Multimodal Dialogue

for Multimedia Databases

Workshop Goals

Workshop goals: Explore the interface between the world of multimodal database systems and multimodal dialogue systems - future database systems aid in finding the desired information through dialogues if the exact query is difficult to pose.

1970

- Translate question and commands into relational–database commands

- Written language, ATN grammars, LUNAR   system (Woods), SHRDLU system (Winograd)

- Language descriptions correspond to simple combinations of (SQL) commands:

- **Instantiate DB-oriented retrieval patterns**. (lexico-semantic patterns)

What is the location of the long red screwdrivers?
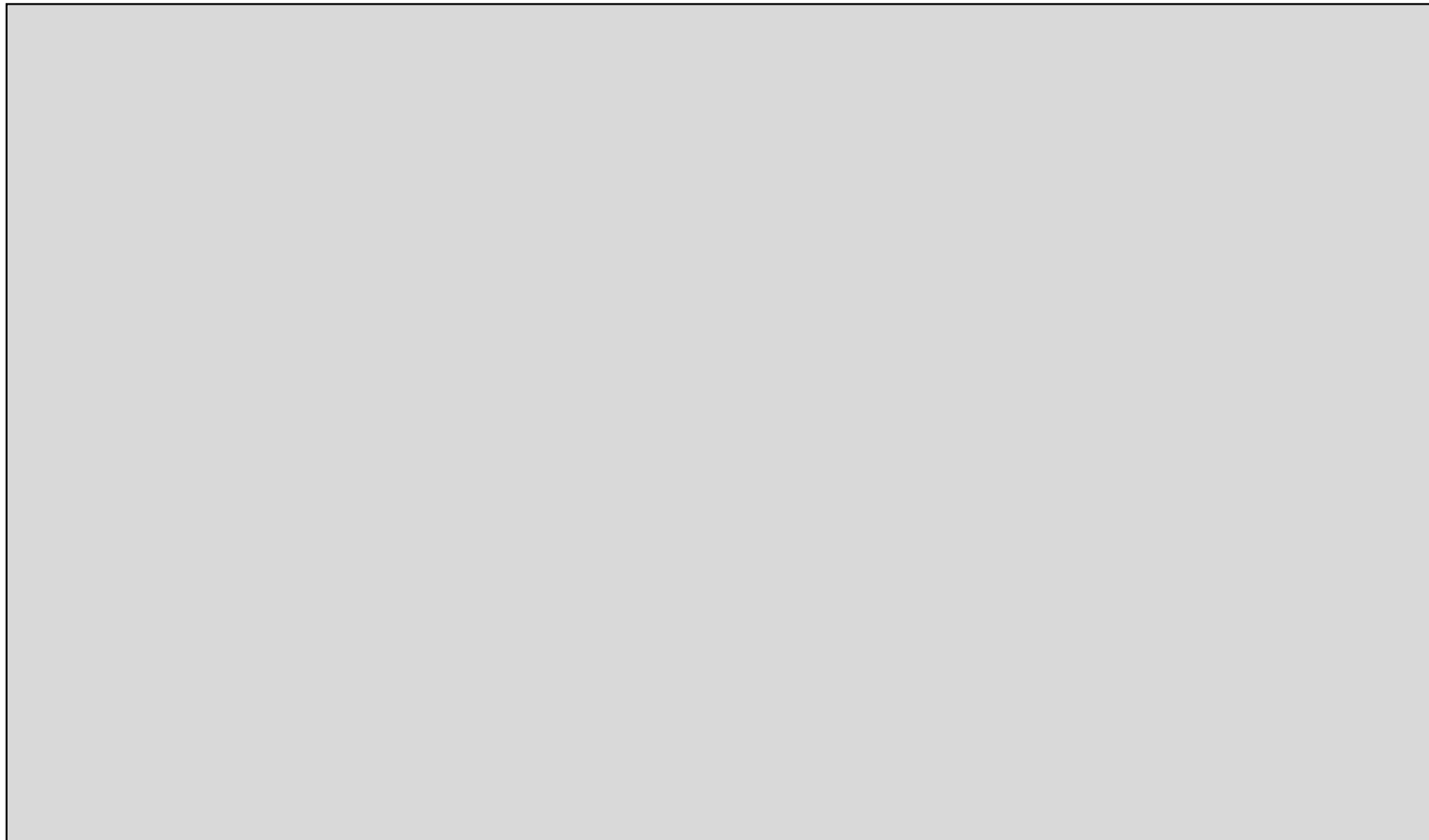**Select * from Tools where length = "long"
& class = "screwdriver"**

