Elevating Data Documentation Proficiency

Harnessing the Power of DDI for Official Statistics

Adrian Dușa
University of Bucharest
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Slides location

https://github.com/dusadrian/uRos2023

Typical data

```r
dfm <- data.frame(
  V1 = sample(c(1:5, -91), 10, replace = TRUE),
  V2 = sample(c(1:2, -92), 10, replace = TRUE)
)
dfm
```

```
    V1  V2
1  -91   2
2    3 -92
3    2   2
4    4   2
5    2   1
6    5 -92
7    3   2
8    2   2
9  -91   1
10   3   2
```

What are the variables all about?

What do the values stand for?

Why are there negative numbers there?

Metadata powered data

Variable and value labels

```r
library(declared)
dfm$V1 <- declared(
  dfm$V1,
  label = "Opinion about this tutorial",
  labels = c(Bad = 1, Good = 5, DK = -91),
  na_values = -91
)

dfm$V1
```

```
<declared<numeric>[10]> Opinion about this tutorial
 [1] NA(-91)       3       2       4       2       5       3       2 NA(-91)       3
Missing values: -91

Labels:
 value label
     1   Bad
     5  Good
   -91    DK
```

Variable and value labels

```r
dfm$V2 <- declared(
  dfm$V2,
  label = "Respondent's gender",
  labels = c(Males = 1, Females = 2, NR = -92),
  na_values = -92
)

dfm$V2
```

```
<declared<numeric>[10]> Respondent's gender
 [1]       2 NA(-92)       2       2       1 NA(-92)       2       2       1       2
Missing values: -92

Labels:
 value   label
     1   Males
     2 Females
   -92      NR
```

All others have it

More typical questions

When was the data collected?

Under which study?

For what purpose?

From which population?

What do the cases represent? (people, companies etc.)

What was the sampling procedure?

If any, how were the weight variables calculated?

Buzzwords

DataDOI
Open data
Open Access
Repository
DataDOI
FAIR
DOI
FAIR
Research data
Repository
DataCite
Data management plans
Open Access
Open Access
DataCite
Openess
Data management
DataDOI
Repository
Data management
Research data
DOI
DataCite
DOI
OpenAIRE
Preservation
FAIR
Open
data
FAIR
DOI
DOI
Research data
OpenAIRE
DataDOI
Knowledge
DOI
DataCite
Data management plans
DataCite
Research data
Repository
Archiving
Publishing
Open science
Open research data
Repository
Open data
Open data
Repository
Open Access
Data management
Data management plans
DataDOI
Open science
FAIR
Open data
Open
research
data
FAIR
DOI
DOI
FAIR
DOI
FAIR
FAIR
DOI
Open data
FAIR
Open science
DataCite
Data management
Open research data
Researchers
DataDOI
Open Access
OpenAIRE
Open research data
Research data
OpenAIRE
FAIR
Data management
DOI
plans
Repository
DataCite
Open science
Open Access
University of Tartu Library
DataDOI
Open Access
OpenAIRE
FAIRest
DOI
OpenAIRE
Research data
DataCite
Open research data
Data management plans
OpenAIRE
Open research data
DOI
Open
science
DOI
FAIR
Repository
Storage
FAIR
DataDOI
DataCite
Research data
Open data
Data management plans
Open science
Data management
Open data
Open Access
Repository
Reuse
Research data
DataDOI
Open data
Open data
DataCite
OpenAIRE
FAIR
Open data
Data management
Research data
DataDOI
Open research data

DDI - Data Documentation Initiative

What is DDI

https://ddialliance.org/

A metadata standard used to describe research data.

An international standard for describing the data produced by (but is not limited to) **surveys** and other observational methods in the social, behavioral, and economic (SBE) sciences, health sciences, and in **official statistics**

Used to document and manage different stages in the research **data lifecycle**, such as conceptualization, collection, processing, distribution/dissemination, discovery, and archiving.

Has a great community of researchers who want their research data to be:

Findable
Accessible
Interoperable
Reusable

What is DDI

- DDI facilitates the creation and use of metadata
- It is expressed in **XML**, and validated against an XML Schema.
- The XML schema supports the tagging of text (the metadata) for meaning, not formatting/appearance
- DDI establishes a clear boundary between the information required to define and understand data and the data itself

DDI Products

DDI Codebook
A light-weight version of the standard intended to document simple survey data.
https://ddialliance.org/Specification/DDI-Codebook/2.5/XMLSchema/field_level_documentation.html

DDI Lifecycle
Next generation, *reusing* information from one study to another, from conceptualisation to analysis, making extensive use of *Controlled Vocabularies*, and monitoring the *change over time*

DDI-CDI Cross-Domain Integration
Facilitates the joint analysis of data from multiple different domains (e.g. combining official statistics, administrative data, and data from enviroment agencies etc.)

Interoperable/Aligned with Other Standards

- Dublin Core and MARC
- Generic Statistical Information Model (GSIM)
- ISO/IEC 11179 (Geography)
- ISO 19118 (Geography)
- ISO 17369 SDMX – Statistical Data and Metadata Exchange
- METS and PREMIS
- Structured Data Transformation Language (SDTL)
- Validation and Transformation Language (VTL)
- Others (you name it)

DDI Codebook

Five sections

1. Document Description

2. Study Description

3. Data Files Description

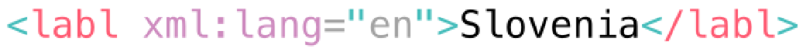
4. Variable Description

5. Other Study Related Materials

Five sections

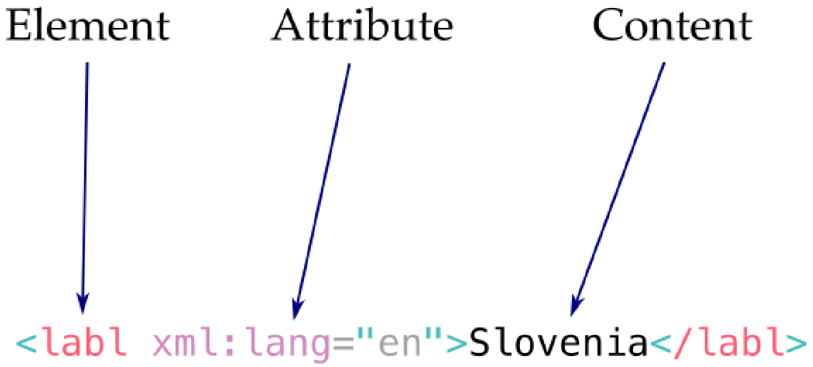
1. Document Description
2. Study Description
3. Data Files Description
4. **Variable Description** (90% of the effort)
5. Other Study Related Materials

