Interpreter

Karoly Nyisztor
DEVELOPER

@knyisztor www.leakka.com

Overview

Motivation

Steering demo

- Interpret a language consisting of simple steering commands

Calculator demo

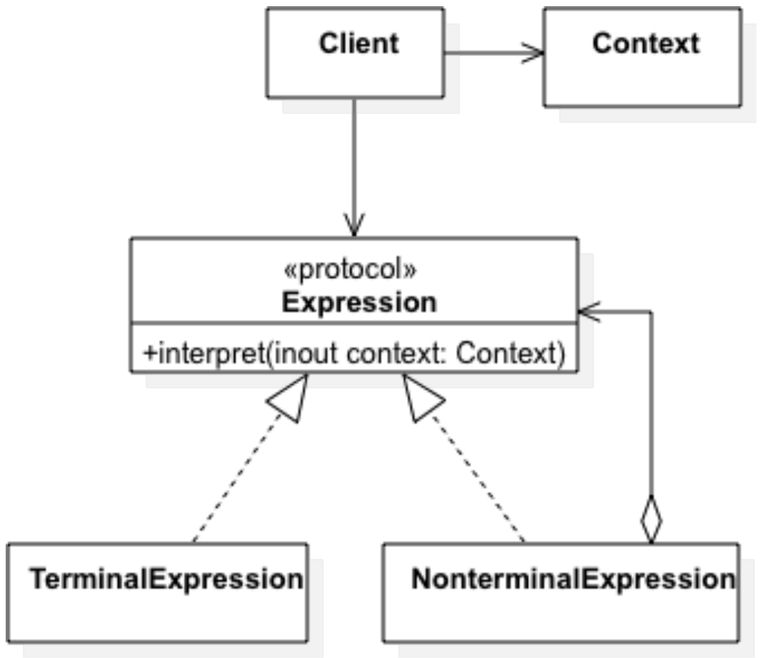
- Add support for compound expressions

Motivation

Define language rules and interpreter

- Create a simple language for frequently occurring problems
- Define the “grammar”
- Map each sentence to a type
- Evaluate the sentences

Interpreter Structure



Expression protocol
- Defines the interpret(context:) method

Context
- Encapsulates global interpreter state

TerminalExpression
- A terminal symbol in the grammar

NonterminalExpression
- A compound symbol in the grammar

Client
- Builds the syntax tree.
  Invokes the interpret() method

Interpreter

Defines a simple language and an object representation of the language grammar along with an interpreter to evaluate the grammar.

Driving Directions

Head North and go one mile. Turn left and proceed three miles.
Take a right at the intersection and go two miles.

Define Grammar

`“headNorth”`

Head North and go one mile. Turn left and proceed three miles. Take a right at the intersection and go two miles.

Define Grammar

`“headNorth”` `“move”`

Head North and **go** one mile. Turn left and proceed three miles. Take a right at the intersection and go two miles.

Define Grammar

`“headNorth”` `“move”`

Head North and **go one mile**. Turn left and proceed three miles. Take a right at the intersection and go two miles.

Define Grammar

`“headNorth”` `“move”` `“headWest”`

Head North and **go one mile**. **Turn left** and proceed three miles. Take a right at the intersection and go two miles.

Define Grammar

`“headNorth”` `“move”` `“headWest”` `“move”`

Head North and **go one mile**. **Turn left** and **proceed** three miles.
Take a right at the intersection and go two miles.

Define Grammar

`“headNorth”` `“move”` `“headWest”` `“move”` `“move”` `“move”`

Head North and **go one mile**. **Turn left** and **proceed three miles**. Take a right at the intersection and go two miles.

Define Grammar

`“headNorth”` `“move”` `“headWest”` `“move”` `“move”` `“move”`

Head North and **go one mile**. **Turn left** and **proceed three miles**. **Take a right** at the intersection and go two miles.

`“headNorth”`

Define Grammar

`“headNorth”` `“move”` `“headWest”` `“move”` `“move”` `“move”`

Head North and **go one mile**. **Turn left** and **proceed three miles**. **Take a right** at the intersection and **go** two miles.

