

Towards Entailment Based Question Answering: ITC-irst at Clef 2006

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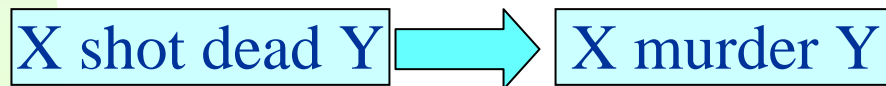
CLEF 2006

Our Goals at QA@CLEF 2006

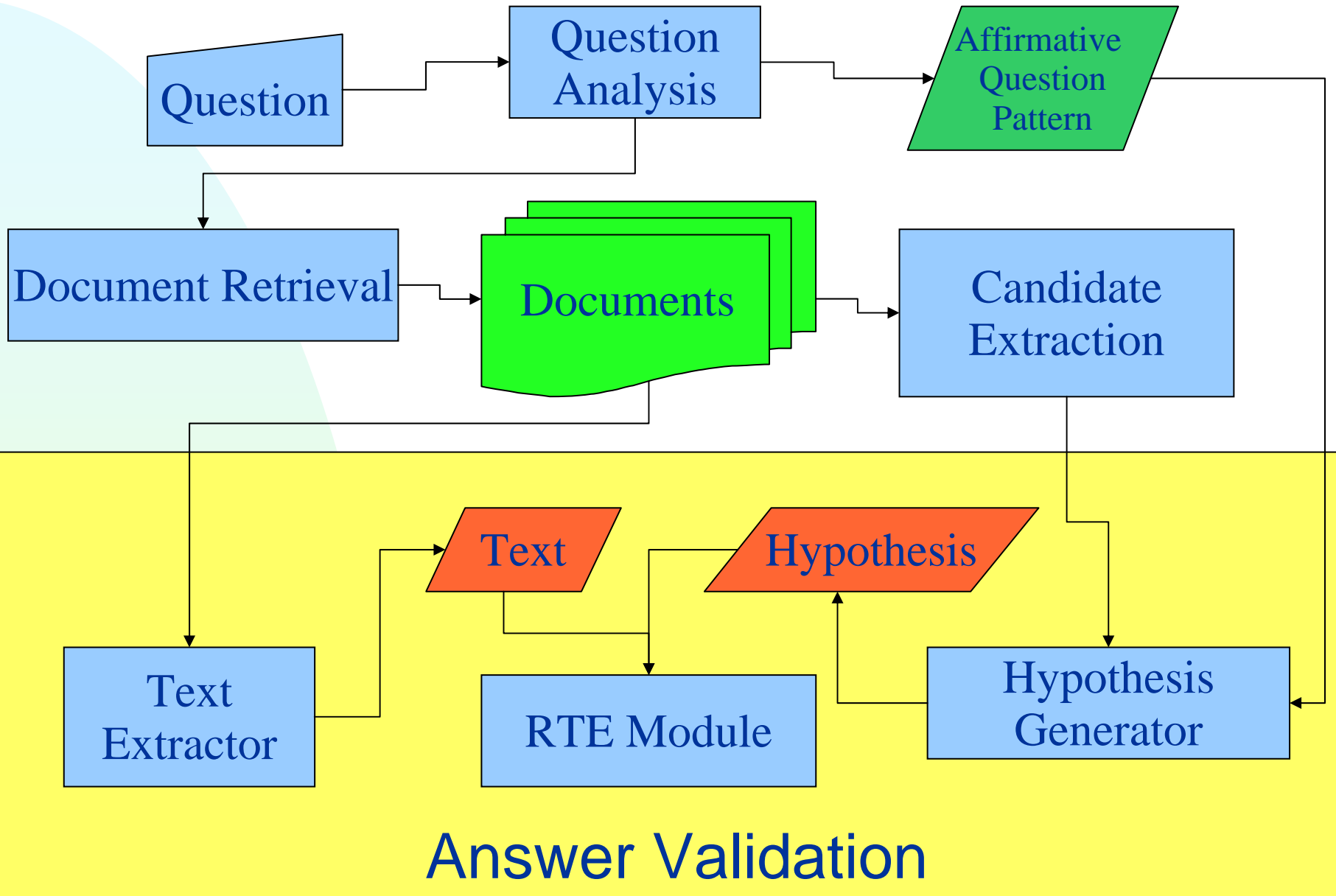
- *New Diogene System*
 - *Modular Architecture*
 - *Web Services Style Definitions*
 - *Open & Portable*
- ***New Answer Validation Module***
 - ***Textual Entailment***

