Part I
Introduction

1 An Overview (week 1)

1.1 Information Systems

1. Functions in models
   - ◯ Are always computable
   - ◯ Can always be represented as data
   - ◯ Can be constrained by axioms
2. Interpretation relationships
   - ◯ Are always computable
   - ◯ Relate constants to real-world entities
   - ◯ Are uniquely defined

1.2 Data Management

1. What is not specified in the data definition language ?
   - ◯ The structure of a relational table
   - ◯ The query of user
   - ◯ A constraint on a relational table
2. Logical data independence means
   - ◯ An abstract data type is implemented using different data structures
   - ◯ A new view is computed without changing an existing database schema
   - ◯ A model can be represented in different data modelling formalisms

1.3 Data Management Tasks

1. Which is wrong ? An index structure
   - ◯ Is created as part of physical database design
   - ◯ Is selected during query optimization
   - ◯ Accelerates search queries
   - ◯ Accelerates tuple insertion
2. Persistence means that
   - ◯ A change of a transaction on a database is never lost after it is completed
   - ◯ The state of a database is independent of the lifetime of a program
   - ◯ The same logical database can be stored in different ways on a storage medium

1.4 Information Management

1. Grouping Twitter users according to their interest by analyzing the content of their tweets is
   - ◯ A retrieval task
   - ◯ A data mining task
   - ◯ An evaluation task
   - ◯ A monitoring task

1.5 Distributed Information Systems

1. Creating a web portal for comparing product prices is (primarily) a problem of
   - ◯ Distributed data management
   - ◯ Heterogeneous data integration
   - ◯ Collaboration among autonomous systems

1.6 Distributed Data Management

1. When you open a Web page with an embedded Twitter stream, the communication model used by Twitter is
   - ◯ Push, unicast and conditional
   - ◯ Pull, multicast and ad-hoc
   - ◯ Push, multicast and ad-hoc
   - ◯ Pull, unicast and conditional

1.7 Heterogeneity

1. Creating a web portal for comparing product prices requires to address
   - ◯ Syntactic heterogeneity
   - ◯ Semantic heterogeneity
   - ◯ Both
2. An ontology is a
   - ◯ Sdatabase
   - ◯ database schema
   - ◯ data model
   - ◯ data modeling formalism
   - ◯ model

1.8 Autonomy

1. Trust is
   - ◯ A quality of information
   - ◯ A quality of a user
   - ◯ A quality of the relationship among user and information
   - ◯ A quality of the relationship among users

Part II
Storage

2 Distributed Data Management

2.1 Schema Fragmentation

2.1.1 Relational Databases

1. At which phase of the database lifecycle is fragmentation performed ?
   - ◯ At database design time

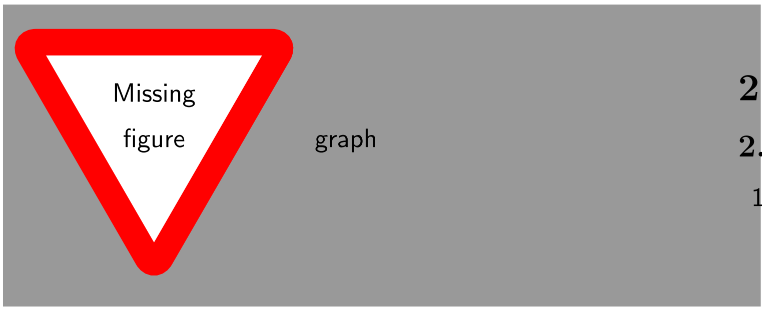
- ◯ During distributed query processing
- ◯ During updates to a distributed database

2. The reconstruction property expresses that
   - ◯ In case of a node failure the data can be recovered from a fragment from another node
   - ◯ The original data can be fully recovered from the fragments
   - ◯ Every data value of the original data can be found in at least one fragment