`“headNorth”` `“move”`

Define Grammar

`“headNorth”` `“move”` `“headWest”` `“move”` `“move”` `“move”`

Head North and **go one mile**. **Turn left** and **proceed three miles**. **Take a right** at the intersection and **go two miles**.

`“headNorth”` `“move”` `“move”`

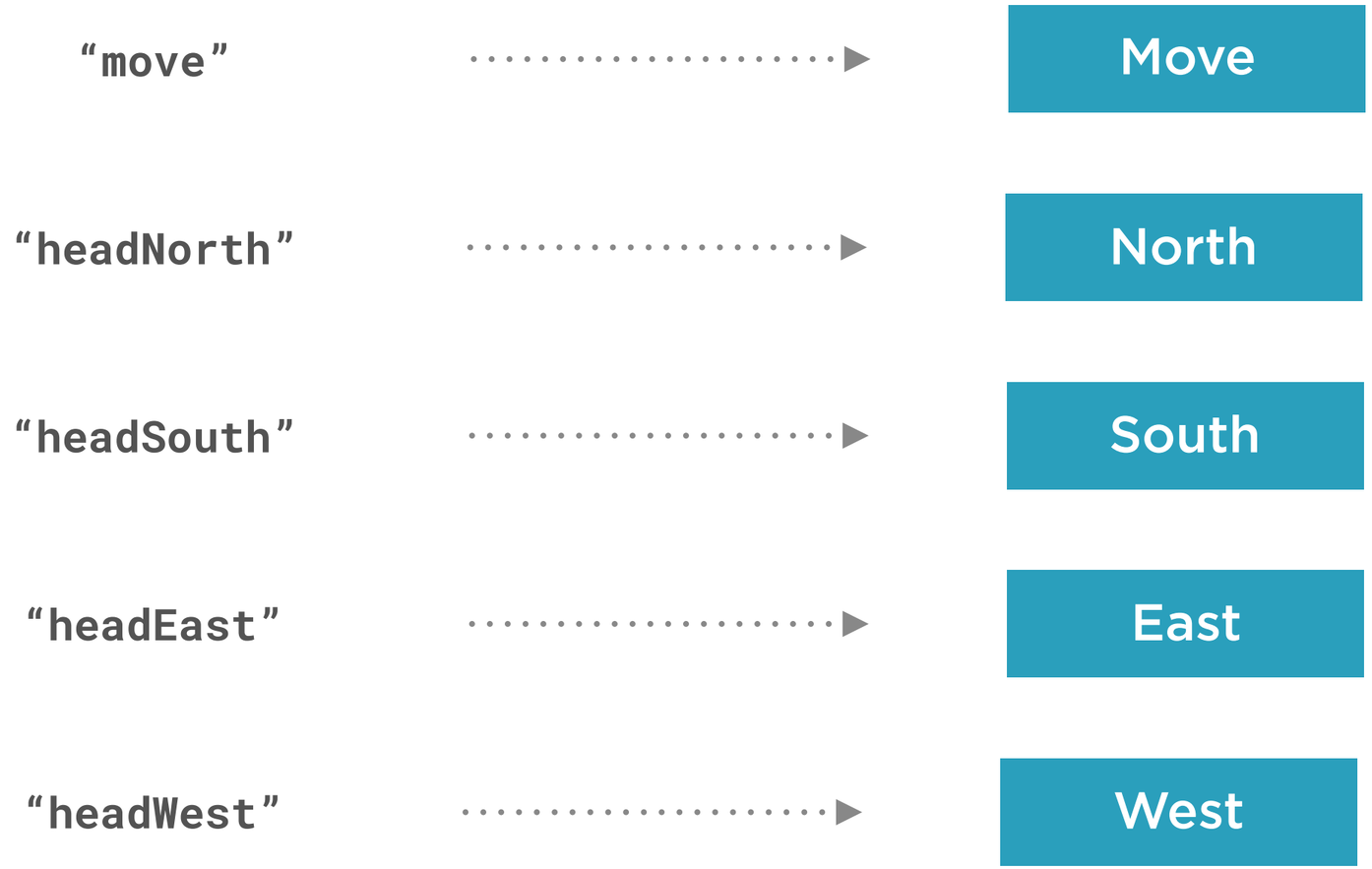
Define Grammar

`“headNorth move headWest move move move headNorth move move”`

Head North and **go one mile**. **Turn left** and **proceed three miles**.
Take a right at the intersection and **go two miles**.

