

Interpretation of natural language instructions

Translating sentences by using a grammar

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Outline

① Introduction & problem description

② Solution

③ Results

④ Conclusion
Enumerate

⑤ Blocs

Introduction & problem description

- An alternative user interface
- Translation
- Delimitation
 - Intranet of a software development company
 - Customers, People and Projects exists
 - Limited amount of instructions

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Interface definition

Sufficient for novice users

people who know Java

Sufficient for expert users

people know java

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Solution

- Precise translation
- Need mapping from natural language to query language
 - Use a grammar

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- Need mapping from natural language to query language
 - Use a grammar

Translate by using a grammar

- Structured rules for strings
- Use logic to combine strings in one language
- Use the same logic to combine strings in another language
- Grammars have a long history within programming languages

How can we build a grammar to translate sentences?

We will use Grammatical Framework (GF)

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Introducing Grammatical Framework (GF)

- Development platform for natural languages
 - Open source functional programming language
 - Designed for creating natural language grammars
- Separates abstract and concrete syntax
 - Abstract syntax captures the *logic* of a sentence
 - Concrete syntax represents the logic as a string

Same technique used by programming languages

- Programmer writes source code in concrete syntax
- Compiler translates concrete syntax to abstract syntax
- The rest of the compiler manipulates the abstract syntax

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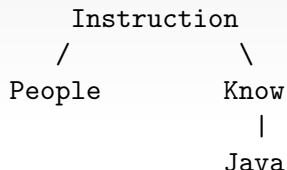
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A simple example

Abstract syntax

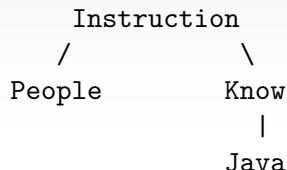


Concrete syntaxes

people who know Java	-- English
personer som kan Java	-- Swedish
q=object_type : Person AND expertise : Java	-- Solr

A simple example

Abstract syntax



Concrete syntaxes

people who know Java	-- English
personer som kan Java	-- Swedish
q=object_type : Person AND expertise : Java	-- Solr

GF implementation: Abstract syntax

```
abstract Instrucs = {  
  cat  
    Instruction  
    Subject ;  
    Relation ;  
    Object ;  
  fun  
    MkInstruction : Subject -> Relation -> Instruction ;  
    People : Subject ;  
    Know : Object -> Relation ;  
}
```

GF implementation: English concrete syntax

```
concrete InstrucsEng of Instrucs = {  
  lincat  
    Instruction = Str ;  
    Subject = Str ;  
    Relation = Str ;  
    Object = Str ;  
  lin  
    MkInstruction subject relation =  
      subject ++ "who" ++ relation ;  
    People = "people" ;  
    Know object = "know" ++ object ;  
    Java = "Java" ;  
}
```

GF implementation: Solr concrete syntax

```
concrete InstrucsEng of Instrucs = {  
  lincat  
    Instruction = Str ;  
    Subject = Str ;  
    Relation = Str ;  
    Object = Str ;  
  lin  
    MkInstruction subject relation =  
      "q=" ++ subject ++ "AND" ++ relation ;  
    People = "object_type : Person" ;  
    Know object = object = "expertise : " ++ object ;  
    Java = "Java" ;  
}
```

GF implementation: Translation

GF + Abstract syntax + Concrete syntax =

- Parser
- Linearizer
- Generator

GF implementation: Translation

GF + Abstract syntax + Concrete syntax =

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GF implementation: Translation

GF + Abstract syntax + Concrete syntax =

- Parser
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Results

foobar

Title

This is an example.

Enumerate

- ① Lorem ;
- ② Ipsum ;
- ③ Dolor ;
- ④ Sit amet.

Lorem ipsum dolor sit amet,
consectetur adipiscing elit. Curabitur
ultrices, dui ac luctus pellentesque,
nunc dui lobortis lorem, nec porta
mauris massa vel ante. Maecenas justo
nisl, sodales quis placerat nec,
convallis mollis magna. Curabitur
blandit elementum elit et euismod. In
et purus nisl, ac elementum orci.

Enumerate

- ① Lorem ;
- ② Ipsum ;
- ③ Dolor ;
- ④ Sit amet.

Lorem ipsum dolor sit amet,
consectetur adipiscing elit. Curabitur
ultrices, dui ac luctus pellentesque,
nunc dui lobortis lorem, nec porta
mauris massa vel ante. Maecenas justo
nisl, sodales quis placerat nec,
convallis mollis magna. Curabitur
blandit elementum elit et euismod. In
et purus nisl, ac elementum orci.

Blocks

Lorem ipsum dolor sit amet

Block

Aliquam quis eros

Aliquam quis eros nec risus mattis porttitor ac eget justo. Aliquam lacinia condimentum tempus. Nulla metus magna, feugiat id faucibus ut, commodo et justo. Aliquam tincidunt purus vitae lacus dictum in placerat purus mollis.

Example block

Nulla cursus vehicula cursus

Nulla cursus vehicula cursus. Suspendisse ac enim eget purus tincidunt eleifend et et purus. Suspendisse ultricies viverra sodales. Proin non congue risus. Maecenas vel ornare sem. Ut laoreet nibh tempor felis suscipit dignissim. Aliquam urna eros, sagittis interdum ultrices sed, venenatis eu nisl.

Alert block

Quisque vehicula pretium arcu

Quisque vehicula pretium arcu, eget bibendum arcu iaculis sit amet. Proin facilisis sollicitudin magna, et varius lorem euismod ornare. Fusce lobortis dignissim tempor. Mauris augue tortor, elementum non lobortis vel, interdum vitae augue.