2004

DB2 Text Information Extender V7.2

Fully integrated into DB2
Full-text search functionality using SQL:

- Text search functions
- Incremental and asynchronous full-text index
- Supports character data types, user-defined types, large objects and external files
- Boolean, wildcard, free-text and fuzzy search

- incorporated into DB2 Net Search Extender V8, use only recommended for UDB 7.2.
- text-search-specific extensions are based on the SQL/MM standard

MMDB Structure

MM Application Workflow

Multimodal/Speech recogniser

Dialogue system

Dynamic grammar

Relevance feedback

Text Index

MMDB

Text Quality

Contextual
→ Amount of data → Relevancy
→ Completeness
→ Timeliness

Intrinsic → Accuracy/Objectivity
→ Reputation

Representational
→ Consistent representation
→ Concise representation
→ Ease of understanding
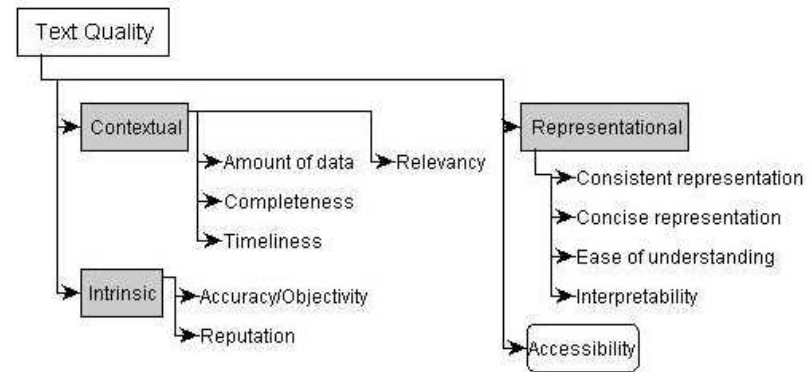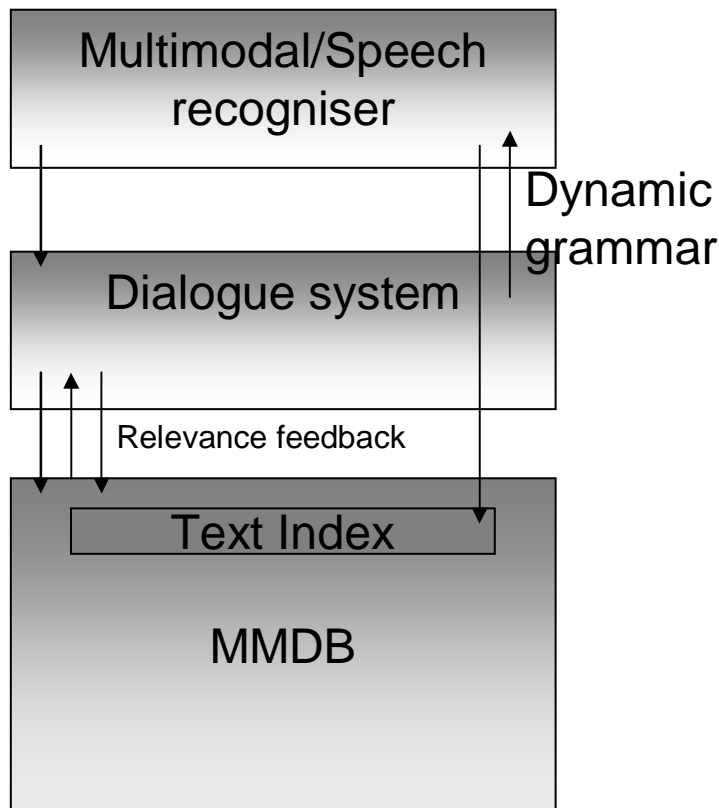→ Interpretability

Accessibility

Figure 1: Text quality dimensions.