Structure of an XML element



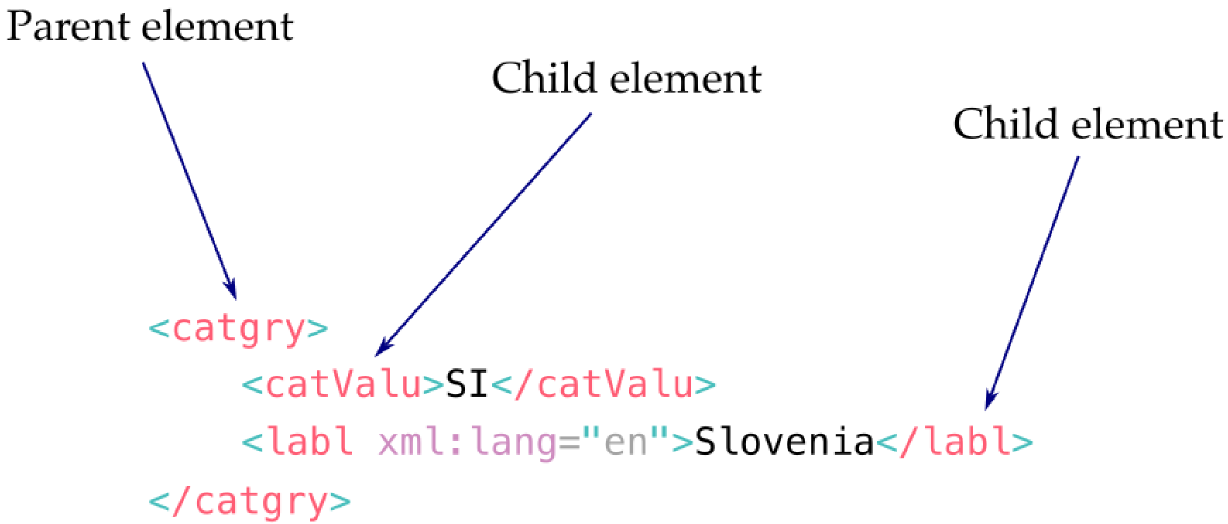
```xml
<labl xml:lang="en">Slovenia</labl>
```

Structure of an XML element



```
<labl xml:lang="en">Slovenia</labl>
```

Structure of an XML element



Parent element

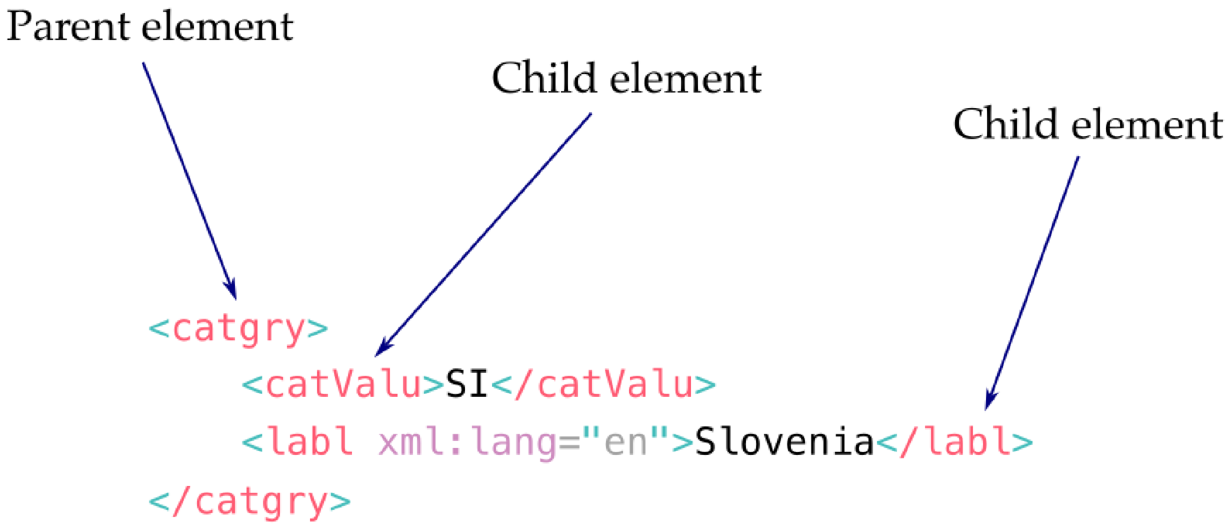
Child element

Child element

```
<catgry>
    <catValu>SI</catValu>
    <labl xml:lang="en">Slovenia</labl>
</catgry>
```

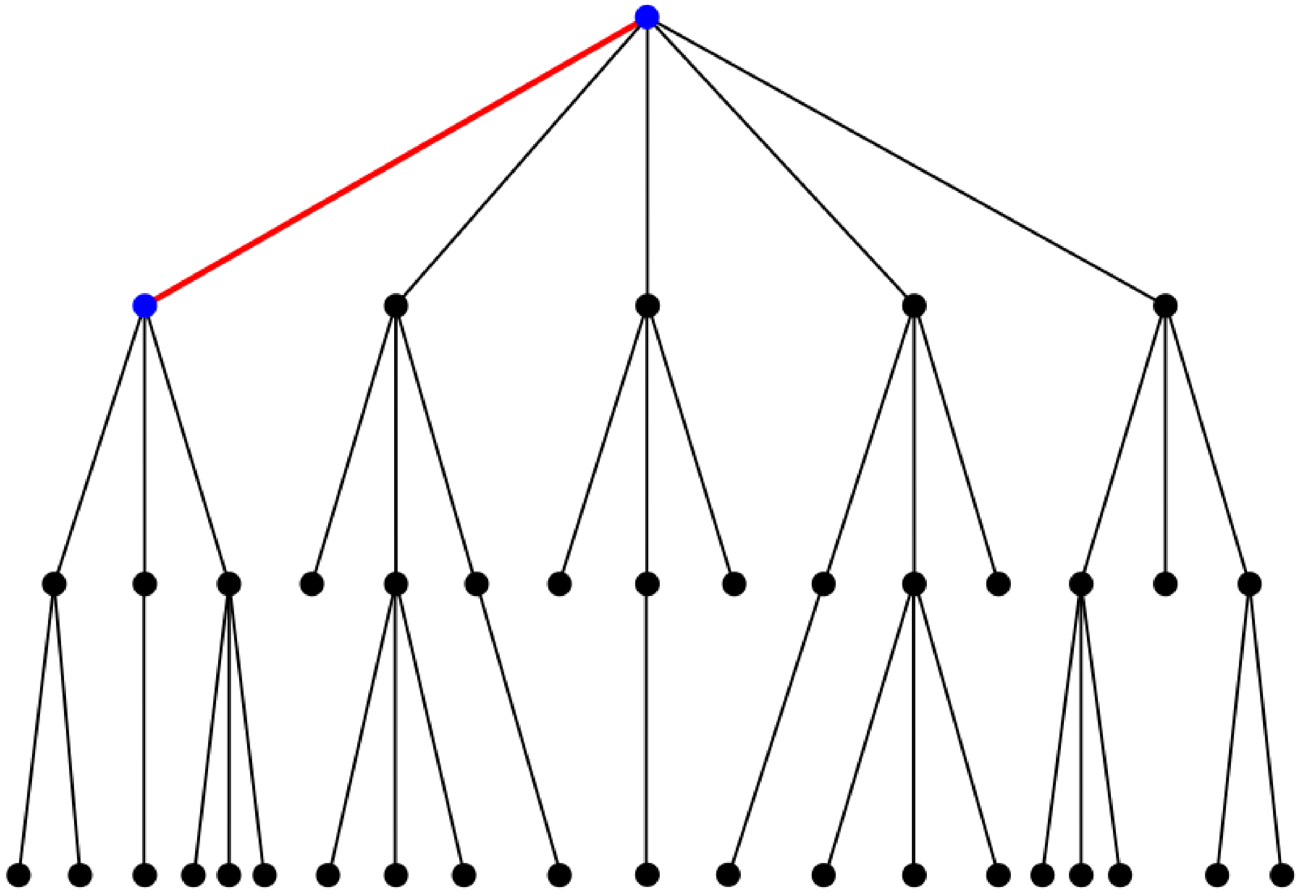
Corresponding structure in R

```
$catgry
$catgry$catValu
$catgry$catValu[[1]]
[1] "SI"


$catgry$labl
$catgry$labl[[1]]
[1] "Slovenia"

attr(,"xmlang")
[1] "en"
```

