Data mining

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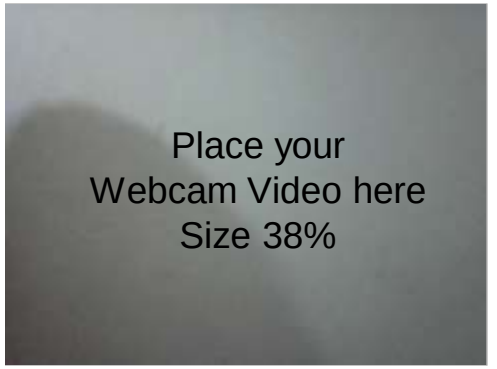
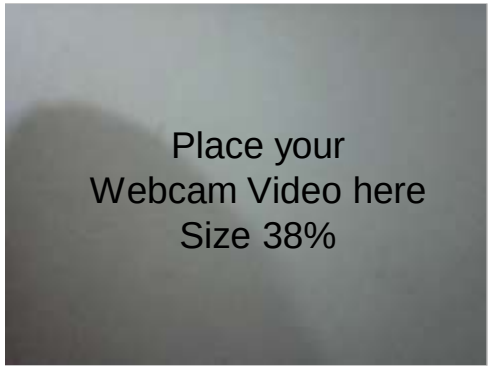
Types of data mined

- Data mining can be applied to any kind of data as long as the data are meaningful for a target application.
- The most basic forms of data for mining applications are database data , data warehouse data and transactional data.

Data Mining: On What Kinds of Data?

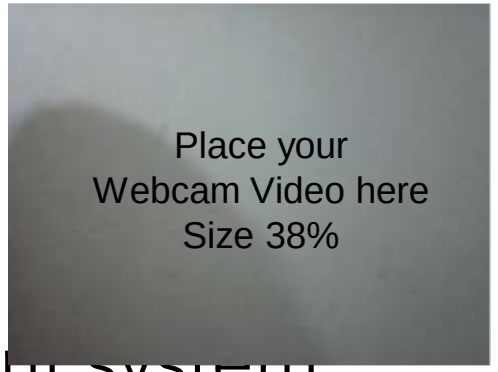


- Database-oriented data sets and applications
  - Relational database, data warehouse, transactional database
- Other data sets and advanced applications
  - Data streams and sensor data
  - Time-series data, temporal data, sequence data (incl. bio-sequences)
  - Structure data, graphs, social networks and multi-linked data



- Object-relational databases
- Heterogeneous databases and legacy databases
- Spatial data and spatiotemporal data
- Multimedia database
- Text databases
- The World-Wide Web

Relational database



- A database system, also called a database management system (DBMS), consists of a collection of interrelated data, known as a database, and a set of software programs to manage and access the data.

- A relational database is a collection of tables, each of which is assigned a unique name.
- Each table consists of a set of attributes (columns or fields) and usually stores a large set of tuples (records or rows).

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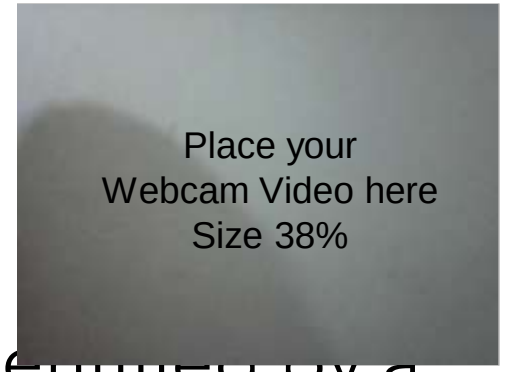
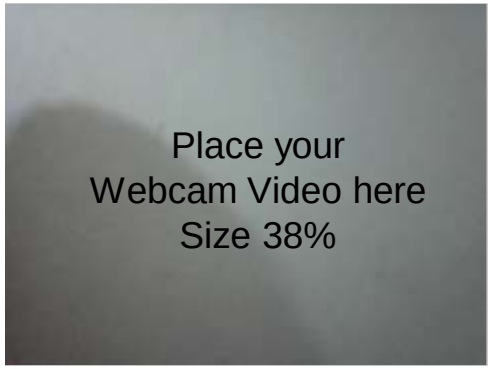


- Each tuple in a relational table represents an object identified by a unique key and described by a set of attribute values.
- A semantic data model, such as an entity-relationship (ER) data model, is often constructed for relational databases.
- An ER data model represents the database as a set of entities and their relationships

Example



A relational database for an Electronics store.