- **Robust DB index for SRE, 00V models**
- Show added value for complex HCI
- Compare to knowledge-based approaches (SW context)

SQLMM Query Operators

Query expansion operator	DB2	Oracle	SQL Server	Informix
Fuzzy term matches to include words that are spelled similarly to the query term.	●	●	-	●
Taxonomy search to include more specific or more general terms.	●	●[1]	-	-
Proximity search to test whether two words are close to each other, i.e. near positions.	●	●	●	●
Related term matches to expand the query by related terms defined in a thesaurus.	●	●	●	●
for synonym searches.				

TBL

Linguistic query expansion operator	DB2	Oracle	SQL Server	Informix
Stem match to search for terms that have the same linguistic stem as the query term, e.g. runs->run, running ->run	●	●	●	-
Translation match to search for translated terms in a different language, defined by a thesaurus.	-	●	-	-
Text summarization Automatic summarization of documents based on key words and related sentences/paragraph (pseudo-semantic processing).	-	●	-	-
Theme search/extraction Automatic extraction of the text theme that can then be searched for.	-	●	-	-
Decomposition match to decompose complex words into their stems.	●	●[1]	-	-

SRindex

Interaction Example

○ U (Query): Show me the mascot of the football WCS.

○ S (Clarification): Which year? 2006 2002 1998 1994 1990

○ U (Feedback): 2006

○ S (Multimodal): GOLEO

○ U (Query): I need some texts about football rules.

○ S (Intermediate Result):

| Paragraph: Yellow card | Paragraph: Red card | Paragraph: Penalty shot |

○ U (Feedback): What does red and yellow card mean?

○ S (Final Result)