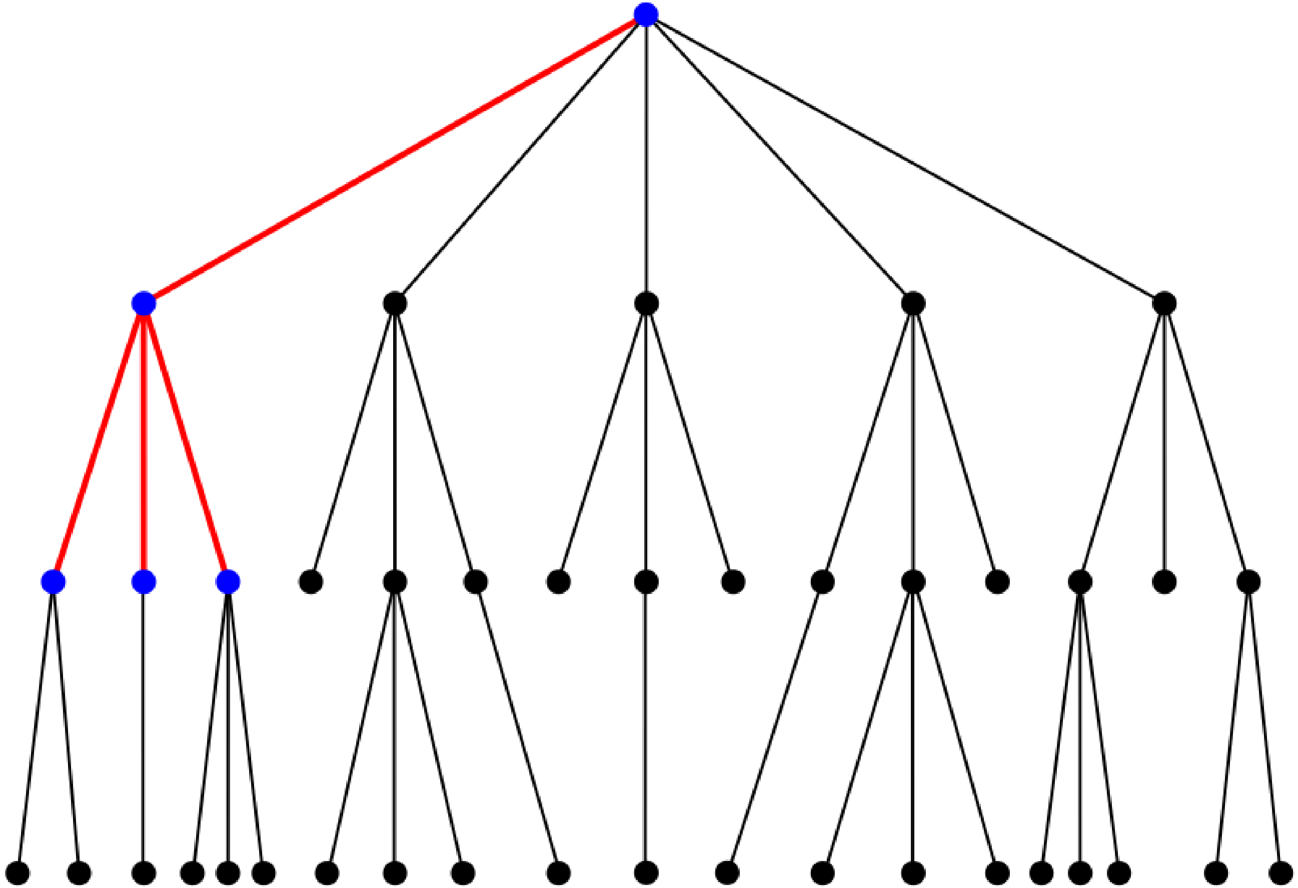


```
<catgry>
    <catValu>SI</catValu>
    <labl xml:lang="en">Slovenia</labl>
</catgry>
```

