Datatrack:
An R package for managing data in an experimental workflow

Data versioning and provenance considerations
In interactive scripting

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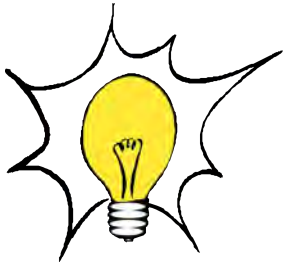
Overview

- Datatrack R package allows easy record-keeping of provenance metadata within the R scripting environment during small-scale exploratory development.
- Simple integration requires minimal learning or modifications of coding style
- Allows visual exploration of provenance metadata within R studio to assist choosing input during interactive scripting

scientific question



idea

coding
testing
small data

Automation
Distribution
etc

Pegasus

Kepler

VisTrails

coding
testing
small data

- Loss of REPL interactivity
- Learning new software
- Learning new language (workflow language)
- Many unneeded features
- Switching between environments

SWfMS

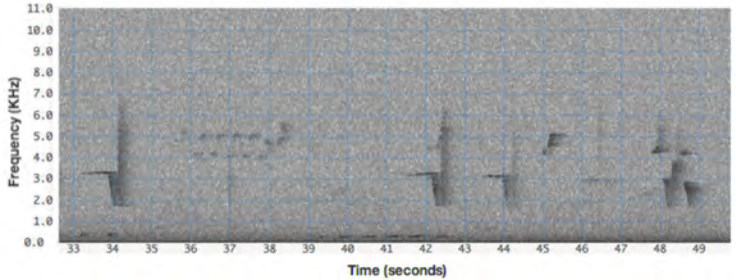
Pegasus

Kepler

VisTrails


Boo!


database


Frequency (KHz)
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
33
34
35
36
37
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46
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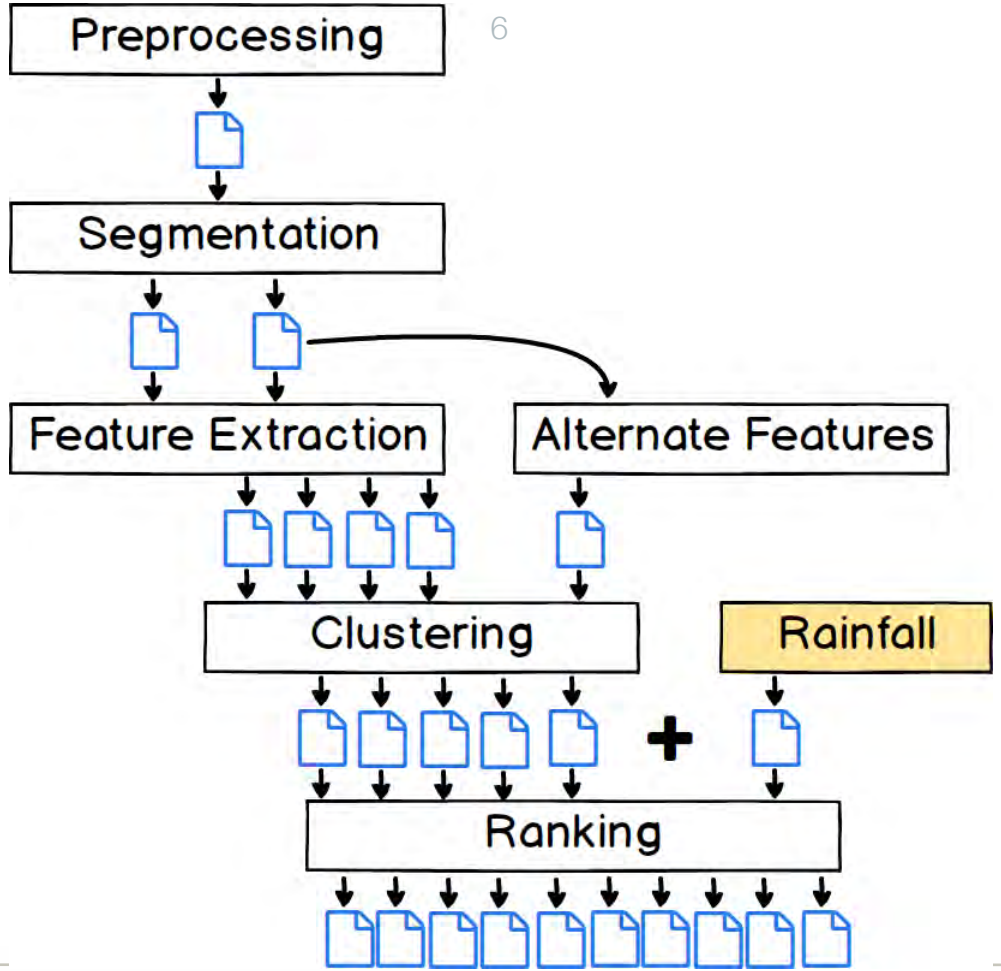
48
49
Time (seconds)


Preprocessing
Segmentation
Feature Extraction
Alternate Features
Clustering
Rainfall
Ranking

Data Provenance

- Information about data required to reproduce it

- Necessary for selecting the desired inputs to a step of a workflow when run in isolation.

Data Provenance
for decision-making in interactive scripting

- Which parameters were used to produce the data?
- Which other data was used as input to produce the data (and their parameters): ***data dependencies*?**

Data Provenance
for decision-making in interactive scripting

Recorded by Datatrack via
wrappers for read and write functions.

