Data, Metadata

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Basic structure for analysis

The data matrix

	Weight	Height	Sex	Eyes
John	85	1.85	M	azul
	:	:	:	:

Point cloud (video)

Rows: Individuals (study units) (i1….in)

Columns: Variables (characteristics of individuals) (X1..Xk)

Cells: Value of variables for individuals (xik)

Type of variables

- Numerical: Quantitative, measure
  - continuous (real quantity): *Weight, Height*
  - discrete (natural quantity): *Age, shoes size*

Categorization

Discretization

Mean/StDev
Histograms

- Categoric: Qualitative, adjective
  - *(evenctually codified)*
  - Ordinal (ordering over modalities): *Socioecnonomic status*
  - Binary (two modalities): *wear glasses*
  - Nominal (unordered modalitites): *Hair color*

REcategorization

Percentages
Tables
BarPlots

- Date: Special formats, only some softwares
- Other variables

  (no standard, rarely used in standard data mining applications)
  - Fuzzy variables
  - Hierarchical variables
  - Multivalued variables
  - Semantic variables
  - Distributional variables
  - Interval variables/Ratio variables (means, standard dev, dotplots)
  - Textual data

Loss information

Better avoid

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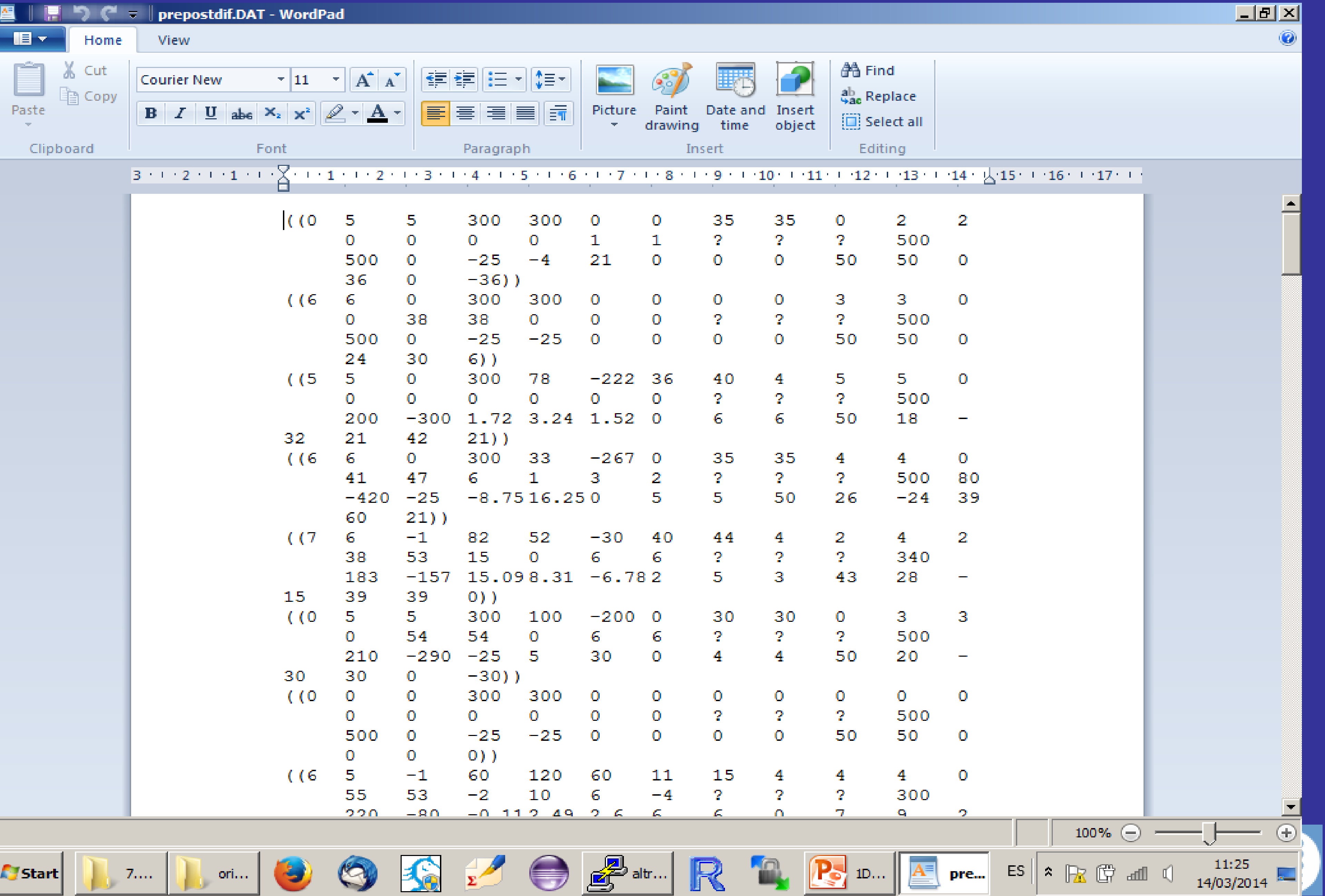
From Data to Decisional Knowledge

