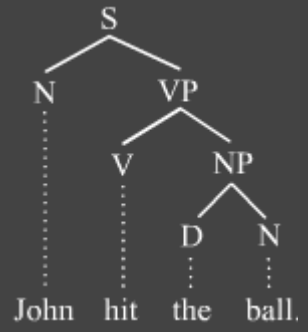
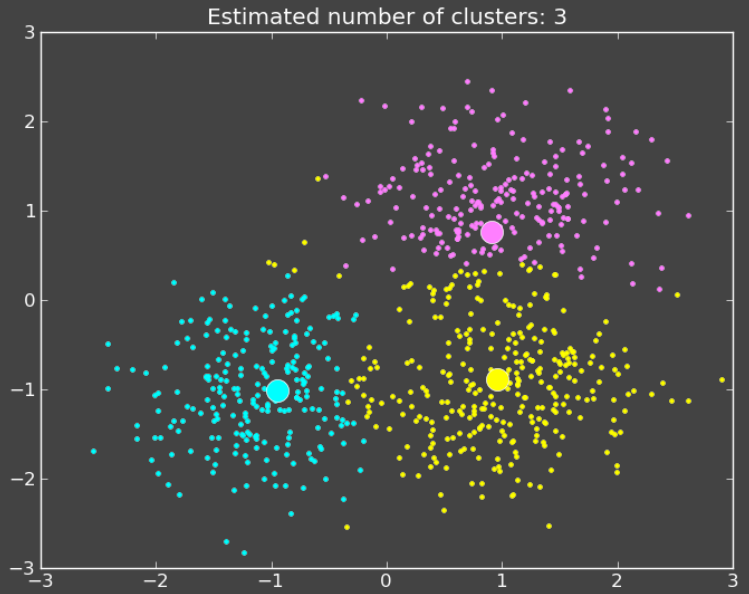
Pipeline`Script`

