

Using Default Logic for Lexical Knowledge

Outline

Definition of Lexical Knowledge

Motivation and Advantages

DEX – Default Lexical Framework

Example

Learning Default Classification Trees

Example

Default Lexical Rules

Bibliography

Lexical knowledge is knowledge about the morphology, grammar, semantics and usage of words



Lexica

- capture lexical knowledge
- identify relations of words

Motivation

- Search engines
- Indexing documents
- Disambiguating words
- Lexical knowledge in relation with context
- Semantic knowledge
- ...

Advantages

- lucid representation
- maintainability
- handling of exceptions
- efficient representation in terms of space

DEX – Default Lexical Knowledge

Query word = A word for which further information is required

Source = A set of words including the query word that is used to identify the context of a query word

Output = Set of formulae providing lexical knowledge about a query word

Steps

1. Input: Source, query word
Method: context classification trees
Output: primary contexts
2. Input: primary contexts
Method: default context rules
Output: inferred contexts(include primary contexts)
3. Input: query word, inferred contexts
Method: default lexical rules
Output:lexical knowledge about the query word⁹

Example

The bank of a river in a flood plain is usually low

Stop words = {The, of, a, in, is}

Source = {bank, river, flood, plain, usually, low}

query word = bank

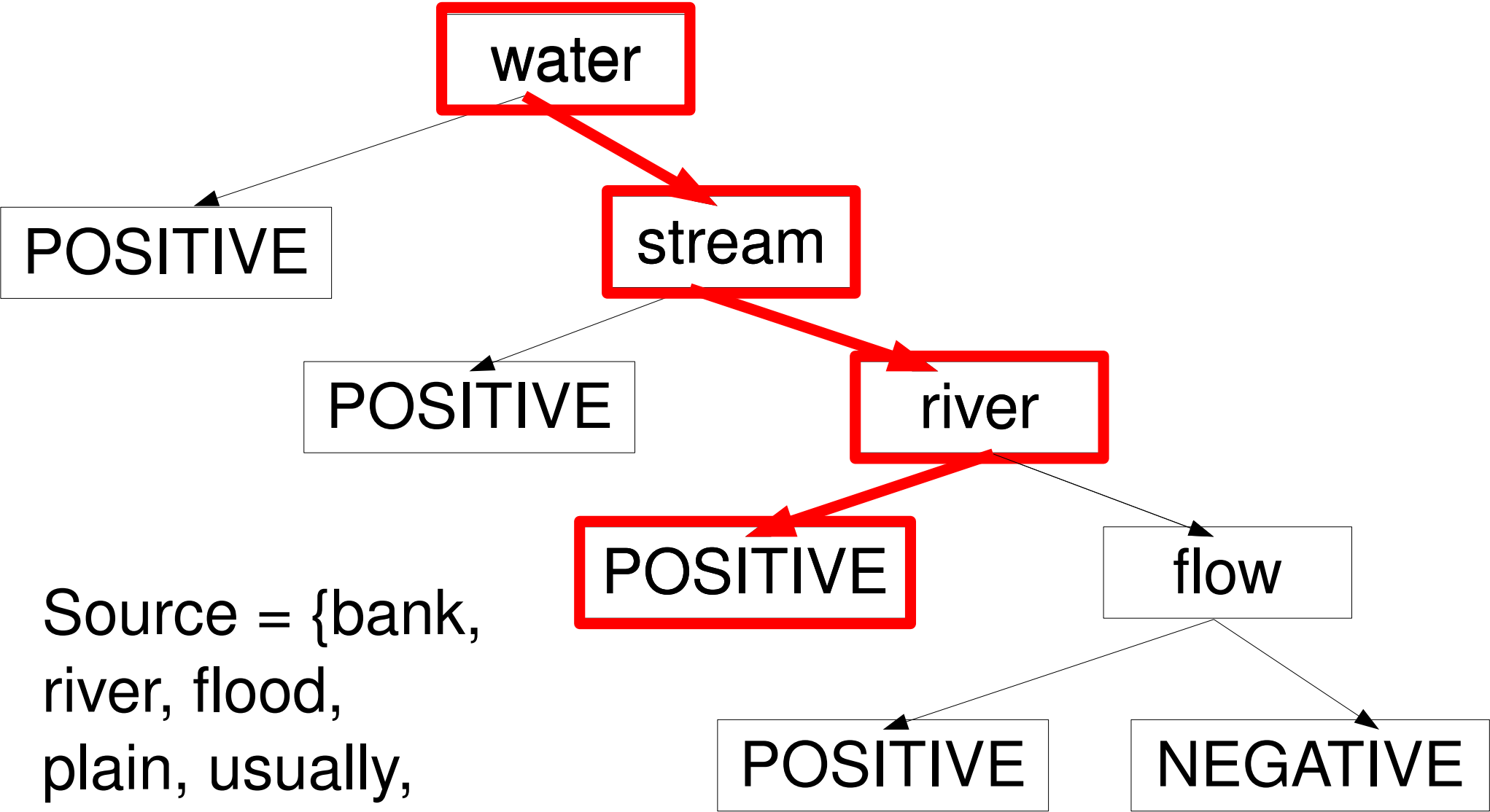
Step 1

Input: Source, query word

Method: Context classification trees

Output: primary context

Context classification tree for river



Source = {bank, river, flood, plain, usually, low}



Primary context: river

T : context(river)
context(river)

Exkursion vom Beispiel

T : context(finance)
context(finance)

Exkursion vom Beispiel

$$\frac{\text{T} : \neg\text{context}(\text{river})}{\neg\text{context}(\text{river})}$$

Step 2

Input: primary contexts

Method: default context rules

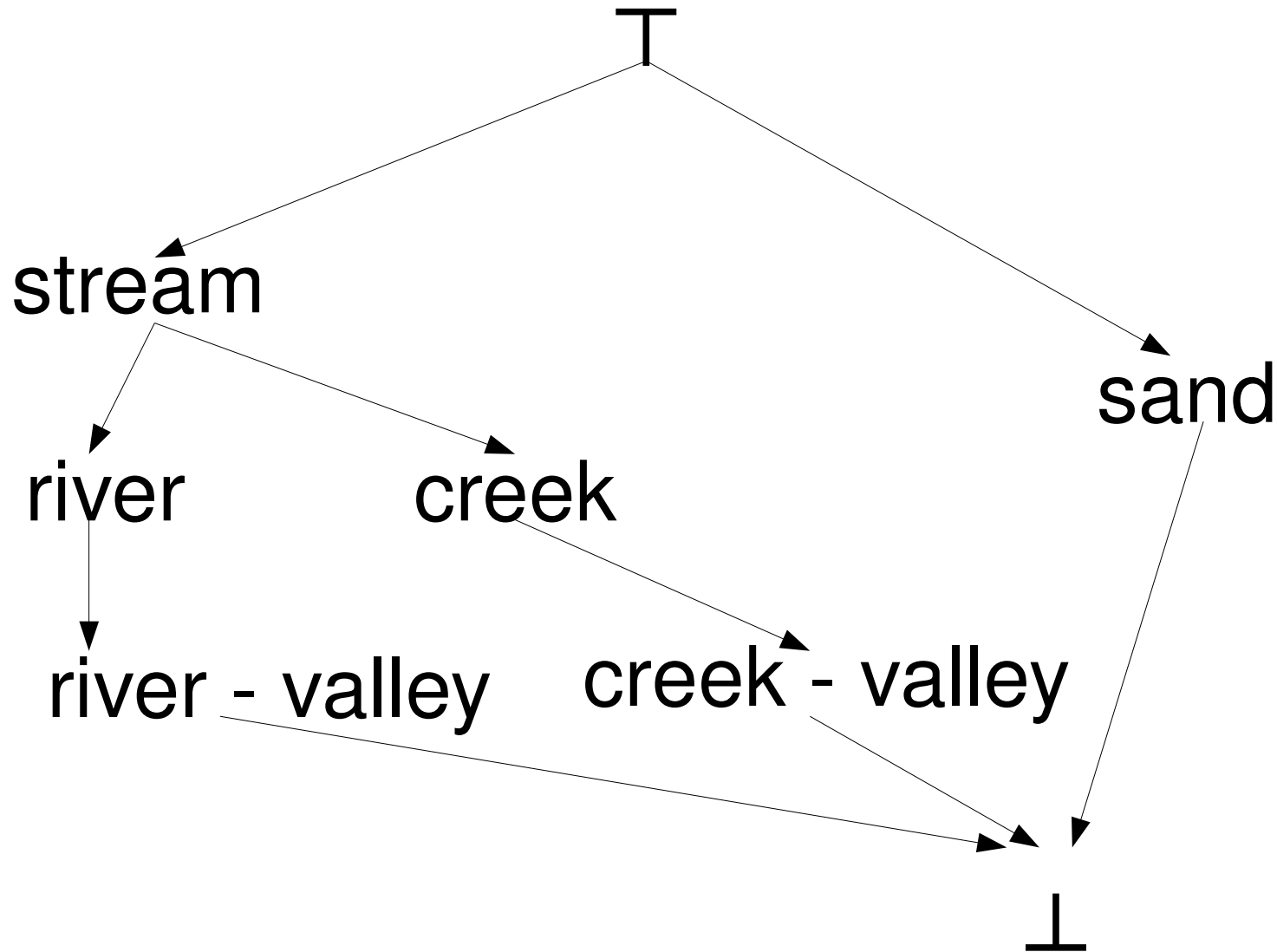
Output: inferred contexts(include primary contexts)

