

Dialogue systems

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Question Answering Systems for Relational Databases

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Question Answering Systems for Relational Databases

Database, Attributes and Search Trees

- Database structure is defined by relational schema (system of attributes)
- System tries to find requested data using the attribute values entered by user, not necessarily all.

Pawlak's Information System

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Database, Attributes
and Search Trees

- Author — Zdzislaw I. Pawlak (1926 — 2006), polish mathematics, member of the Polish Academy of Science.
- Pawlak's IS - quaternion $S = (U, T, V, f)$:
 - U – set of objects
 - T – set of attributes
 - V – set of attributes values
 - $f : U \times T \rightarrow V$
- Pawlak's IS formally describes relations between objects, their attributes and values.
- Dialogue system relation – searching the minimal set of attributes identifying each object.

Pawlak's IS

Example

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	<i>Element₁</i>	<i>Element₂</i>	<i>Element₃</i>	<i>Element₄</i>
<i>Attribute₁</i>	1	1	0	0
<i>Attribute₂</i>	0	1	1	1
<i>Attribute₃</i>	1	1	1	0

- Pawlak's IS Search Tree construction:
 - 1 We gradually take individual attributes contained in the IS and ask on their presence/value.
 - 2 Leaves are the particular elements stored in IS.
- Relation to system initiative dialogue interface:
 - We ask the value/presence of an attribute on the level corresponding the attribute.
 - User's answer determines the way the dialogue continues.
- The mixed initiative dialogue can be used as well:
 - 1 User fills the values of any number of elements at once.
 - 2 System will process the answer and asks for missing values.

Pawlak's IS

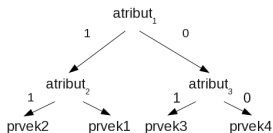
Search Trees Examples

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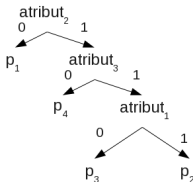
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Obrázek: Pawlak's IS search tree 4



Obrázek: Another Pawlak's IS search tree 4

- Select a minimal set of the IS attributes identifying every element.

	<i>Element₁</i>	<i>Element₂</i>	<i>Element₃</i>	<i>Element₄</i>
<i>attribute₁</i>	1	1	1	0
<i>attribute₂</i>	1	1	0	1
<i>attribute₃</i>	1	0	1	1
<i>attribute₄</i>	1	1	0	0
<i>attribute₅</i>	1	0	1	0

- Has been proved the problem is NP-Complete.
- Select optimal search tree according the set of elements.
 - Criterion – the tree height for example – the problem is NP-complete again.
- There are approximative algorithms.

Question Answering Systems

Examples

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- *General question answering system Start*
- *General practitioners question answering system Hermes*
- *Unmaintained and inaccessible NLP FI question answering system UIO*
- Bot Libre Chatbots, you may create your own chatbot.