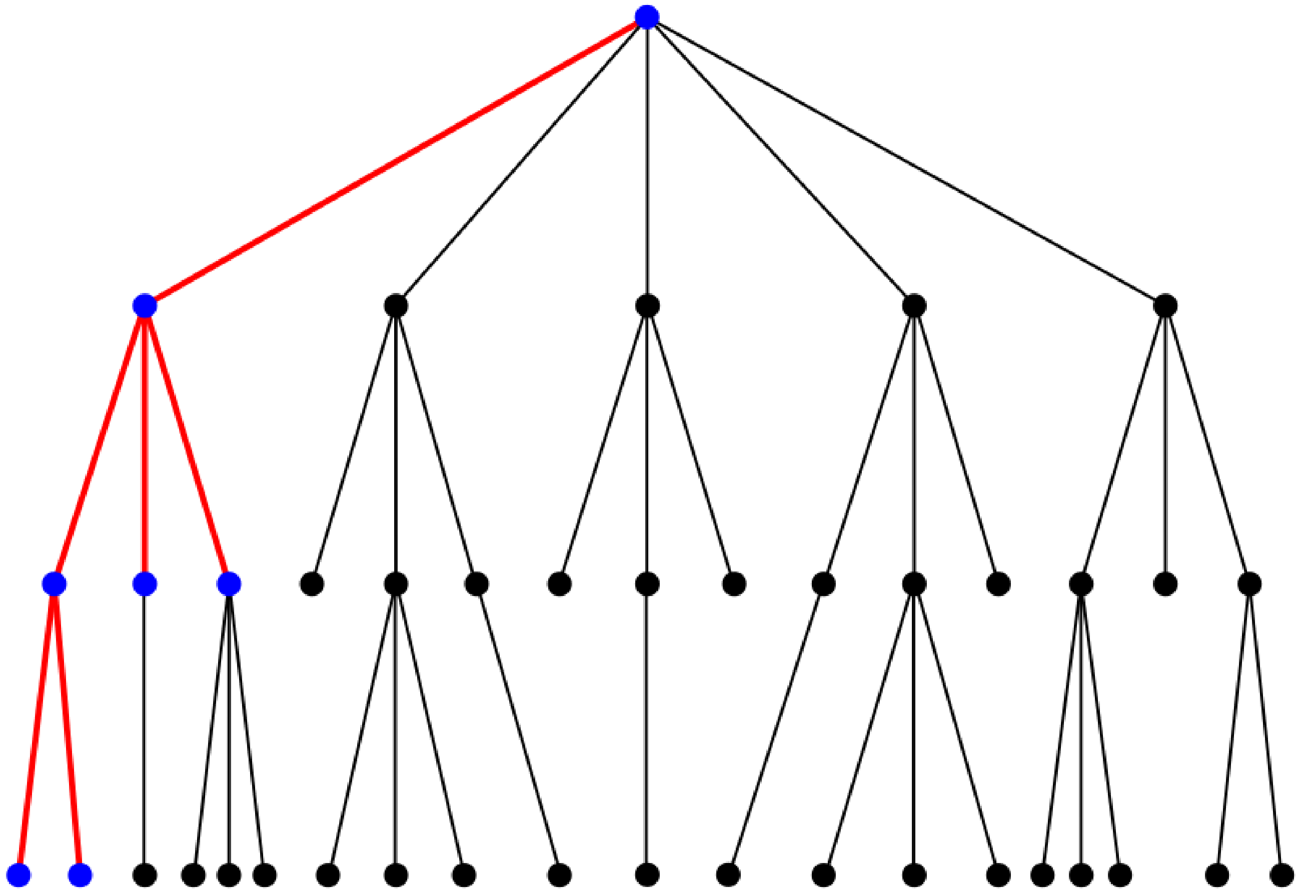
Top-down approach



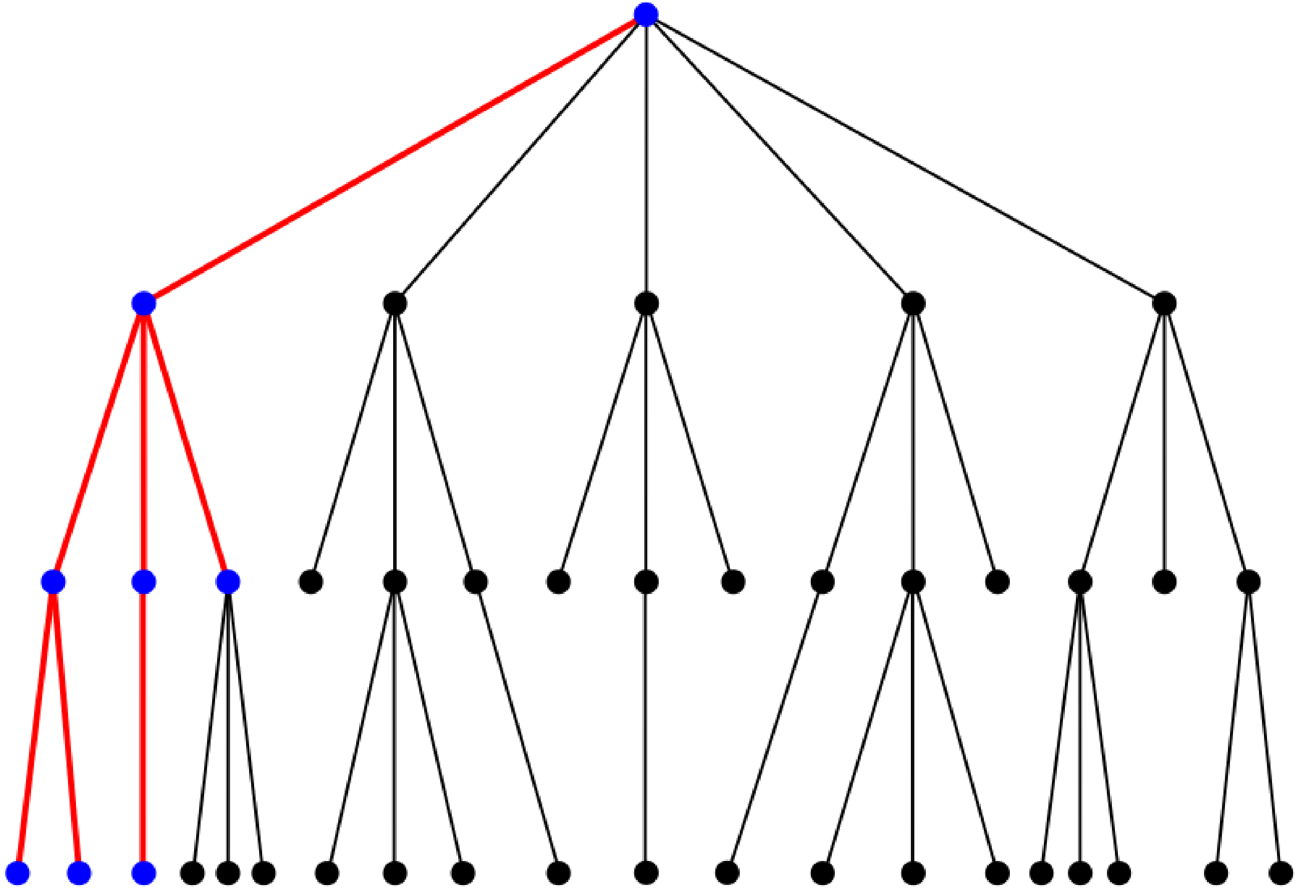
Top-down approach



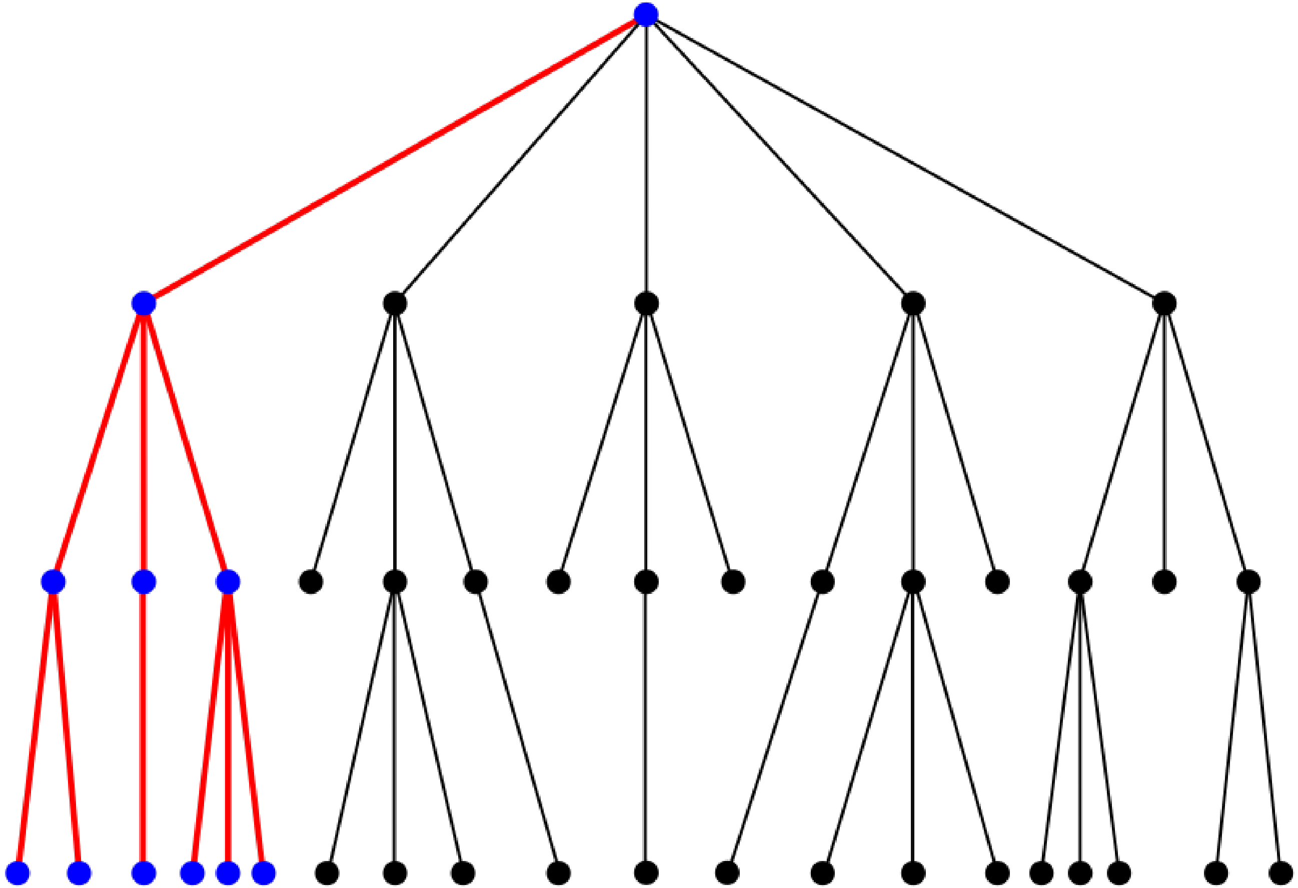
Top-down approach



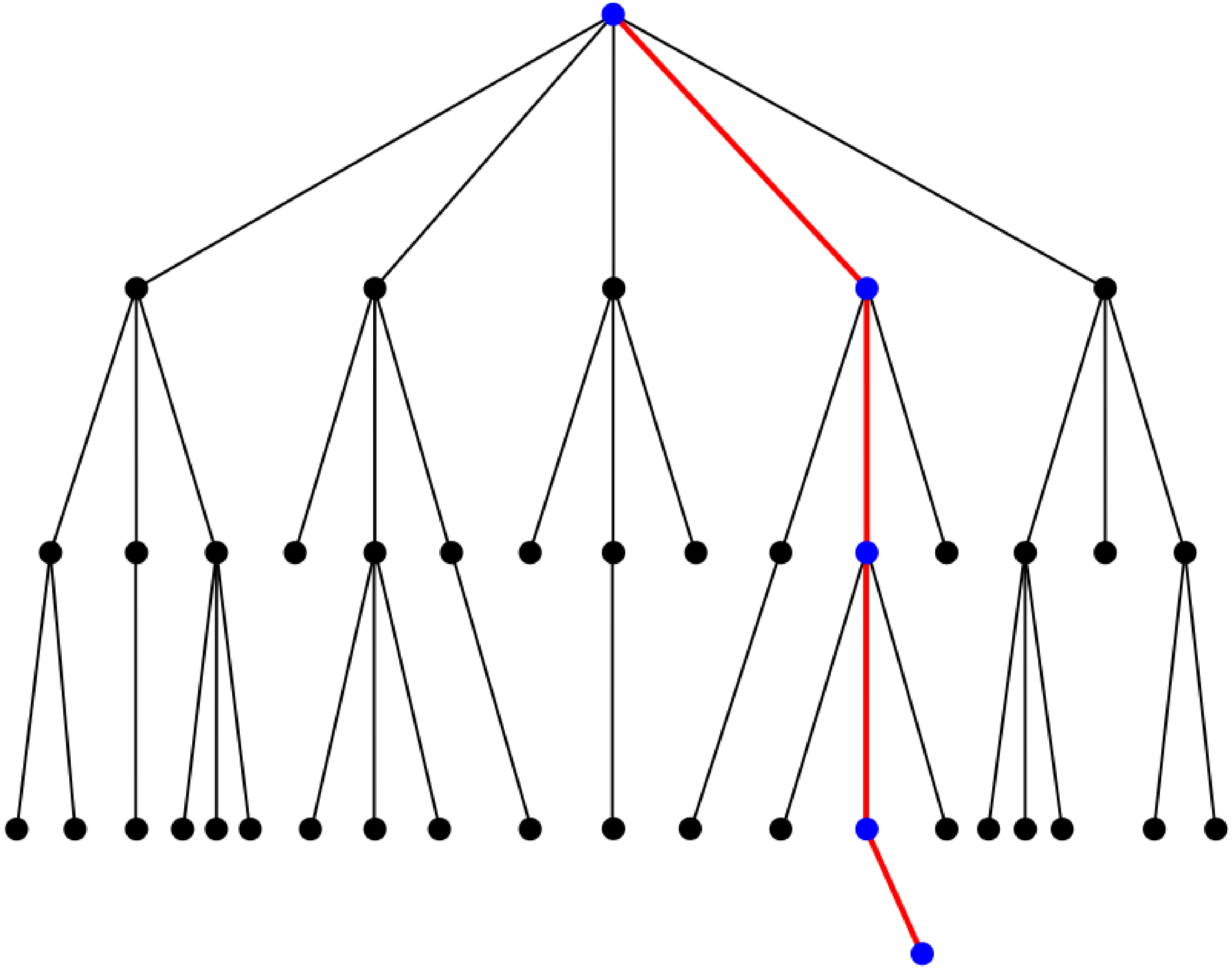
Top-down approach



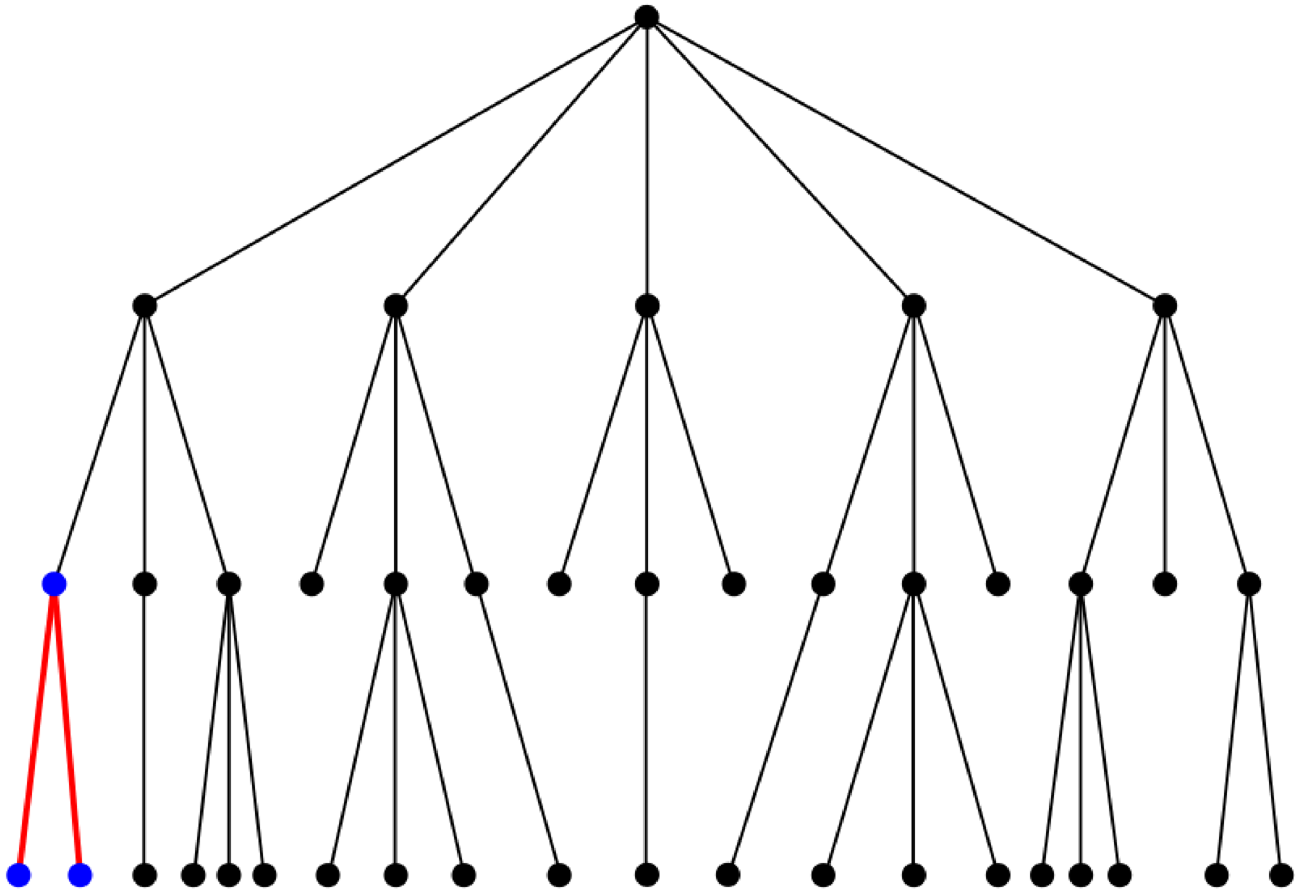
Top-down approach



