Cutting-edge research centre

Multi-Dimensional View of Data Mining

Market Analysis and Management

Why Data Mining? — Potential Applications

WHAT IS DATA MINING?

WHY DATA MINING?

DATA MINING

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WHY DATA MINING?

- **The Explosive Growth of Data: from terabytes to petabytes**
  - Data collection and data availability
    - Automated data collection tools, database systems, Web, computerized society
  - **Major sources of abundant data**
    - Business: Web, e-commerce, transactions, stocks, …
    - Science: Remote sensing, bioinformatics, scientific simulation, …
    - Society and everyone: news, digital cameras,
- **We are drowning in data, but starving for knowledge!**
- "Necessity is the mother of invention"—Data mining—Automated analysis of massive data sets

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WHAT IS DATA MINING?

•**What Is Data Mining?**

•Data mining (knowledge discovery in databases):

•Extraction of interesting (non-trivial, implicit, previously unknown and potentially useful) information or patterns from data in large databases

•**Alternative names :**

•Knowledge discovery(mining) in databases (KDD), knowledge extraction, data/pattern analysis, data archeology, data dredging, information harvesting, business intelligence, etc.

• **What is not data mining?**

•(Deductive) query processing.

•Expert systems or statistical programs7

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WHAT IS (NOT) DATA MINING?

- **What is not Data Mining?**
- – Look up phone number in phone directory
- – Query a Web search engine for information about —Amazon

- **What is Data Mining?**
- – Certain names are more prevalent in certain US locations (O'Brien, O'Rurke, O'Reilly… in Boston area)
- – Group together similar documents returned by search engine according to their context (e.g. Amazon rainforest, Amazon.com,)

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WHY DATA MINING?
POTENTIAL APPLICATIONS

- Data analysis and decision support
  - Market analysis and management
    - Target marketing, customer relationship management (CRM), market basket analysis, market segmentation
  - Risk analysis and management
    - Forecasting, customer retention, quality control, competitive analysis
  - Fraud detection and detection of unusual patterns (outliers)

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WHY DATA MINING?
POTENTIAL APPLICATIONS

Other Applications

- Text mining (news group, email, documents) and Web mining
- Stream data mining
- Bioinformatics and bio-data analysis

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MARKET ANALYSIS AND MANAGEMENT

Where does the data come from?

Credit card transactions, discount coupons, customer complaint calls

Target marketing

Find clusters of "model" customers who share the same characteristics: interest, income level, spending habits, etc.

Determine customer purchasing patterns over time

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MARKET ANALYSIS AND MANAGEMENT

Cross-market analysis

Associations/co-relations between product sales, & prediction based on such association

