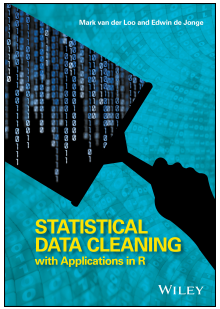

Statistical Data Cleaning

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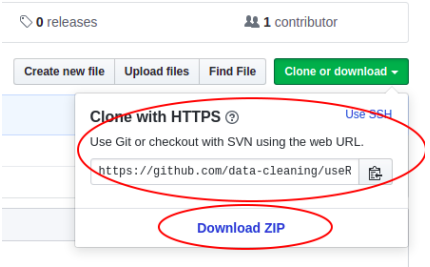
ENBES|EESW 2019

Materials: github.com/data-cleaning/EESW2019_tutorial

Clone (DOS or bash shell):

```
git clone https://github.com/data-cleaning/EESW2019_tutorial
```

Or download:



This tutorial

Topics

First two steps of the the Statistical Value chain

Form

1. You start with hands-on scripts
2. Presentation: background
3. Extra assignment (if there is time)

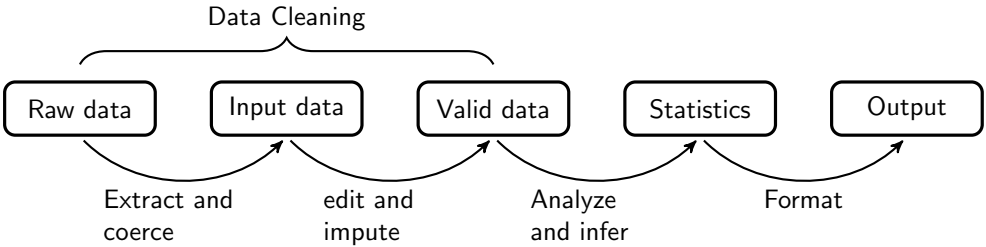
The Statistical Value Chain

Value Chains

Porter's value chain (1985)

The idea of the value chain is based on the process view of organizations, the idea of seeing a manufacturing (or service) organization as a system, made up of subsystems each with inputs, transformation processes and outputs.

Data Cleaning and the Statistical Value Chain



Notes

- This part only pertains to the data processing stage. Collection, design, dissemination is not included.
- The fixed points are well-defined statistical products.

Stages in the SVC

1. **Raw Data** is data as it arrives
   - Can differ in quality/source: survey/admin/big data
2. **Input data** satisfies technical demands:
   - File type is known and can be read
   - Variables are of correct type (number/date/text/categorical...)
   - Records identified with statistical objects
   - Variables identified with statistical properties

Stages in the SVC

3. **Valid data** satisfies domain knowledge constraints
   - Age cannot be negative
   - Someone under 15 yrs old cannot have income from work
   - mean economic growth/decline does not exceed 5% in a certain sector
   - ...

Justification

Invalid data leads to invalid statistical results.

Stages in the SVC

4. **Statistics** are the target output values (aggregates) describing the population characteristic of interest.
   - Economic growth
   - Unemployment
   - Income distribution
   - GDP
   - ...

Note
Statistics also need to satisfy domain knowledge constraints.

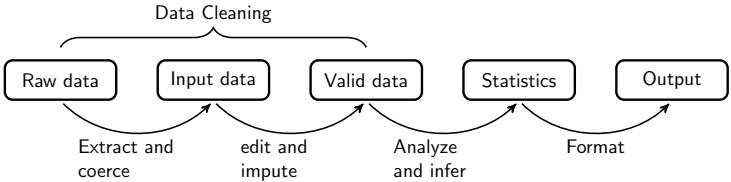
Stages in the SVC

5. **Output** are statistics, formatted and annotated for publication
   - Figures, tables
   - Definitions
   - ..

The SVC: Remarks

- Actual data processing is not necessarily linear across the chain
- In production architectures a more flexible model is often used where the definition of interfaces between processing steps play a crucial role. The chain shown here is a general example covering most steps in some way.
- The general idea scales really well.

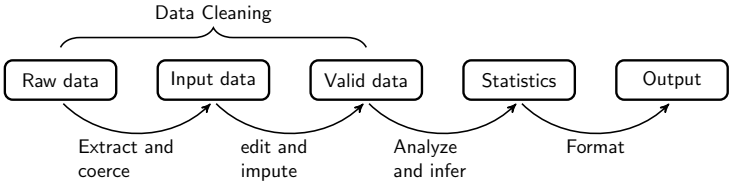
Quizz (1)



Where does the following activity take place?

Formatting date-time variable to `ISO8106` format.

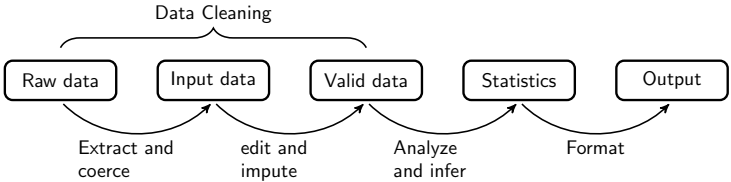
Quizz (2)



Where does the following activity take place?

Estimating the covariance between unemployment percentage and age.

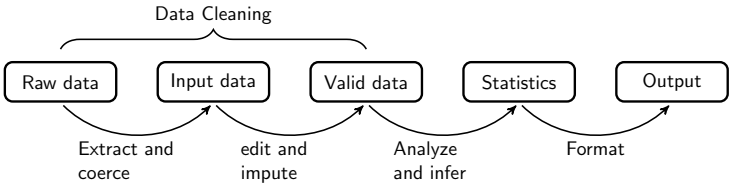
Quizz (3)



Where does the following activity take place?

Join data with a backbone using standard (SQL) join operations, based on unique keys.

Quizz (4)



Where does the following activity take place?

Join data with a backbone using probabilistic linkage, based on approximate matches between various columns of the data and the backbone.