data workflows made simple

Target Domains



- Natural language processing
- Machine learning
- Network analysis



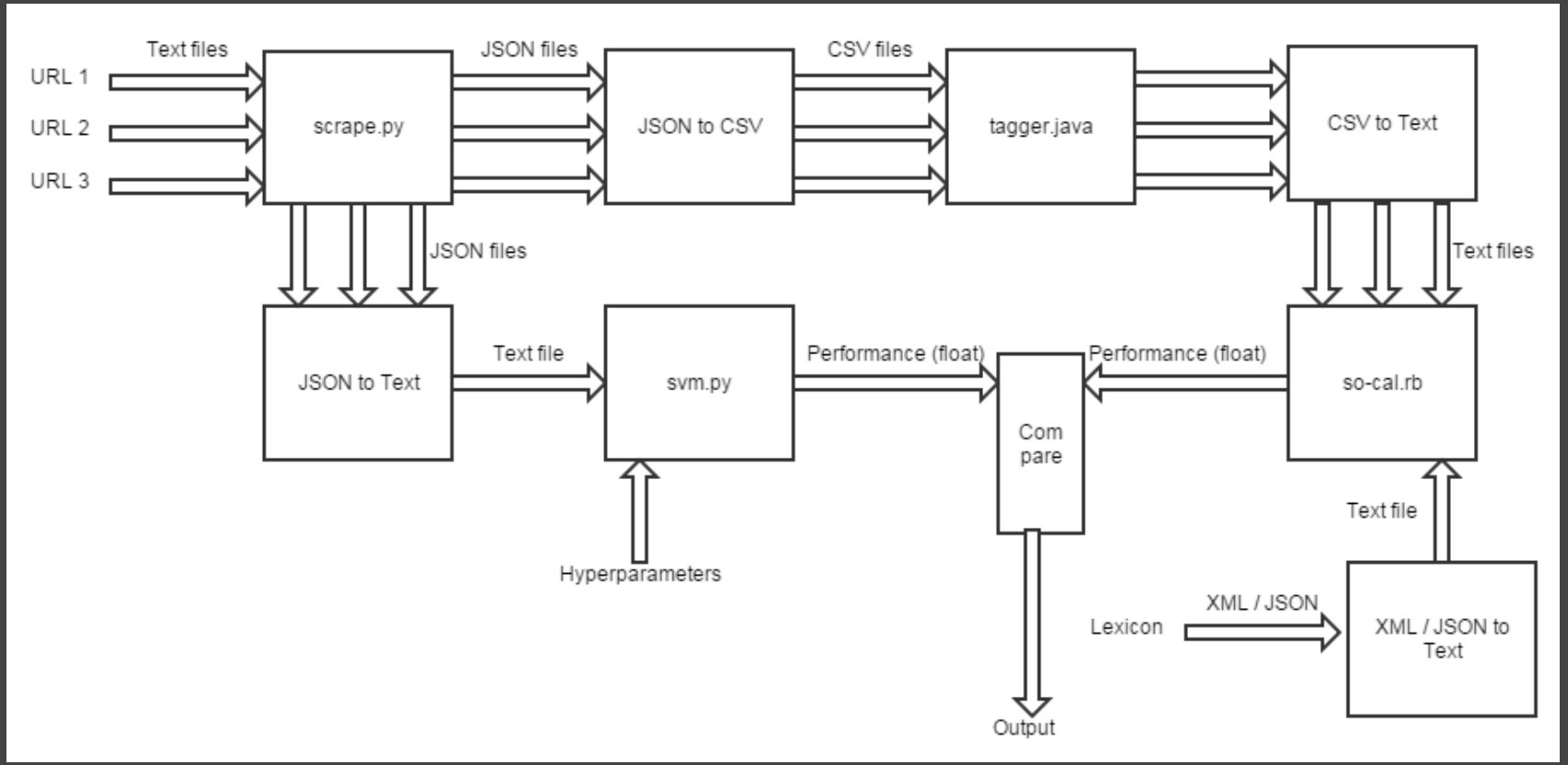
The Problem

data analysis can be complicated

Data Formats

Programming Languages

The Problem


URL 1
URL 2
URL 3
Text files
scrape.py
JSON files
JSON to CSV
CSV files
tagger.java
CSV to Text
JSON files
Text files
JSON to Text
Text file
svm.py
Performance (float)
Com
pare
Performance (float)
so-cal.rb
Hyperparameters
Text file
Lexicon
XML / JSON
XML / JSON to
Text
Output

The Problem

Data analysis can be complicated by
different **data formats** and
different **algorithm implementations**

The Solution

A new **layer of abstraction** that allows different **data formats** and different **algorithm implementations** to be used interchangeably

Key Ideas

- Function import from third-party algorithms
- Easy data file read/write
- Parallel processing

Syntax

- Function import

```
function f = !”scrape.py”
```

- File read/write

```
“id,date,cost,quant” -> ”data.csv”
table t = @”data.csv”
```

- Parallel processing

```
&get_names(“text#.txt”) => “names#.txt”
```

Project Management

- Version control
  - Git
- Code hosting & task management
  - GitHub: https://github.com/danvegeto/pipelinescript
- Document collaboration
  - Google Docs

Development Process

1. Java-side functionality
   Dan & Burak
2. Grammar and Translation
   Pedro & Rachel
3. Testing system
   David

Design Choices

Translator: Python

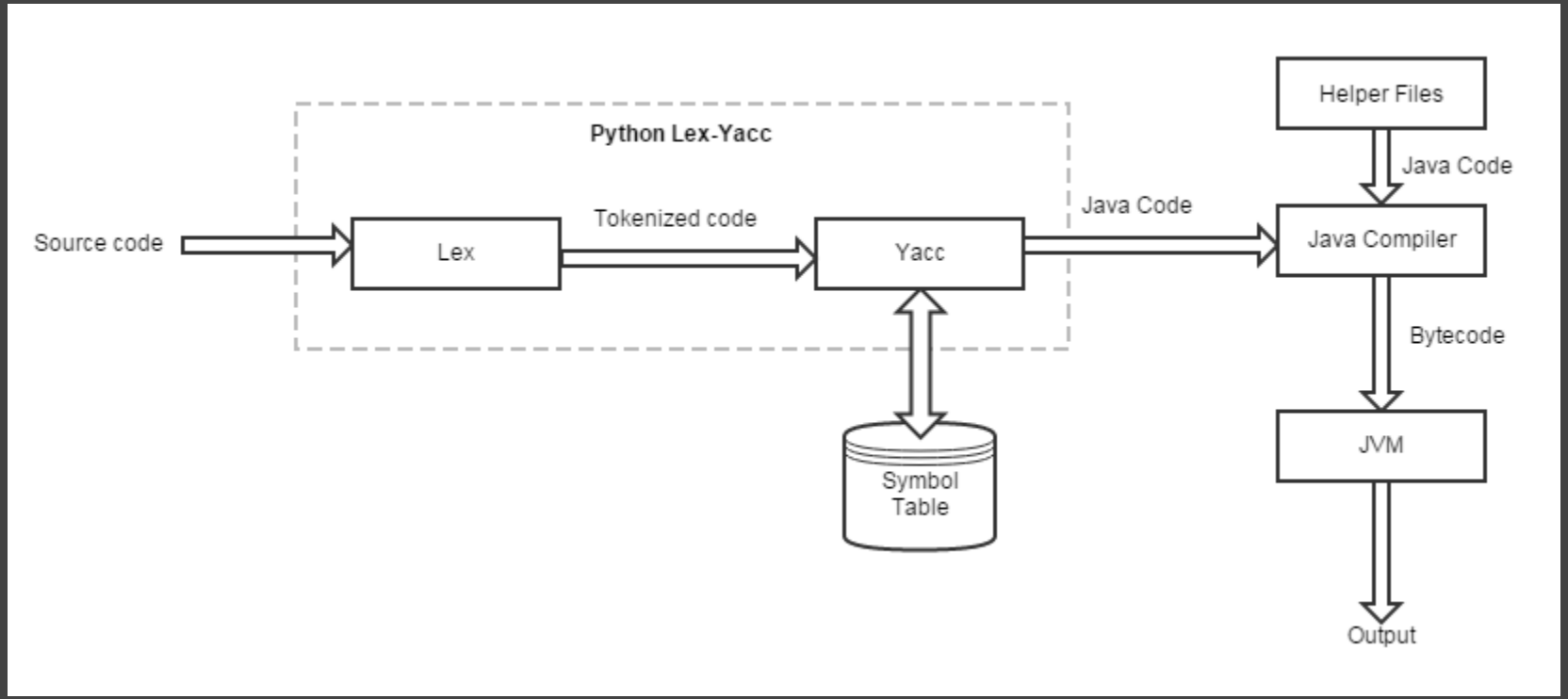
- Easy
- Compact
- Integrated
- Powerful