Customer profiling

What types of customers buy what products

Customer requirement analysis

Identifying the best products for different customers

Predict what factors will attract new customers

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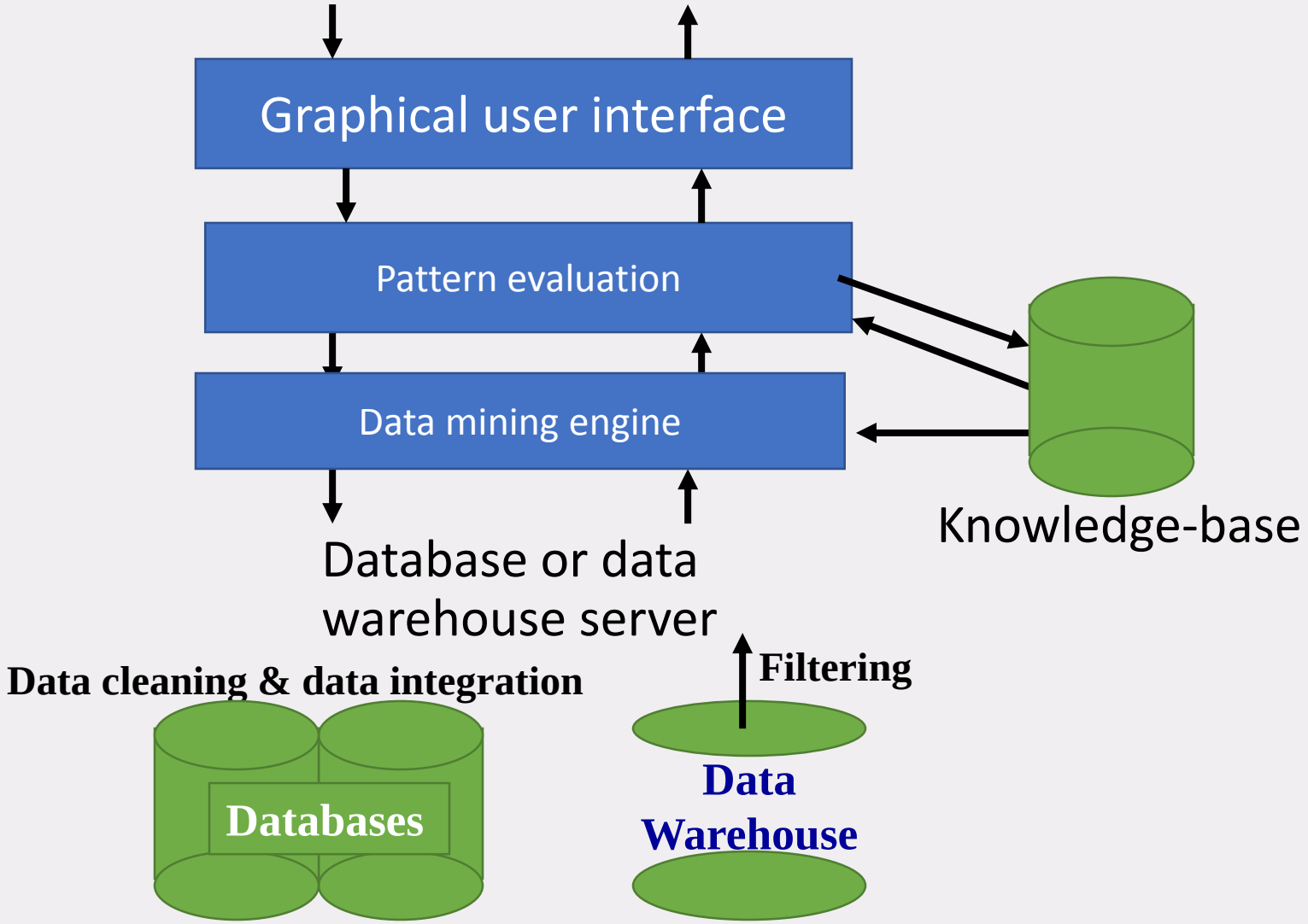
ARCHITECTURE: TYPICAL DATA MINING SYSTEM



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DATA MINING: ON WHAT KINDS OF DATA?

- **Relational database**
- **Data warehouse**
- **Transactional database**
- **Advanced database and information repository**
  - Spatial and temporal data
  - Time-series data
  - Stream data
  - Multimedia database
  - Text databases & WWW

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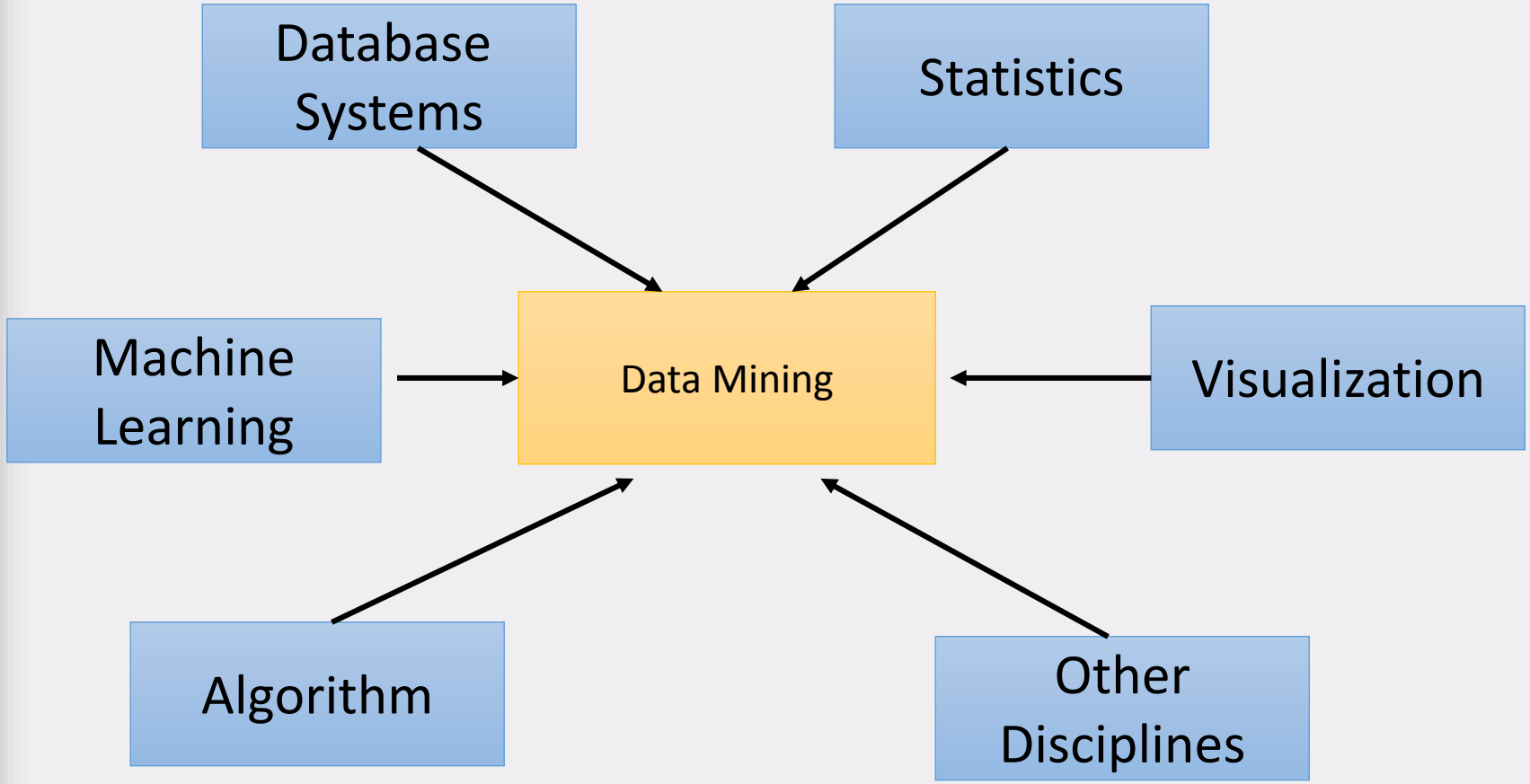
DATA MINING: CONFLUENCE OF MULTIPLE DISCIPLINES



