth requirements, and 5) noisy. The system should be designed based on these characteristics of immersidata.

The students will be organized into 3 groups, where each group emphasizes on one important feature in the immersidata management system:

A) Modeling Immersidata
B) Spatial Queries on Immersidata
C) Temporal Queries on Immersidata

Group A should at least accomplish three tasks: 1) collecting the immersidata by using the Haptic equipments of Infolab, 2) modeling the immersidata, 3) on demand visualization of immersidata abstractions. Group B & C implement at least three different types of queries on the immersidata. **Note that the immersidata required during the project are provided by Group 1 by 10/2**.

❖ Administration:

- Each group has a group leader to coordinate with the project leader.
- Each group needs to schedule a meeting with the project leader every two weeks.
- Grading Policy:
  - Group A: 25% Task1, 25% Task2, 25% Task3, 10% Report, 15% Oral Reports during meetings
  - Group B&C: 15% Simulation system, 20% each type of queries, 10% Report, 15% Oral Report during meetings
  - Contributions of each student are independently evaluated by the instructor and the project leader.

❖ Resource and Related Links:

- USC AIMS project : http://infolab.usc.edu/AIMS/Introduction.html
- Tutorial on Wavelets and Signal Processing: http://www.bearcave.com/misl/misl_tech/wavelets/index.html
- Publications:
  - Jacob Eisenstein, Shahram Ghandeharizadeh, Leana Golubchik, Cyrus Shahabi, Donghui Yan, and Roger Zimmermann, Device Independence and Extensibility in Gesture Recognition, IEEE Virtual Reality Conference (VR) , LA, CA, March, 2003

- Cyrus Shahabi, AIMS: An Immersidata Management System, VLDB First Biennial Conference on Innovative Data Systems Research (CIDR2003) , Asilomar, CA, January 2003
- Cyrus Shahabi, Mehdi Sharifzadeh and Albert A. Rizzo, Modeling Data of Immersive Environments, ACM First International Workshop on Immersive Telepresence (ITP 2002), Juan Les Pins, France, December 2002
- C. Shahabi, G. Barish, B. Ellenberger, N. Jiang, M. Kolahdouzan, A. Nam, and R. Zimmermann, Immersidata Management: Challenges in Management of Data Generated within an Immersive Environment , Fifth International Workshop on Multimedia Information Systems (MIS?9) , Palm Spring, CA, October 1999

- Haptic equipments of Infolab:
  - 5DT Data Glove 16: http://www.5dt.com/products/pdataglove16.html
  - Flock of Birds: http://www.ascension-tech.com/products/flockofbirds.pdf

❖ Time Schedule:

- 9/4: Students should make their group and elect the group leader. The group leader should send the name of group and the name of group members to the project leader.
- 9/11: Each group presents their sub-system proposal including a survey about the research work on their part and the approaches they want to develop.
- 10/2: Group A delivers the samples of immersidata to Group B& C
- 10/23: Group B & C demo the simulation systems
- 12/4: The demo day!

❖ Additional Notes:

- Group A: It is very important to deliver the sampled data of immersidata to Group B&C. The group leader of each group should have a meeting to discuss the applications and the delivery details.
- Group B:
  - Note that compared to the traditional geo-spatial data, performing spatial analysis on immersidata is more challenging for the following reasons: 1) data continuously coming into the database, 2) the number of dimensions is large; 3) data are noisy. Therefore, the spatial queries designed for immersidata should overcome these challenges.
  - The simulation system should simulate the real-time data streams from the static samples collected by Group A.
  - The final demonstration should be on the simulated data streams.
- Group C:
  - The simulation system should simulate the real-time data streams from the static samples collected by Group A.
  - The final demonstration should be on the simulated data streams.
  - Note that it is important to demonstrate the tolerance of your algorithm of noise. In other words, your simulation system should have a noise knob. By adjusting the value of the noise knob, the simulation system will add randomized noise into the simulated data streams.