2.1.2 Primary Horizontal Fragmentation (week 2)

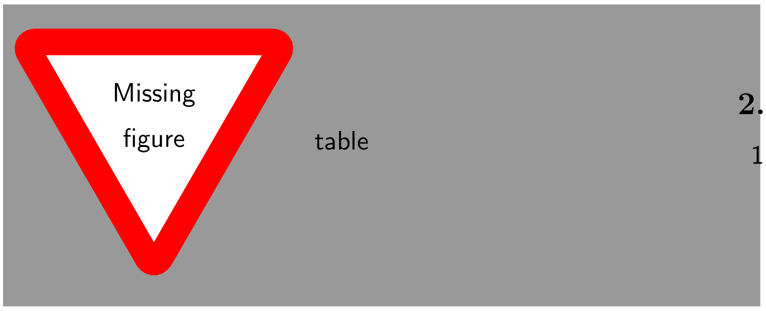
1. Example: application A1 accesses
   1. Fragment F1: with frequency 3
   2. Fragment F2: with frequency 1

   A1 accesses the whole relation with frequency



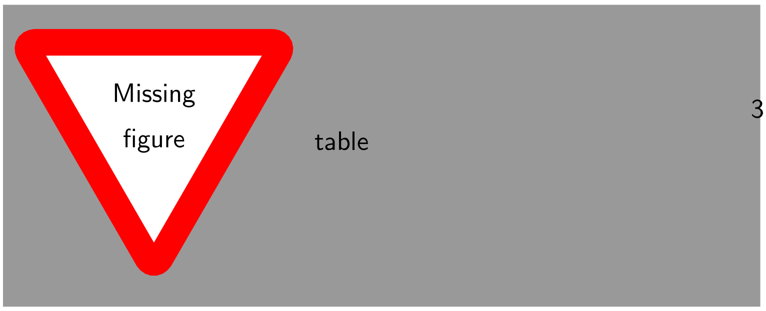
   - ◯ $^{13}/_{7}$
   - ◯ $^{4}/_{7}$
   - ◯ $^{14}/_{7}$

2. Consider the access frequencies below: How many horizontal fragments would a minimal and complete fragmentation have?



   - ◯ 3
   - ◯ 4
   - ◯ 6

3. Which of the following sets of simple predicates is complete?



   - ◯ Location = "Munich", Budget > 200000
   - ◯ Location = "Munich", Location = "Bangalore"
   - ◯ Location = "Paris", Budget ≤ 200000
   - ◯ None of those

4. Which is true for MinFrag algorithm?
   - ◯ The output is independent of the order of the input
   - ◯ It produces a monotonically increasing set of predicates
   - ◯ It always terminates
   - ◯ All of the above statements are true

5. When deriving a horizontal fragmentation for relation S from a horizontally fragmented relation R
   - ◯ Some primary key attribute in R must be a foreign key in S
   - ◯ Some primary key attribute in S must be a foreign key in R
   - ◯ Both are required

2.2 Graph Databases (week 3)

2.2.1 Semi-structured Data

1. Semi-structured data
   - ◯ Is always schema-less
   - ◯ Always embeds schema information into the data
   - ◯ Must always be hierarchically structured
   - ◯ Can never be indexed

2. Why is XML a document model?
   - ◯ It supports application-specific markup
   - ◯ It supports domain-specific schemas
   - ◯ It has a serialized representation
   - ◯ It uses HTML tags

2.2.2 Graph Data Model

1. In a graph database
   - ◯ There is a unique root node
   - ◯ Each node has a unique identifier
   - ◯ Data values in leaf nodes are unique
   - ◯ The labels of edges leaving a node are different
   - ◯ There is a unique path from the root to each leaf

2. The simulation relationship is a relation
   - ◯ Among nodes in the data and schema graph
   - ◯ Among edges in the data and schema graph
   - ◯ Among sets of nodes in the data and schema graph
   - ◯ Among sets of edges in the data and schema graph