Paragraph: Yellow, yellow-red, and red cards are shown …

Impact

Answer snippets/
word frequencies

Ontological query

String query

MM objects

Semantic Web Lookup

DB Lookup

QA Lookup
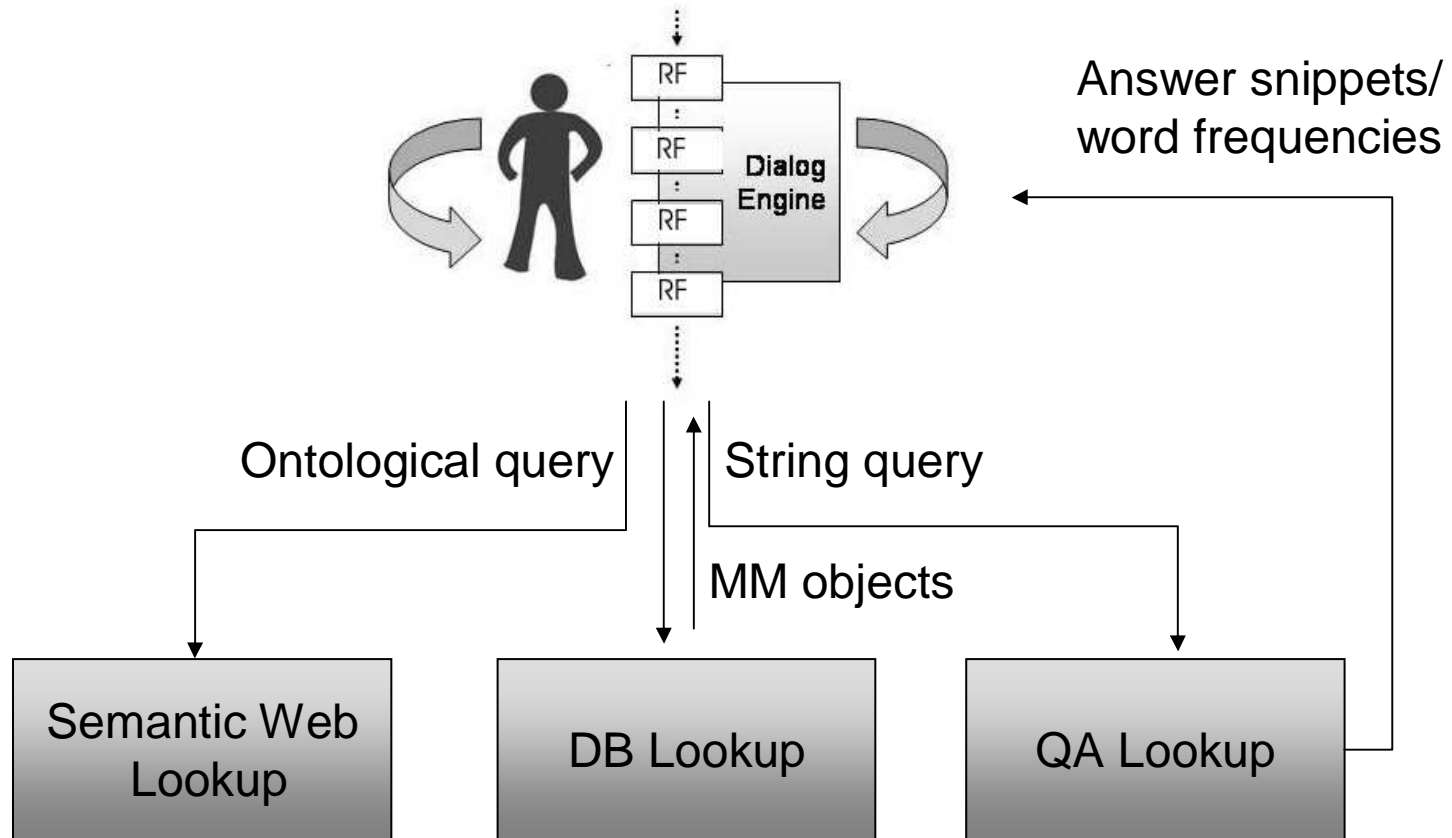
Feature Extraction Methods

	Concept level	Feature extraction method	DB2	Oracle	Discovir
Color global	1/2	Global color histogram	●	●	●
	1/2	Global average color	●	-	●
	2	Color moment	-	-	●
	2	Color coherence vector	-	-	●
Color local	3	Local color histogram	-	●	●
	3	Local average color	●	-	-
Texture global	2	Homogeneity	-	-	●
	2	Entropy	-	-	●
	2	Probability	-	-	●
	2	inverse differential moment	-	-	●
	2	differential moment	-	-	●
	2	Contrast	●	-	-
	2	Edge direction	●	-	-
	2	Granularity/fineness	●	●	●
	2	Edge frequency	-	-	●
	2	Length of primitives/texture	-	-	●
Texture local	3	Locality of texture	-	●	-
Shape global	2	Geometric moment	-	-	●
	2	Eccentricity	-	-	●
	2	Invariant moment	-	-	●
	2	Legendre moment	-	-	●
	2	Zernike moment	-	-	●
	2	Edge direction histogram	-	-	●
	2	Color-based segmentation	-	●	-
Shape local	3/4	Locality of Shape	-	●	●

Meta Data Management

- **What kind of Meta Data can be mined to allow for better answer selection?**

- What kind of Meta Data can be mined for Answer Merging?

- What kind of Meta Data can be mined to allow for better context-sensitive Answer Filtering and Presentation?

- What kind of Meta Data can be exploited to allow for better reaction behaviour? Dialog management and turn taking behaviour should be adaptable to increase usability.

- How can context-dependency, i.e. linguistic-, multimodal-, architectural-, and dialog state -dependency be expressed by available Meta Data?

- The Dialogue – Semantic Mediator Interface needs to communicate status messages about turn numbers, cancelling of ongoing retrieval tasks, turn commits and answer times

Meta Data Classes

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