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MULTI-DIMENSIONAL VIEW OF DATA MINING

Data to be mined

Relational, data warehouse, transactional, stream, object-oriented/relational, active, spatial, time-series, text, multi-media, heterogeneous, WWW

Knowledge to be mined

Characterization, discrimination, association, classification, clustering, trend/deviation, outlier analysis, etc.

Multiple/integrated functions and mining at multiple levels

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MULTI-DIMENSIONAL VIEW OF DATA MINING

Techniques utilized

Database-oriented, data warehouse (OLAP), machine learning, statistics, visualization, etc.

Applications adapted

Retail, telecommunication, banking, fraud analysis, bio-data mining, stock market analysis, Web mining, etc.

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TING-EDGE RESEARCH CENTRE

e : Cutting-edge research centre in Košice, Slovakia

ty: Košice

gion: Central Europe

untry: Slovakia

Objectives:

e project has brought advanced technologies and laboratory equipment the Technical University of Košice. This has enabled both the iversity and Slovakia to engage more fully in research into artificial elligence, informatics and telecommunications at the European level.

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CUTTING-EDGE RESEARCH CENTRE

arget area:

Data-mining

Problems addressed:

rtificial Intelligence and **Data Mining** is very poor developed in rope.

We don't have much research labs for ***AI*** and **data mining** in Europe uropean Goverments are spending a lot of money for foreign ***AI*** chnologies which they buy from USA or China mostly

eneral description of the solution:

RDF funding was provided for a scientific research centre in Košice, ovakia.

e Centre of Information and Communication Technologies for nowledge Systems performs scientific research on a range of topics cluding artificial intelligence, informatics and telecommunications. ch year, some 30 national and international projects are run at the ntre, on subjects ranging from virtualisation to data mining.

olutions used:

he idea is to build a research lab to research and develop new *AI* and a mining technologies. These technologies can be used by any ropean Goverement / Companies, or simple european citizens.

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UTTING-EDGE RESEARCH CENTRE

Benefits gained from the solutions used:

•This will enable universities, proffesors and young students to work towards this promissing technology.
•A research lab will be built where ideas are put into reality
•We will be able to create our own intelligent systems depending on our own needs

Community/ies where the smart change is used:

This can be used and built anywhere in Europe. The important thing is here that it will need ***AI*** and **Data Mining** experts, universities and also students to work on it. The outcomes of this research lab can be used anywhere in the world.

•Cost (optional):

EUR 1 252 007

-Link to the project website

https://ec.europa.eu/budget/euprojects/cutting-edge-research-centre-ko%C5%A1ice-slovakia_en?language=en
http://ec.europa.eu/regional_policy/en/projects/slovakia/a-cutting-edge-r-d-centre-of-excellence-in-kosice

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QUESTION

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