The Textual Entailment Framework

- General Framework proposed by Dagan and Glickman (2004) addressing language variability.
- An **Entailment Relation** holds between two text fragments (i.e. **text T** and **hypothesis H**) when the meaning of H, as interpreted in the context of T, can be inferred from the meaning of T.
- An **Entailment Relation** is directional
- Entailment relations are expressed by **Entailment Rules** (i.e. syntactic patterns) where where the LHS of the rule entails the RHS.



RTE-Based QA Architecture



RTE–Based QA Architecture

AVE Example

- **Question:** What was O.J. Simpson accused of ?
- **Question Pattern:** O.J. Simpson was accused of X
- **Candidate Answer:** “murder trial Thursday”
- **Hypothesis:** “O.J. Simpson was accused of murder trial Thursday”
- **Document Fragment (Text):**
“After a series of testy exchanges between a prosecutor and a prospective juror in the **O.J. Simpson murder trial Thursday**, Simpson's attorneys accused government lawyers of treating black jury candidates differently than others.”

Our Approach: Entailment with Tree Edit Distance

- Represent T and H as **dependency trees**
- The probability of an entailment relation between T and H is related to the mappings between H and T
- Mappings can be described as a sequence of **editing operations** that transform T into H
- Each edit operation has a **cost** assigned to it
- Entailment holds if the overall **transformation cost** is below a certain threshold, estimated over the training data.