Writing Data

- Ability to write data along with provenance metadata

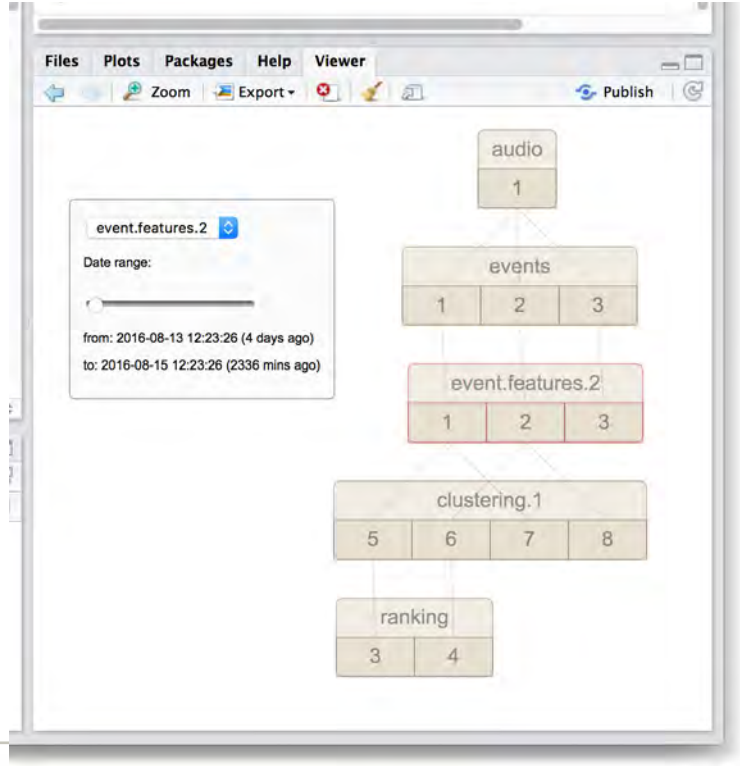
```
writeDataobject(mydata,
                name = ‘my.data.output’,
                ... additional metadata as parameters ...
```

- Which parameters were used when generating the data
- Which other data objects that were used when generating the data

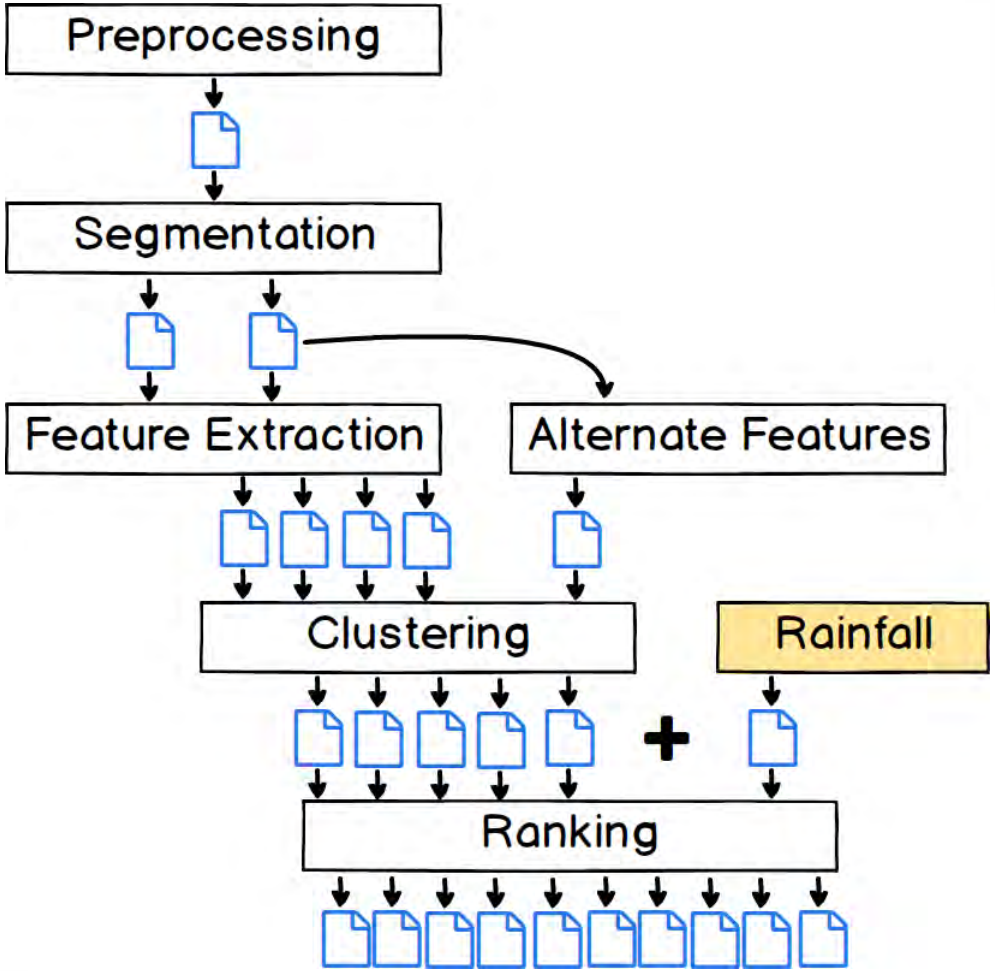
Reading Data

- Ability to view the dependency graph of existing data to assist selection when reading data

```
readDataobject(
        'event.features.2')
```



Demo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Considerations

- Tracking of users: the “who” of provenance
- Tracking of code versions and environment information
- Generating versions and overwriting data
- Cyclic data dependencies

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Thank You

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https://github.com/peichins/datatrack

Implementation

- Metadata stored as a single csv
- Dependency graph visualization written in javascript using D3.js
- Inserted into R Studio viewer using Html Widgets package.