Map Rules to Swift Types

Map Rules to Swift Types



Demo

Steering demo

- Interpret a language consisting of simple steering commands

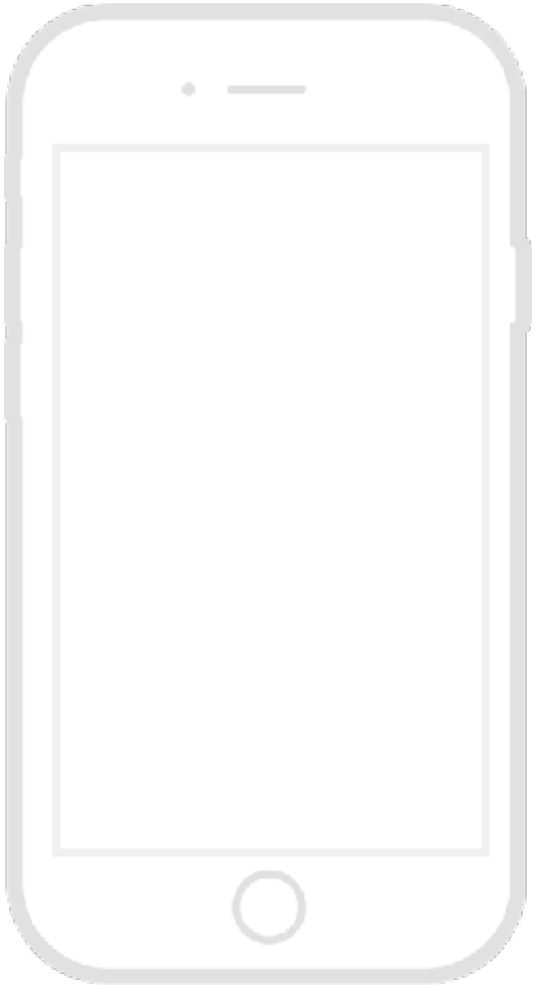
The context represents a global Interpreter state.

Pose

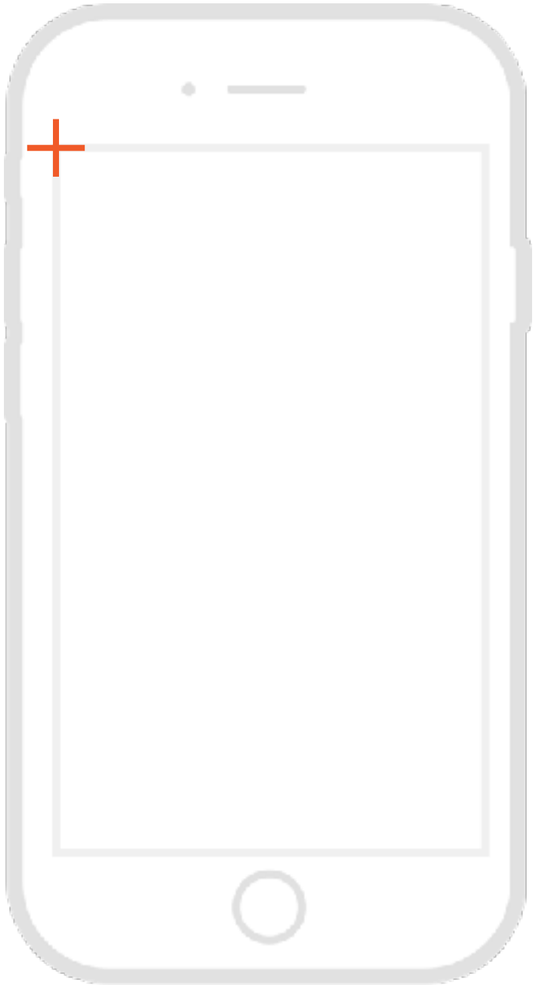
(computer vision/robotics)

The combination of position and orientation.