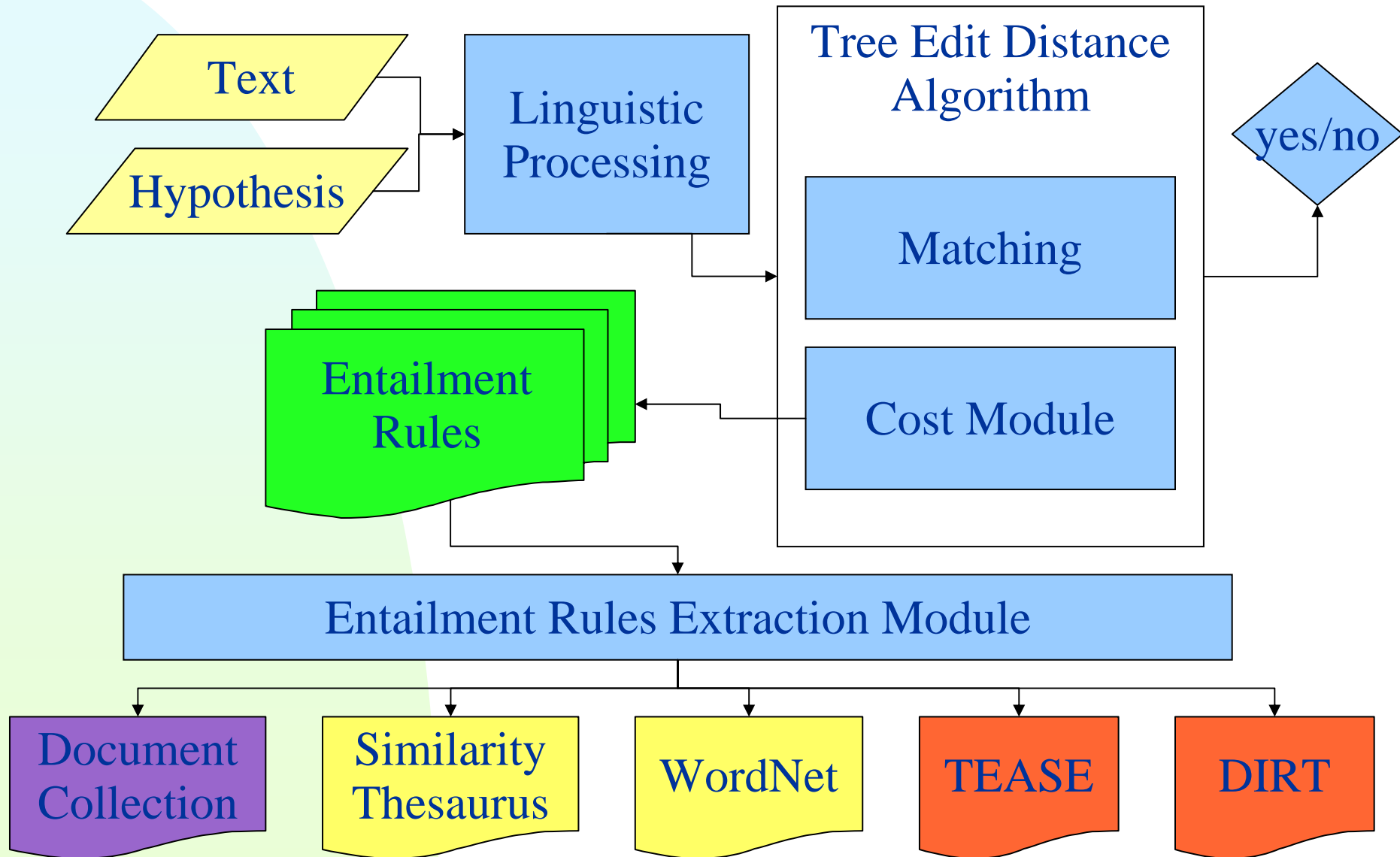
Tree Edit Distance on Dependency Trees

- (Zhang and Shasha, 1990) Tree Edit Distance algorithm has been implemented.
- Edit operations (Insertion, Deletion, Substitution) are allowed on **single nodes only**
- Parsing is performed with Minipar (Lin 1998)
- **Node order** is relevant: nodes are re-arranged according to: *subj* --> *obj* --> *mods*
- The original algorithm does not consider labels on edges: **relations names** are concatenated to node names
 - E.g. eat [subj] John eat --> John#subj

Cost functions

- **Insertion:** the cost of inserting a node w in T should be proportional to the relevance of w in the context of H .
- **Deletion:** the cost of deleting a node w in T should be proportional to the relevance of w in the context of T .
- **Substitution:** the cost of substituting a node $w1\#rel1$ in T with a node $w2\#rel2$ in H is proportional to the strength of the entailment relation between the two nodes and relevant to the context of H and T .