3. Which is true?
   - ◯ For each labelled edge in S a corresponding edge in D can be identified
   - ◯ For each root node in S a corresponding root node D can be identified
   - ◯ For each leaf node in D a corresponding typed node in S can be identified

- ◯ For each node in S a unique path reaching it from a root node can be identified

4. If there exists a uniquely defined simulation relationship among a graph database D and a schema graph S
   - ◯ The data and schema graph are simulation equivalent
   - ◯ Ambiguous classification cannot occur
   - ◯ Multiple classification cannot occur
5. If schema graph S_1 subsumes S_2
   - ◯ Every graph database corresponding to S_1 corresponds also to S_2
   - ◯ S_2 simulates S_1
   - ◯ S_1 has fewer nodes than S_2

2.2.3 Schema Extraction

1. Which is wrong? In a dataguide
   - ◯ Every path in the data graph occurs only once
   - ◯ Every node in the data graph occurs only in one data guide node
   - ◯ Every data guide node has a unique set of nodes
   - ◯ A leaf node in the data graph corresponds always to a leaf node in the data guide
2. In a non-deterministic schema graph
   - ◯ Every node of the data graph occurs exactly once
   - ◯ Every path of the data graph occurs at most once
   - ◯ Every label of an outgoing edge of a node in the schema graph is unique

Part III
Search

3 Information Retrieval and Data Mining

3.1 Information Retrieval (week 4)

3.1.1 Information Retrieval

1. A retrieval model attempts to model
   - ◯ The interface by which a user is accessing information
   - ◯ The importance a user gives to a piece of information
   - ◯ The formal correctness of a query formulation by user
   - ◯ All of the above
2. If the top 100 documents contain 50 relevant documents
   - ◯ The precision of the system at 50 is 0.5
   - ◯ The precision of the system at 100 is 0.5
   - ◯ The recall of the system is 0.5
   - ◯ None of the above
3. If retrieval system A has a higher precision than system B
   - ◯ The top k documents of A will have higher similarity values than the top k documents of B
   - ◯ The top k documents of A will contain more relevant documents than the top k documents of B
   - ◯ A will recall more documents above a given similarity threshold than B
   - ◯ Relevant documents in A will have higher similarity values than in B

3.1.2 Text-based Information Retrieval

1. Full-text retrieval means that
   - ◯ The document text is grammatically deeply analyzed for indexing
   - ◯ The complete vocabulary of a language is used to extract index terms
   - ◯ All words of a text are considered as potential index terms
   - ◯ All grammatical variations of a word are indexed
2. The term-document matrix indicates
   - ◯ How many relevant terms a document contains
   - ◯ How relevant a term is for a given document
   - ◯ How often a relevant term occurs in a document collection
   - ◯ Which relevant terms are occurring in a document collection
3. Let the query be represented by the following vectors: (1, 0, -1) (0, -1, 1); the document by the vector (1, 0, 1)
   - ◯ Matches the query because it matches the first query vector
   - ◯ Matches the query because it matches the second query vector
   - ◯ Does not match the query because it does not match the first query vector
   - ◯ Does not match the query because it does not match the second query vector
4. Which is right? The term frequency is normalized
   - ◯ By the maximal frequency of a term in the document
   - ◯ By the maximal frequency of a term in the document collection
   - ◯ By the maximal frequency of a term in the vocabulary
   - ◯ By the maximal term frequency of any document in the collection
5. The inverse document frequency of a term can increase
   - ◯ By adding the term to a document that contains the term
   - ◯ By adding a document to a document collection that does not contain the term
   - ◯ By removing a document from the document collection that does not contain the term
   - ◯ By adding a document to a document collection that contains the term