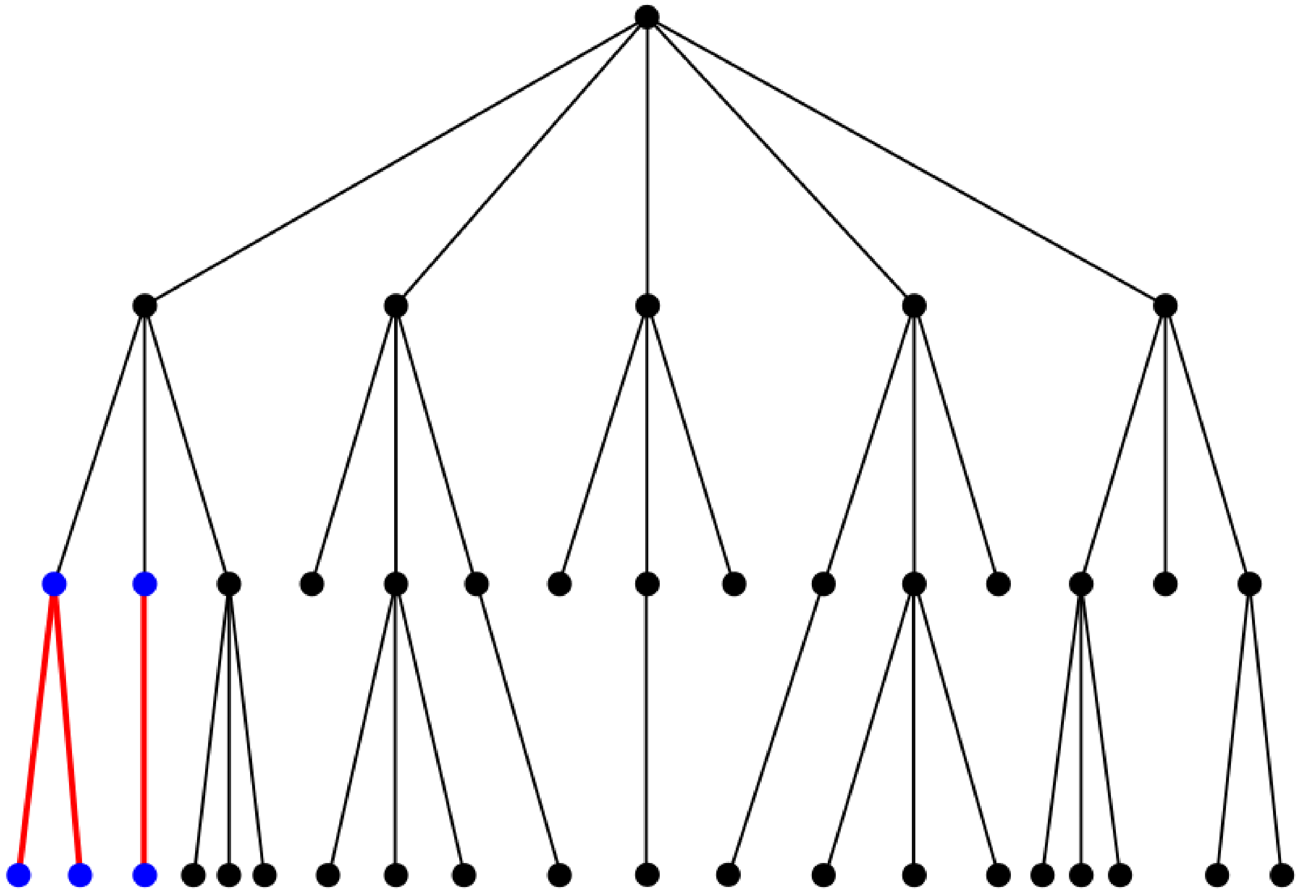
Top-down approach



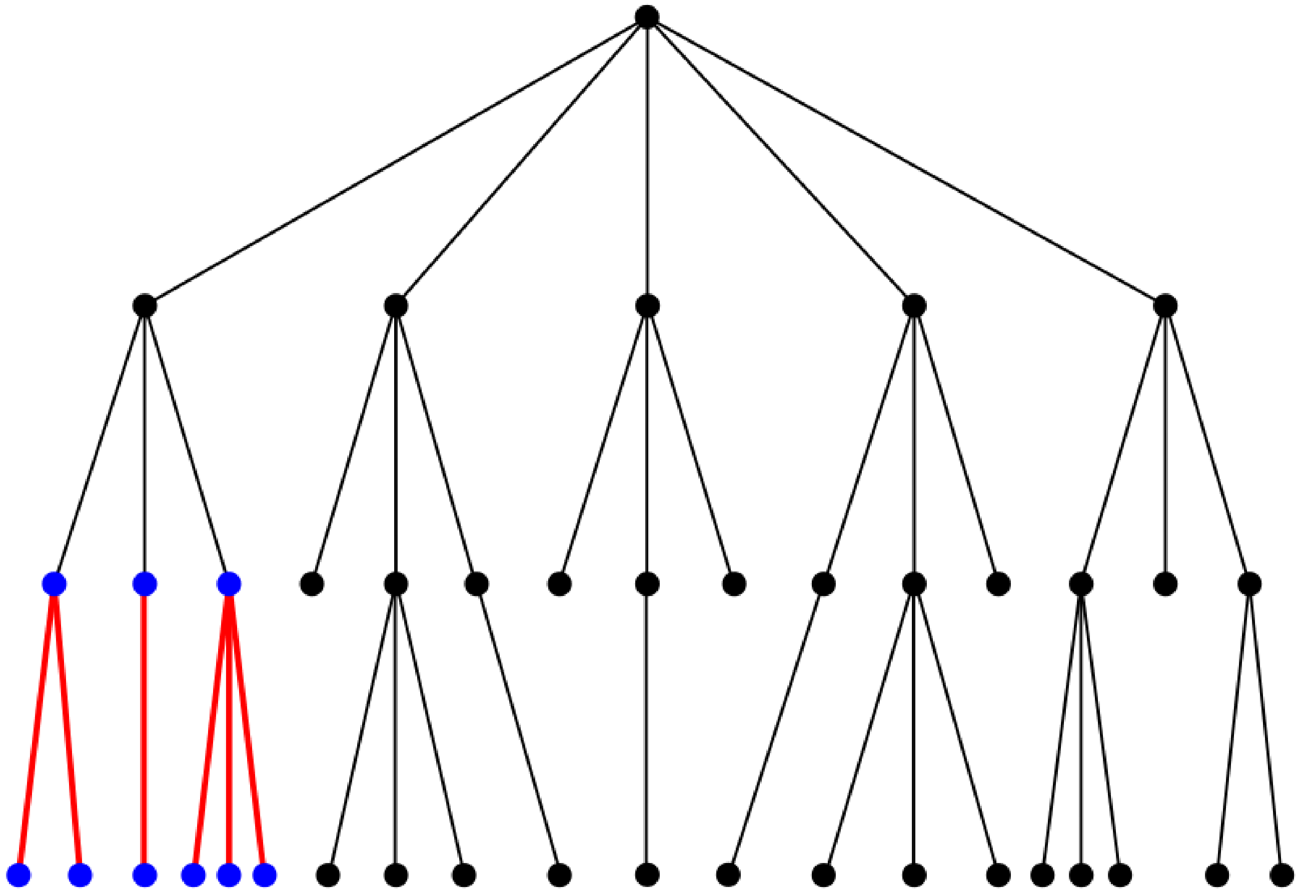
Bottom-up approach



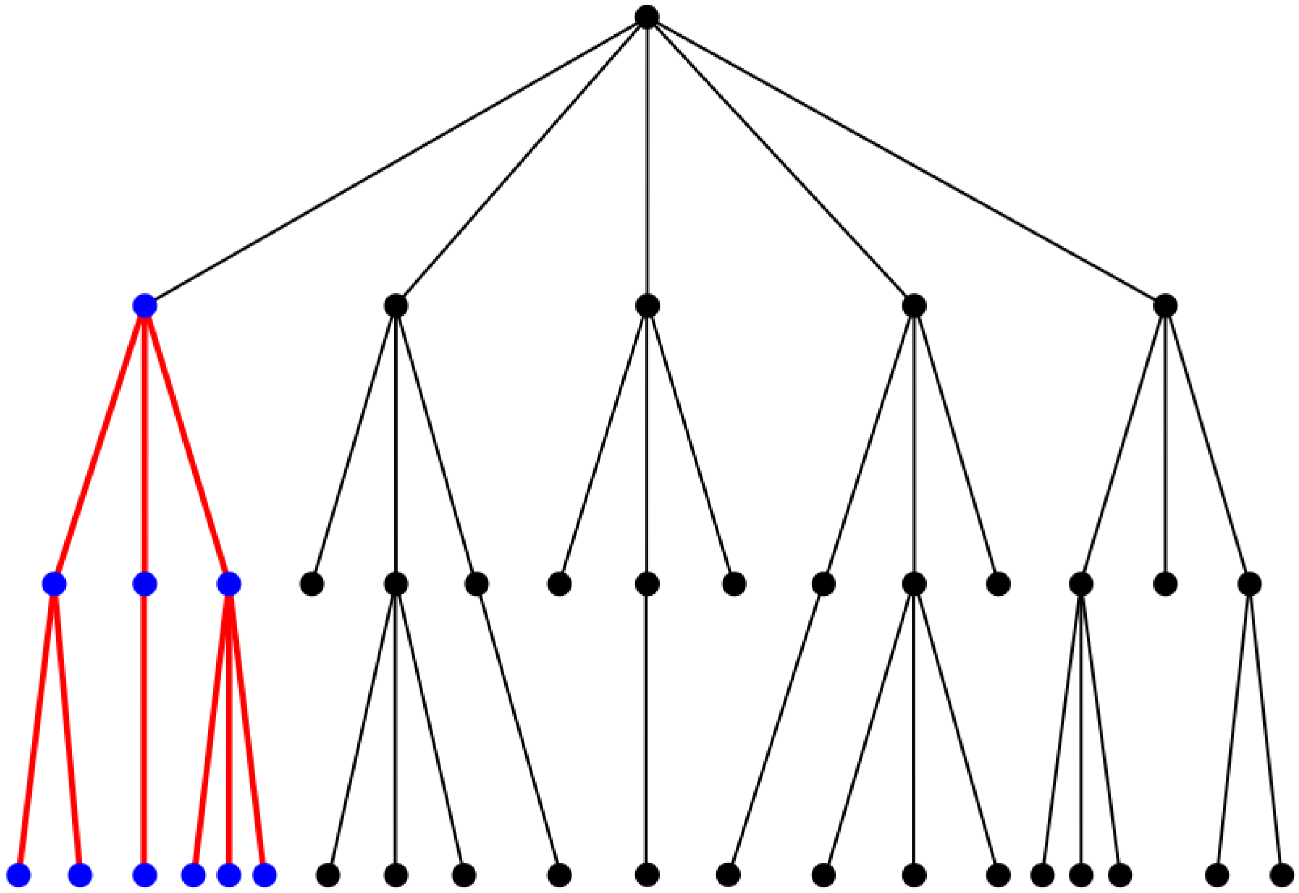
Bottom-up approach



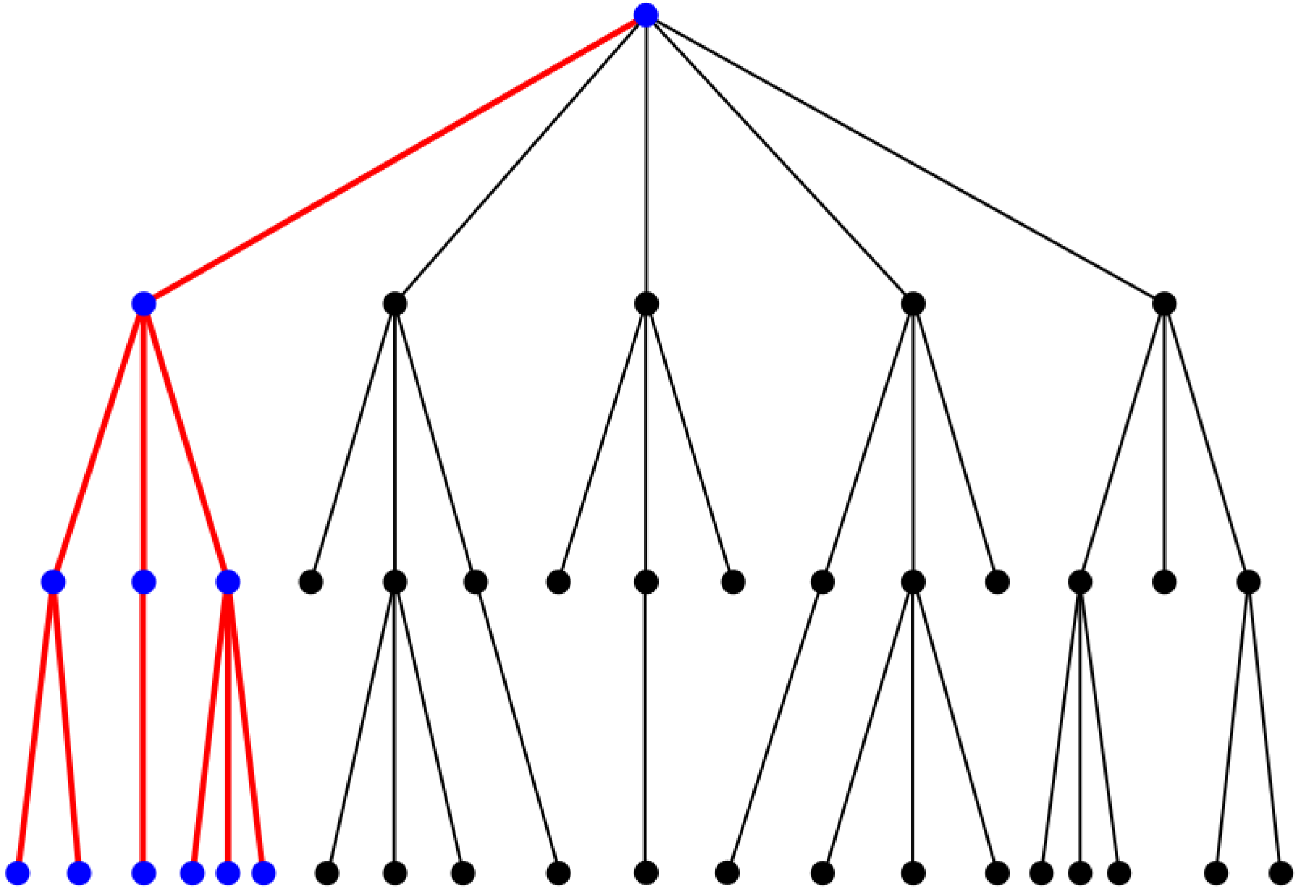
Bottom-up approach



Bottom-up approach



Bottom-up approach

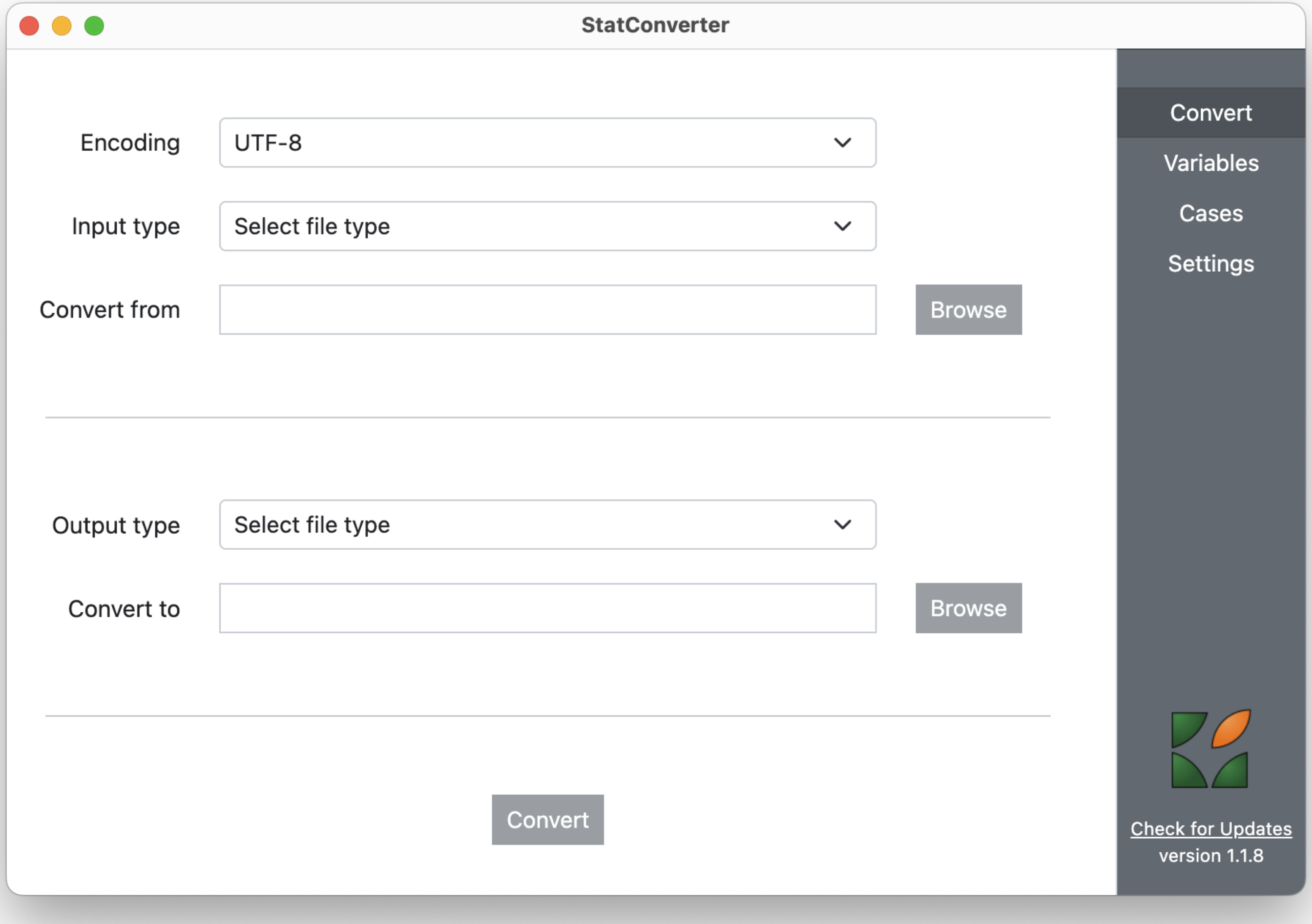