Primary context = context(river), context(valley)

context(river) \wedge context(valley) : context(river –
valley)

context(river - valley)

A directed acyclic graph of context



Step 3

Input: query word, inferred contexts

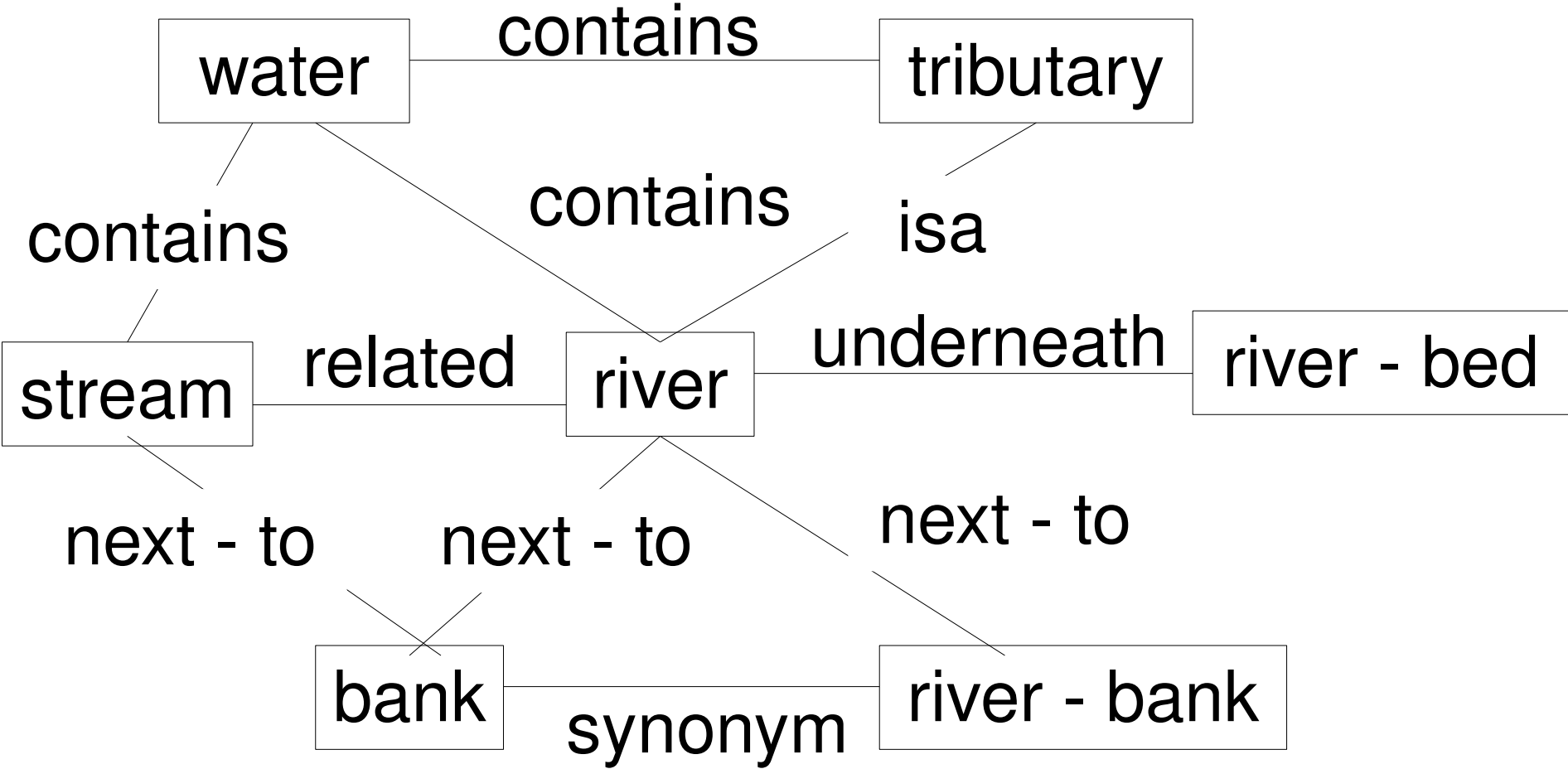
Method: default lexical rules

Output: lexical knowledge about the query word

focus(bank) \wedge context(river) : synonym(bank, river -
bank)

synonym(bank, river - bank)

A Semantic Network for "river"