3.2 Advanced Retrieval Models (week 5)

3.2.1 Latent Semantic Indexing

1. In vector space retrieval each row of the matrix M^T corresponds to

   ○ A document

   ○ A concept

   ○ A query

   ○ A query result

2. Applying SVD to a term-document matrix **M**. Each concept is represented

   ○ As a singular value

   ○ As a linear combination of terms of the vocabulary

   ○ As a linear combination of documents in the document collection

   ○ As a least square approximation of the matrix **M**

3. The number of term vectors in the SVD for LSI

   ○ Is smaller than the number of rows in the matrix **M**

   ○ Is the same as the number of rows in the matrix **M**

   ○ Is larger than the number of rows in the matrix **M**

4. A query transformed into the concept space for LSI has

   ○ s components (number of singular values)

   ○ m components (size of vocabulary)

   ○ n components (number of documents)

3.2.2 User Relevance Feedback

1. Can documents which do not contain any keywords of the original query receive a positive similarity coefficient after relevance feedback ?

   ○ No

   ○ Yes, independent of the values β and γ

   ○ Yes, but only if $\beta > 0$

   ○ Yes, but only if $\gamma > 0$

3.2.3 Link-based Ranking

2. A positive random jump value for exactly one node implies that

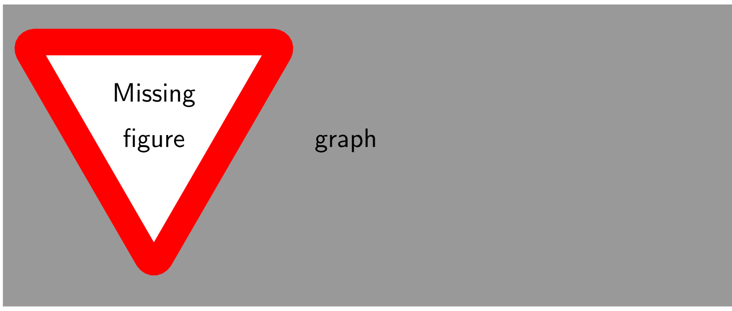
   ○ a random walker can leave the node even without outgoing edges

   ○ a random walker can reach the node multiple times even without outgoing edges

   ○ a random walker can reach the node even without incoming edges

   ○ none of the above

3. Given the graph below and an initial hub vector of $(1, 1, 1)$. The hub-authority ranking will result in the following



   ○ authority vector $(0, 0, 1)$; hub vector $(1, 1, 0)$

   ○ authority vector $(0, 0, 2)$; hub vector $(2, 2, 0)$

   ○ authority vector $(0, 0, 1)$; hub vector $(\frac{1}{2}, \frac{1}{2}, 0)$

   ○ authority vector $(0, 0, 2)$; hub vector $(1, 1, 0)$

3.2.4 Inverted Files (week 6)

1. A posting indicates

   ○ The frequency of a term in the vocabulary

   ○ The frequency of a term in a document

   ○ The occurrence of a term in a document

   ○ The list of terms occurring in a document

2. When indexing a document collection using an inverted file, the main space requirement is implied by

   ○ The access structure

   ○ The vocabulary

   ○ The index file

   ○ The postings file

3. Using a trie in index construction

   ○ Helps to quickly find words that have been seen before

   ○ Helps to quickly decide whether a word has not seen before

   ○ Helps to maintain the lexicographic order of words seen in the documents

   ○ All of the above

4. Maintaining the order of document identifiers when partitioning the document collection is important

   ○ In the index merging approach for single node machines

   ○ In the map-reduce approach for parallel clusters

   ○ In both

   ○ In neither of the two

3.2.5 Distributed Retrieval

1. When applying Fagin's algorithm for a query with three different terms for finding the k top documents, the algorithm will scan

   ○ 2 different lists

   ○ 3 different lists

   ○ k different lists

   ○ it depends how many rounds are taken

2. Once k documents have been identified that occur in all of the lists

- ◯ These are the top-k documents
- ◯ The top-k documents are among the documents seen so far
- ◯ The search has to continue in round-robin till the top-k documents are identified
- ◯ Other documents have to be searched to complete the top-k list

Credits

Quiz questions were taken from the lecture notes of Prof. Karl Aberer.