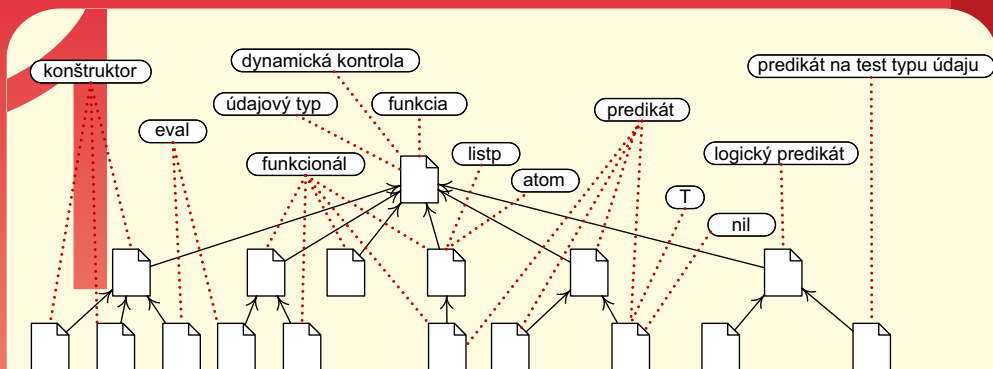
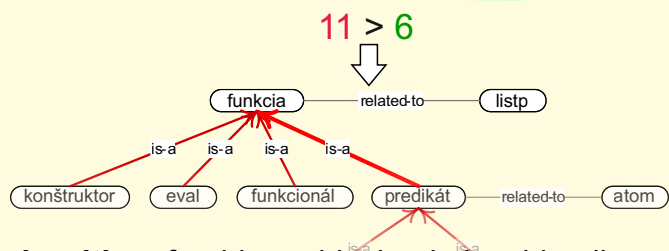
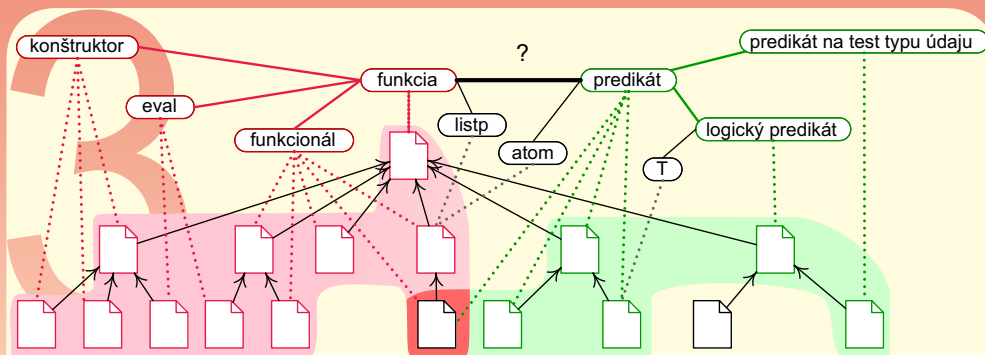


Relationship Discovery in Educational Content

The domain model is an essential part of an adaptive learning system (purpose in tracking users' learning progress, adaption of the content accordingly). It expresses the semantics of educational content in the form of metadata. Its manual construction is a demanding task for the teacher, therefore it **needs to be automated**. It consists of relevant domain terms (RDTs) and relationships between them. The core of the model comprise hierarchical relationships (i.e., is-a relationship).



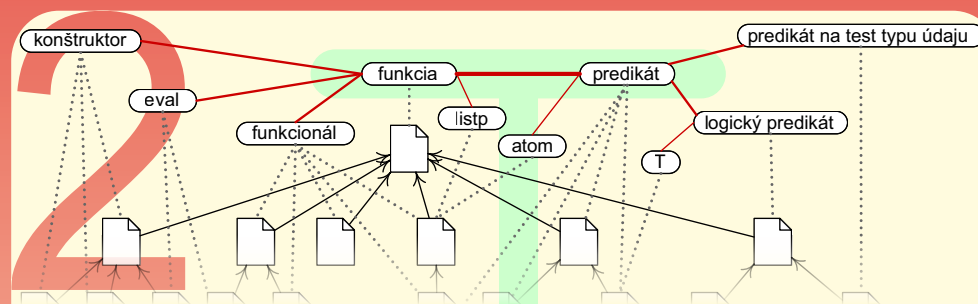
The **input** of our method is a set of learning objects (LOs) – text documents with RDTs – keywords expressing the semantics of the documents' content. The content is firstly preprocessed using methods and techniques of natural language processing.



Our algorithm for hierarchical relationship discovery is applied on each LSA relationship to determine its relationship type.

Our method for relationship discovery:

- fills the gap in the area of adaptive learning - **support for content authors**,
- facilitates the process of **domain model acquisition** - is integrated in the educational content management system to **help the teachers**,
- uses **statistical** approach (pros: language independent, no syntax knowledge),
- is suitable for educational content (coherent vocabulary and structure),
- has great potential to **supplement** methods based on **linguistic processing**.



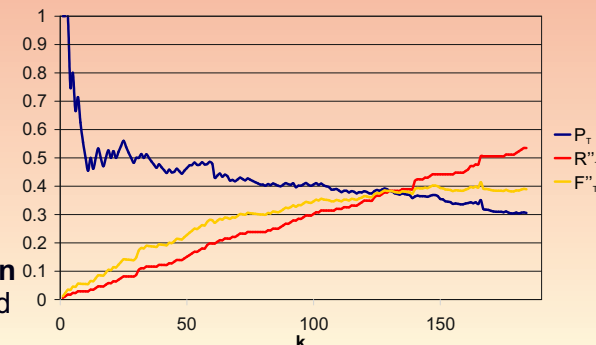
Predikáty a vetvenie
Predikát je **funkcia**, ktorá vráti hodnotu pravda alebo nepravda.
Jednou zo základných riadiacich konštrukcií všetkých programovacích jazykov...

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Jednou zo základných riadiacich konštrukcií...

In the next step the **Latent Semantic Analysis (LSA)** is applied on the content of learning objects. Relationships between RDTs are created based on the similarity of words surrounding RDTs in the text.

Evaluation results

- test data - Functional and Logic programming courses
- method was **able to correctly identify** hierarchical relationships
- best **F-measure: 0.41** ($k=161$, precision: 0.36, recall: 0.51)
- found **different relationships** than those discovered by method based solely on **linguistic processing**



Dependency of precision, recall and F-measure on number of created relationships (k).