Design Choices

Target Language: Java

- Fast
- Cross-Platform
- Manageable

Translator Design



Directory Structure

`pipelinescript/`	
`PipelineScript`	Java helper classes
`plugins`	third-party algorithms
`data`	data storage
`tests`	test pipelines and testing system
`examples`	example pipelines
`doc`	documentation
`ply.py`	Python translator
`ply.sh`	Shell script

Environment Setup

- git clone https://github.com/danvegeto/pipelinescript.git
- Install PLY (Python - lex - yacc) and Java
- Run the self tests by tester.py in the /tests folder
- Run your first pls program by ./pls.sh hello_world.pls
- External plugins -> pipelinescript/plugins/
- Data files (txt,csv) -> pipelinescript/data/

Testing System

- Initial dynamic approach to study corner cases
- Easy updation (addition) of new tests
- Coverage extended to all features

```
tests/arith_add_multi.pls
9
////////////////////////////////////////////////////////
tests/arith_div.pls
2
////////////////////////////////////////////////////////
tests/text_concat.pls
foo bar
////////////////////////////////////////////////////////
```

tests/Results.txt

```
------------------------------tests/arith_add_multi.pls CHECK PASSED-----------------------
The actual output is ['9']

The expected output is ['9']

------------------------------tests/arith_div.pls CHECK PASSED-----------------------------
The actual output is ['2']

The expected output is ['2']

------------------------------tests/text_concat.pls CHECK PASSED---------------------------
The actual output is ['foo bar']

The expected output is ['foo bar']
```

tests/tester.py

DEMO

Example 1: File I/O

```
"this is some example text, and it is exemplary" -> "text.txt"

print @"text.txt"
```

Example 2: Shell Commands

```
"1\n2\n3\n4\n5\n6\n7\n8\n9" -> "data.txt"

function head = !"head -n 3"

head("data.txt") -> "head.txt"

print @"head.txt"
```

Example 3: Simple Scripts

```
function words = !"tokenize.py"
function counts = !"count.py"

"the boy and the girl played with the dog and the cat" -> "text.txt"

words("text.txt") -> "words.txt"
counts("words.txt") -> "counts.csv"

print @"counts.csv"
```

Example 4: Newspaper

```
function head             = !"head"
function scrape           = !"newspaper/scrape.py"
function download         = !"newspaper/download.py"
function tokenize         = !"tokenize.py"
function count            = !"count.py"

"http://www.nytimes.com" -> "source.txt"
scrape("source.txt")      -> "urls.csv"
head("urls.csv")          -< "url#.txt"
&download("url#.txt")     => "text#.txt"

print head("text#.txt")
```

Example 5: Newspaper + NER

```
function scrape          = !"newspaper/scrape.py"
function head            = !"head"
function download        = !"newspaper/download.py"
function get_names       = !"stanford-ner/ner.py"
function count           = !"count.py"

"http://www.nytimes.com" -> "source.txt"
scrape("source.txt")     -> "urls.csv"
head("urls.csv")         -< "url#.txt"
&download("url#.txt")    => "text#.txt"
&get_names("text#.txt")  => "names#.txt"
count("names#.txt")      -> "counts.csv"

print head("counts.csv")
```

Lessons Learned

- Maintain constant communication
- Plan ahead in detail
- Weekly group meeting are important
- Focus on test driven approach
- Always test basics and push the code

Further Development

- Improve error-checking
- Add support for additional data formats and algorithm languages
- Add additional plugin algorithms
- Implement plugin manager
- Create online platform

THANK YOU