Bottom-up R code

```r
catValu <- makeElement("catValu", content = "SI")

labl <- makeElement(
  "labl",
  content = "Slovenia",
  attributes = c(xmlang = "en")
)

catgry <- makeElement(
  "catgry",
  children = list(catValu, labl)
)
```

```xml
<catgry>
    <catValu>SI</catValu>
    <labl xml:lang="en">Slovenia</labl>
</catgry>
```

StatConverter



StatConverter

Encoding: UTF-8

Input type: Select file type

Convert from:

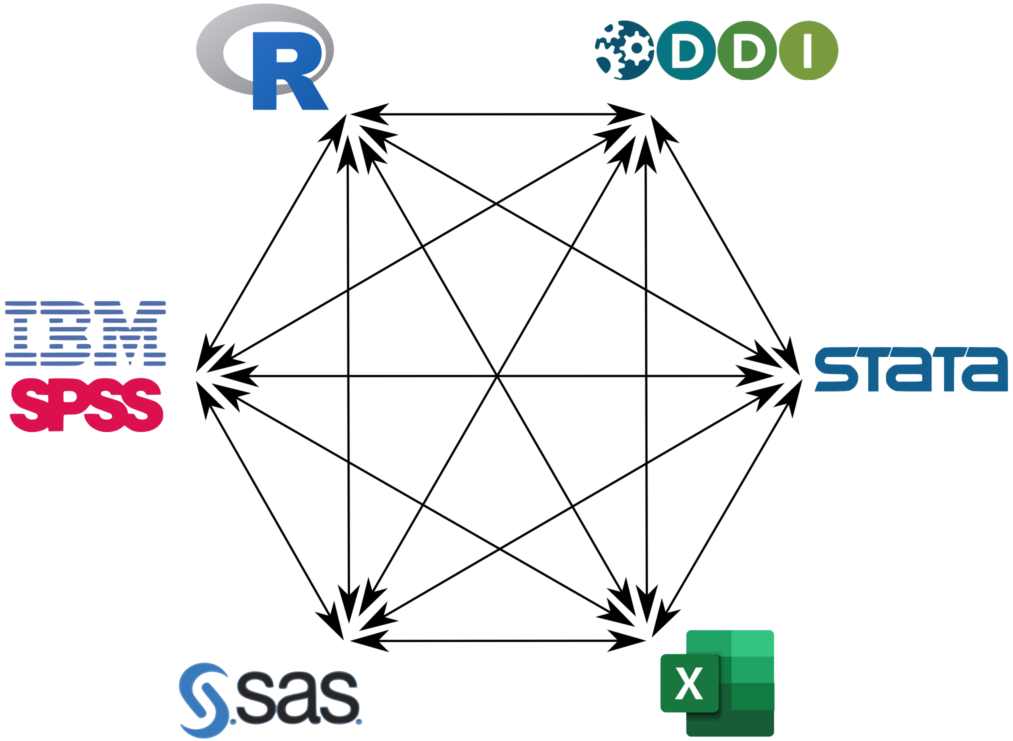
Output type: Select file type

Convert to:

R package DDIwR

- handles DDI Codebook v2.6
- much finer and grained control over the DDI XML output
- robust solution to the problem of categories and missing values in R
- imports and export to and from: SPSS, Stata, SAS, R and Excel
- capable of reading metadata from social science datasets
- translates the metadata into an R list, compatible with DDI's XML structure

Achieves this



Hands on computers...