Division of Computational Informatics

Database Group

Introduction

In the field of computational sciences, management and utilization of massive data are extremely important issues. The database group in the computational informatics division is in charge of research and development in the field of data engineering. In particular, we have been engaging in the following research topics: infrastructure for integrating heterogeneous databases and various information sources, data mining and knowledge discovery technologies to discover knowledge and outliers from massive data, and scientific data management. Additionally, we also have engaged in application studies, such as development of JPV/JMA meteorological databases and knowledge discovery from the database in cooperation with Global Environment Science division and management of Lattice Data Grid in cooperation with Particle Physics division.

Research Topics Infrastructure for Information Integration

We have been developing SS*, which allows us to integrate not only conventional data sources, such as relational databases and Web data, but also stream data, such as network packets, sensor data and location information. Based on SS*, we are studying (1) a security aware stream data processing scheme on the cloud, and (2) malware detection management system.
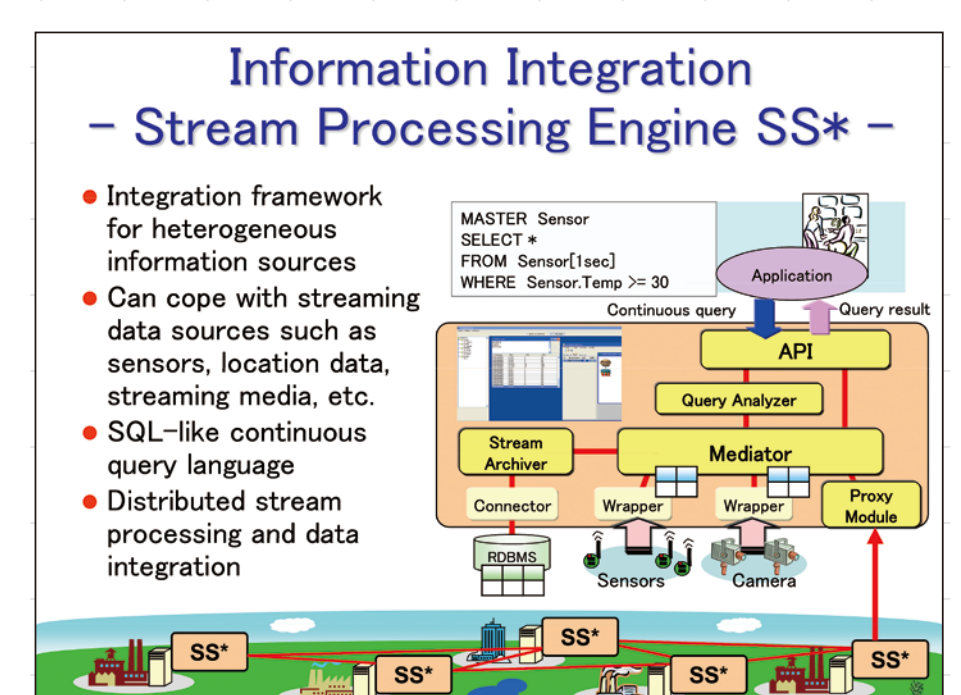
Data Mining and Knowledge Discovery

We have been studying various data mining and knowledge discovery techniques, such as (1) outlier detection on uncertain datasets, (2) GPU acceleration of association rule mining, (3) detection of social bookmarking spams, and (4) microblog analysis.

Scientific Data Management

To deal with rapidly increasing big scientific data, we have been studying the following topics: (1) a hot spots detection from satellite data using SciDB, (2) a faceted - navigation system for QCDml ensemble XML data, and (3) meteolorogical data management (GPV/JMA).

Computational Media Group

Computational Media are advanced information media on which high sensing functionality and huge computing resource over computer network are smartly unified. We aim to feed appropriate information to everyone wherever and whenever it is necessary by the computational media.

Computational media stand on advanced and intelligent visual information processing technologies. Surveillance cameras are one of our major data source. While they have been installed in public space, some people may feel uncomfortable with cameras though they play important role of keeping security and safety of our daily life. The computational media will give a new role to cameras by which people can enjoy the advantage of IT life. For example, people will be able to have "free viewpoint video on football games" and "see-through vision" in their daily life.

Free Viewpoint Video on Football Games

Our proposed approach can visualize a real football game at remote user site where people can see the game from any 3D viewpoint by our new CHI technology. Players in the free viewpoint video are rendered from actually captured images.

See-Through Vision

We have proposed a new visualization method of watching people behind obstacles in augmented reality fashion. Our preliminary system shown in the figure had been installed and tested in a popular commercial shopping mall in Kyoto.