Data Warehouses

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Software Development Technologies
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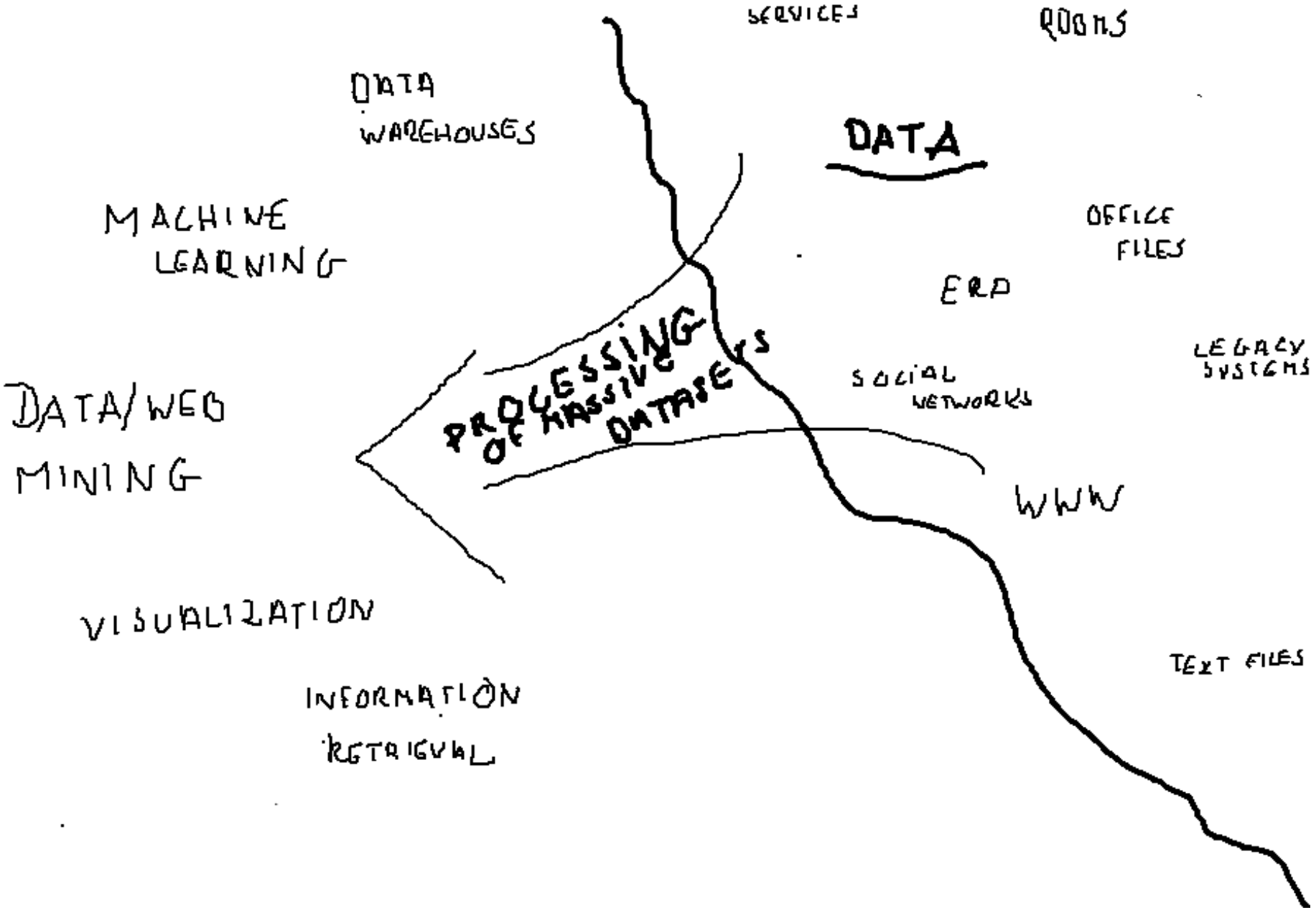
Goal: understanding data ...


SERVICES
ROOMS
DATA WAREHOUSES
DATA
MACHINE LEARNING
OFFICE FILES
ERP
LEGACY SYSTEMS
SOCIAL NETWORKS
DATA/WEB MINING
PROCESSING OF MASSIVE DATABASES
WWW
VISUALIZATION
TEXT FILES
INFORMATION RETRIEVAL

Goal: . . . to make data analysis efficient.

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- **OpenAI** founded in 2015 as a non-profit artificial intelligence research company.

Data mining

- Data mining is the discovery of **models** for data, ...
- But what is a model?

if all you have is a hammer, everything looks like a nail

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- **Data miner** will discover the most frequent patterns.

They all want to understand data and use this knowledge for making better decisions

Data+ideas vs. statistics+algorithms

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- WhizBang! Labs tried to use machine learning to locate people's resumes on the Web: the algorithm was not able to do better than procedures designed by hand, since a resume has a quite standard shape and sentences.

Data+computational power

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- Automatic translation
  - Statistical translation based on large corpora **outperforms** linguistic models!

Human computation

- CAPTCHA and reCAPTCHA
- ESP game
- Check a lecture given by Luis von Ahn:
  `http://videolectures.net/iaai09_vonahn_hc/`
- Amazon Mechanical Turk

Data+ideas vs. statistics+algorithms

Those who ignore Statistics are condemned to reinvent it.

Brad Efron

- In Statistics, a term **data mining** was originally referring to attempts to extract information that was not supported by the data.
- Bonferroni's Principle: "if you look in more places for interesting patterns than your amount of data will support, you are bound to find crap".
- Rhine paradox.

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  - Deep learning.
  - And many others.

Data+ideas+computational power+statistics+algorithms

Processing of massive data sets

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- To make the data analysis efficient, we need to organize data in a way that ensures efficient storage and access.
- Different data management technologies:
  - File management systems,
  - Database management systems (hierarchical, network-based, relational),
  - Data warehouses,
  - NoSQL.

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- **Knowledge discovery**: finding hidden patterns and associations, analytical models for prediction and clustering, visualization.

To be learned in the upcoming semester ...

The aim and the scope of the course

- **Aim**: To get to know how to design and construct data warehouses for efficient data processing.
- **Scope**: We will learn about:
  - Dimensional modeling,
  - ETL process,
  - OLAP systems,
  - MapReduce systems (Spark),
  - Processing of massive data.

Main information about the course

- Instructor:
  - dr inż. Krzysztof Dembczyński (kdembczynskicsputpoznanpl)
- Website:
  - www.cs.put.poznan.pl/kdembczynski/lectures/dw

Lectures

- Main topics of lectures:
  - Introduction
  - Evolution of database systems
  - Dimensional modeling
  - ETL and OLAP systems
  - MapReduce systems (Spark)
  - Processing of massive data.

Labs

- Strong connection between lectures and labs.
- Software: Spark.
- List of tasks and exercises for each meeting (also homeworks).
- Small programming projects and short exercises.
- Main topics:
  - Dimensional modeling
  - ETL process
  - MapReduce in Spark

Evaluation

- **Lecture**:

  Test: 75 % (min. 50%)
  Labs: 25 % (min. 50%)

- **Labs**:

  Regular exercises and home works: 4x25 points (min. 50%)

- **Scale**:

90 %	–	5.0	80 %	–	4.5	70 %	–	4.0
60 %	–	3.5	50 %	–	3.0	$<$ 50 %	–	2.0

- **Bonus points for all**: up to 10 percent points.

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