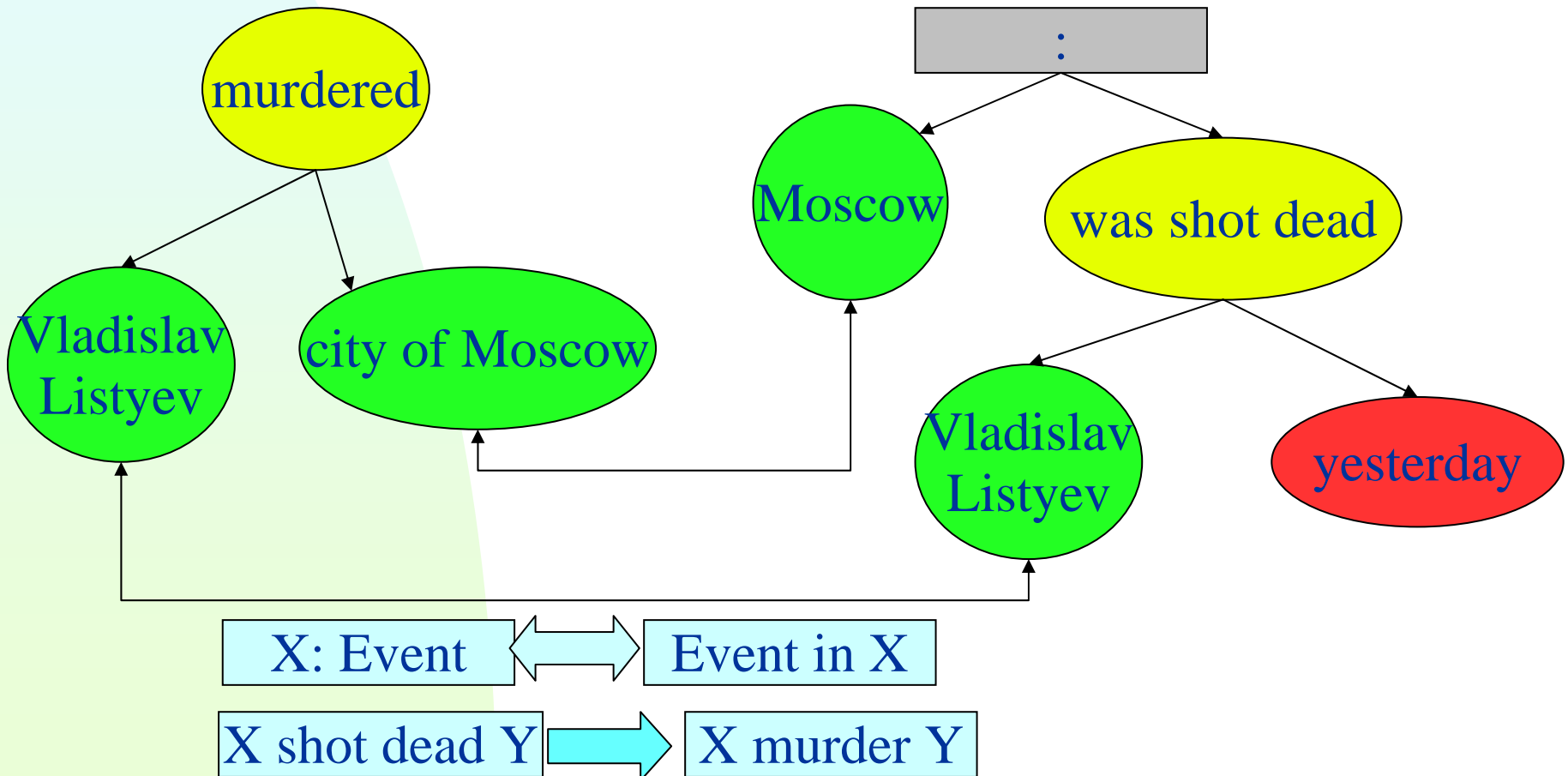
RTE System: Architecture



RTE System: Example

T: Moscow: Vladislav Listyev, executive director of Russia's main Ostankino television channel, was shot dead yesterday

H: Vladislav Listyev was murdered in the city of Moscow.



Performance: Pascal & CLEF-AVE

	precision	recall	F1
AVE Run	0.30	0.50	0.37
New Run	0.29	0.62	0.40
Pascal 1	0.53	0.53	0.53
Pascal 2	0.6	0.6	0.6

- **Pascal RTE-1 RTE-2 (QA subset)**
 - Artificial Set: Results are always higher
 - Useful for training
- **AVE Dataset**
 - Real Examples: Need additional processing
 - Type Distinction (Factoid vs Definition)
- **Answer Validation vs Answer Filtering?**



Thank You!