- The fictitious AllElectronics store is used to illustrate concepts.
- The company is described by the following relation tables: customer, item, employee, and branch. The relation customer consists of a set of attributes describing the customer information, including a unique customer identity number (cust ID), customer name, address, age, occupation, annual income, credit information, and category.

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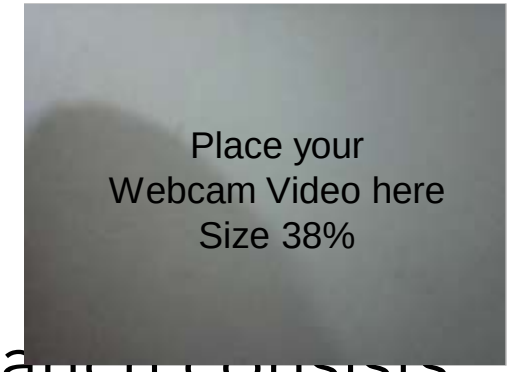
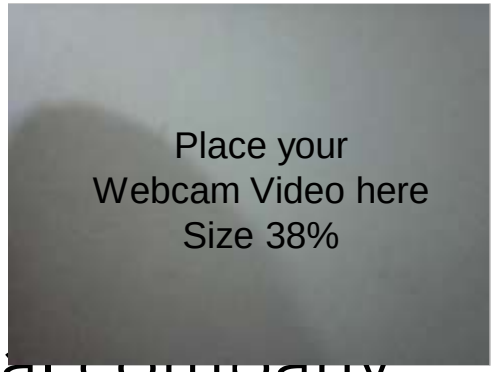


- Similarly, each of the relations item, employee, and branch consists of a set of attributes describing the properties of these entities.
- Tables can also be used to represent the relationships between or among multiple entities.
- In our example, these include purchases (customer purchases items, creating a sales transaction handled by an employee), items sold (lists items sold in a given transaction), and works at (employee works at a branch of AllElectronics).

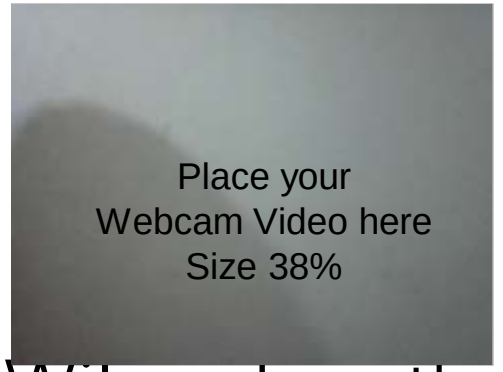
Data Warehouses



- Suppose that AllElectronics is a successful international company with branches around the world.
- Each branch has its own set of databases.
- The president of AllElectronics has asked you to provide an analysis of the company's sales per item type per branch for the third quarter. This is a difficult task, particularly since the relevant data are spread out over several databases physically located at numerous sites.
- If AllElectronics had a data warehouse, this task would be easy. Here comes the application of Datawarehouse

- A data warehouse is usually modeled by a multidimensional data structure, called a data cube, in which each dimension corresponds to an attribute or a set of attributes.
- A data cube for summarized sales data of AllElectronics .
- The cube has three dimensions: address (with city values Chicago, New York, Toronto, Vancouver), time (with quarter values Q1, Q2, Q3, Q4), and item(with item type values home entertainment, computer, phone, security).
- The aggregate value stored in each cell of the cube is sales amount (in thousands)

Reference



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