Learning Context Classification Trees

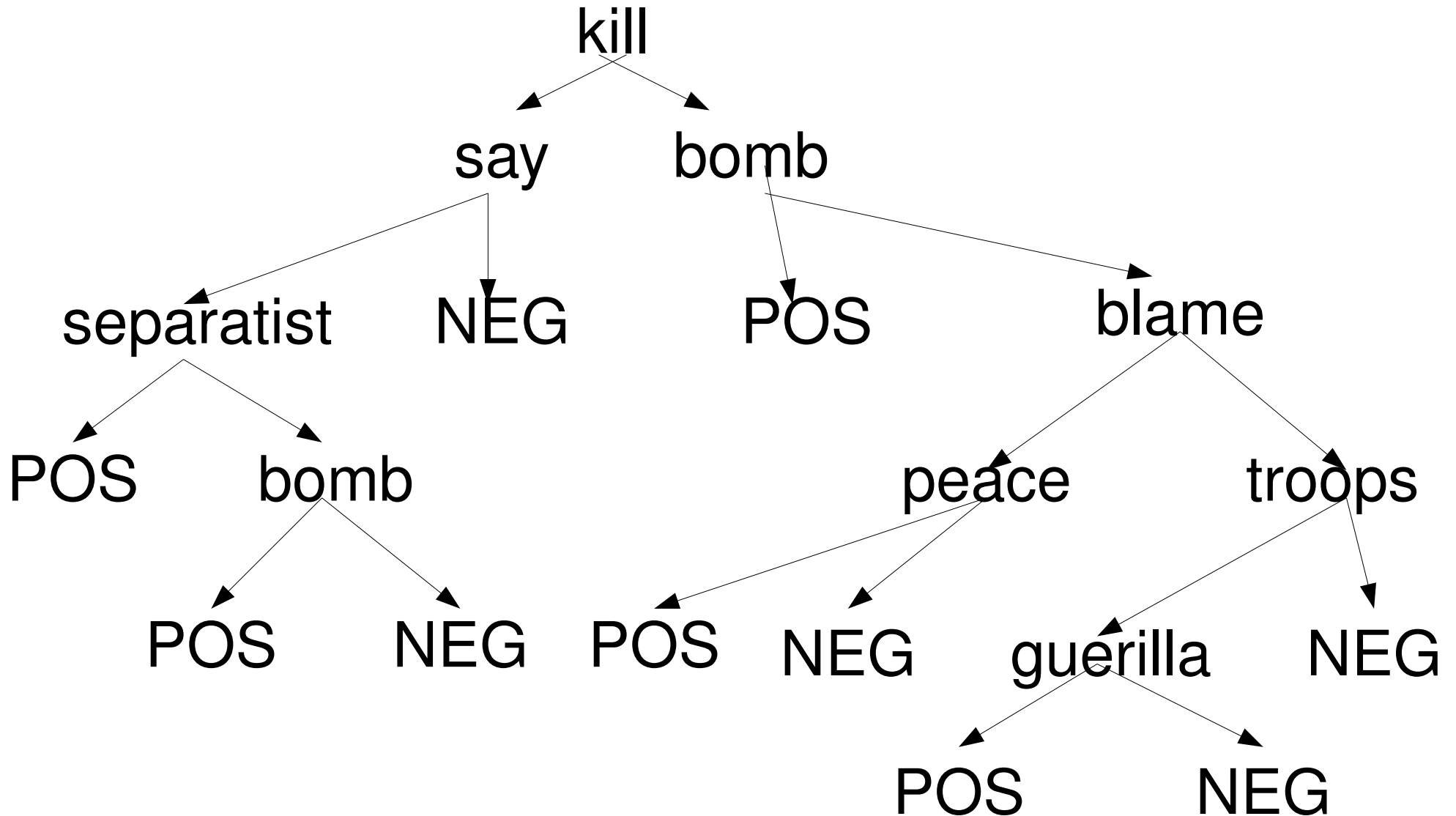
Steps

1. Taking an corpus
2. Removing stop words
3. Classification of the training examples as either POSITIVE or NEGATIVE example for each context

Example

Source = {after, army, blame, bomb, country,
government, group, guerilla, kill, last, military,
month, more, peace, people, say, separatist,
soldier, talk, troops}

Context Classification Tree for “paramilitary incident”



Default Lexical Rules

focus(bank) \wedge context(river) : synonym(bank, river - bank)
synonym(bank, river - bank)

focus(bank) \wedge synonym(bank, river - bank) \rightarrow focus(river - bank)

focus(knife) : context(cooking)
located(knife, kitchen)

focus(hull) : context(ship)
made - of(hull, steel)

focus(bank) : context(finance)
category(bank, verb) v category(bank, noun)

focus(bank) : context(river)
category(bank, noun)

Fruit flies like plants

focus(flies) \wedge wordtoleft(fruit) : context(biology)
specialization(flies, fruit-flies) \wedge category(flies,
noun)
 \wedge category(fruit-flies, noun-noun-phrase)



focus(sentence) \wedge context(law) : \neg context(writing)
 $\exists x,y,t(\text{judge}(x) \wedge \text{defendant}(y) \wedge \text{sentence}(x,y) \wedge$
 $\text{sentence}(y,t))$



Bibliography

A default logic based framework for context-dependent reasoning with lexical knowledge, Anthony Hunter, 2001

Using default logic for lexical knowledge, Anthony Hunter, 1997

Vielen Dank für eure
Aufmerksamkeit