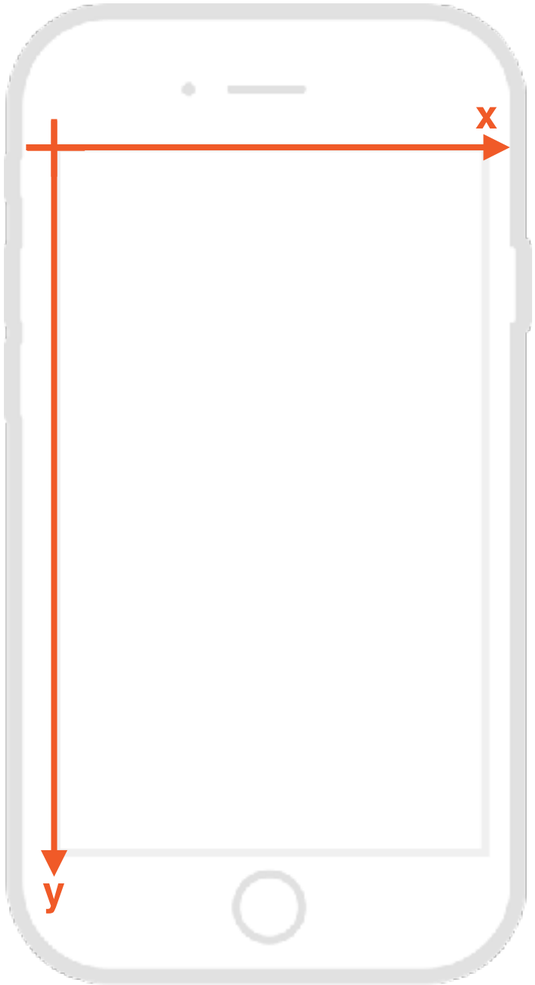
iOS Coordinate System



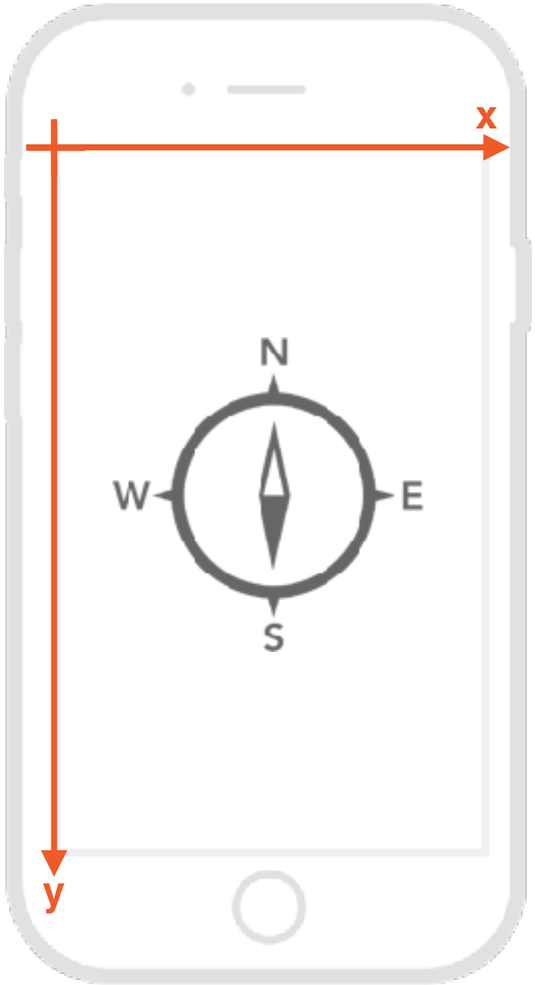
iOS Coordinate System



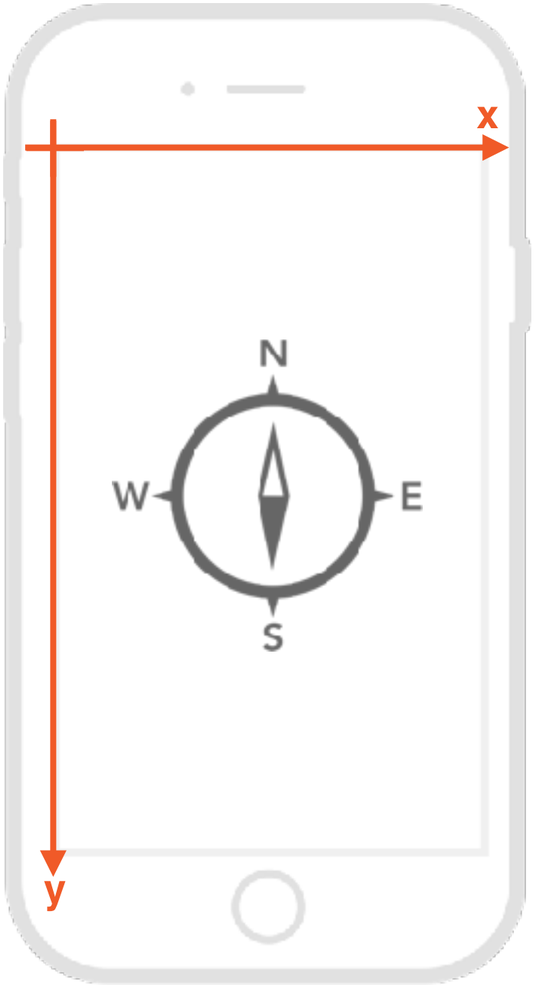
iOS Coordinate System



iOS Coordinate System



Directions



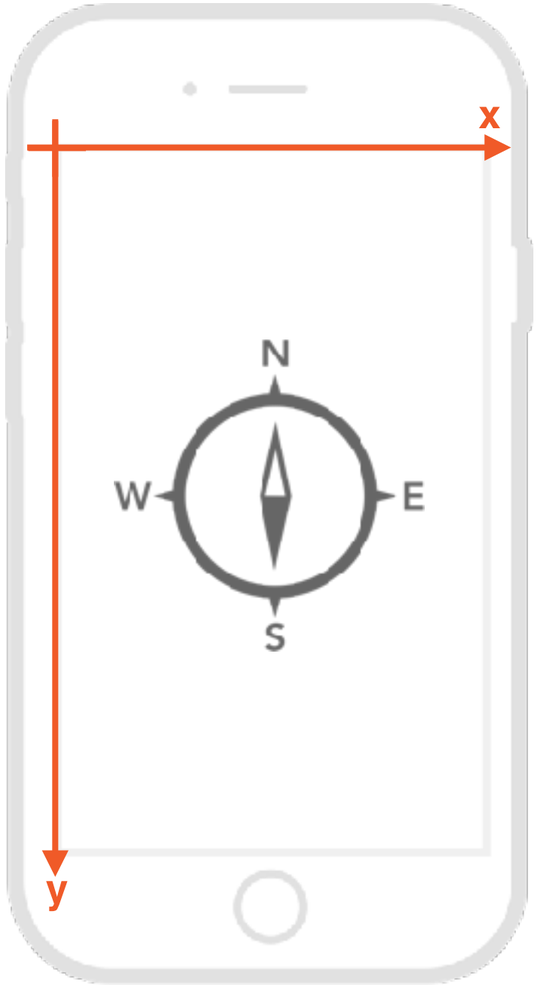
North: x = 0, y = -1

South: x = 0, y = 1

East: x = 1, y = 0

West: x = -1, y = 0

Directions



North: (0, -1)

South: (0, 1)

East: (1, 0)

West: (-1, 0)

Demo

Calculator demo

- Add support for compound expressions

Nonterminal expression

An expression that contains other expressions.

Define Grammar

“1 plus 3 minus 7 plus 11 minus 8”

Evaluate

```
“1 plus 3 minus 7 plus 11 minus 8”
```

Evaluate

1 plus 3 minus 7 plus 11 minus 8

Expressions

1 plus 3 minus 7 plus 11 minus 8

Expressions

1 plus 3 minus 7 plus 11 minus 8.

Summary

The Interpreter design pattern:

- Creates a simple language
- Defines the grammar
- Maps grammar sentences to types
- Interprets the grammar

Pitfalls

- Don’t use for complex grammar