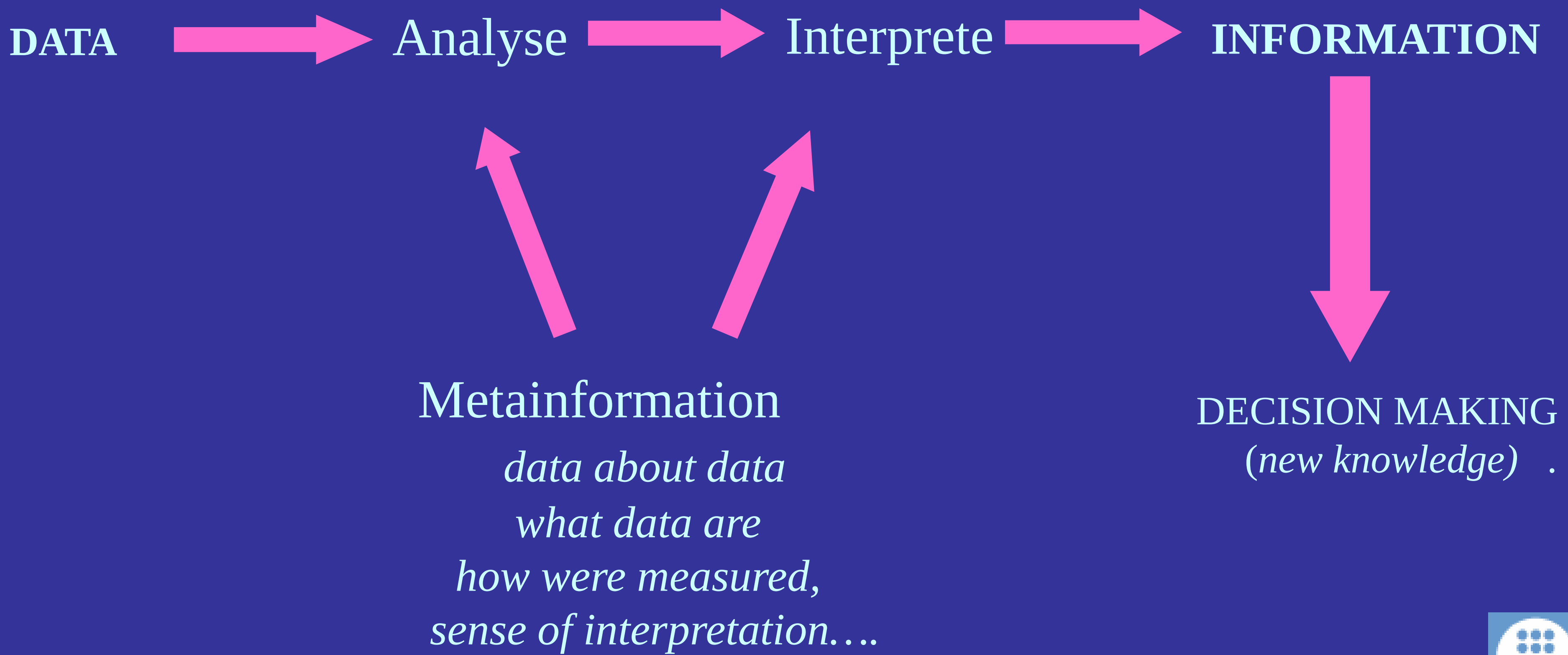
DATA <> INFORMATION



```
((0  5    5    300  300  0    0    35   35   0    2    2
     0    0    0    0    1    1    ?    ?    ?    500
     500  0    -25  -4   21   0    0    0    50   50   0
     36   0    -36))
((6  6    0    300  300  0    0    0    0    3    3    0
     0    38   38   0    0    0    ?    ?    ?    500
     500  0    -25  -25  0    0    0    0    50   50   0
     24   30   6))
((5  5    0    300  78   -222 36   40   4    5    5    0
     0    0    0    0    0    0    ?    ?    ?    500
     200  -300 1.72 3.24 1.52 0    6    6    50   18   -
32   21   42   21))
((6  6    0    300  33   -267 0    35   35   4    4    0
     41   47   6    1    3    2    ?    ?    ?    500  80
     -420 -25  -8.7516.250    5    5    50   26   -24  39
     60   21))
((7  6    -1   82   52   -30  40   44   4    2    4    2
     38   53   15   0    6    6    ?    ?    ?    340
     183  -157 15.098.31 -6.782    5    3    43   28   -
15   39   39   0))
((0  5    5    300  100  -200 0    30   30   0    3    3
     0    54   54   0    6    6    ?    ?    ?    500
     210  -290 -25  5    30   0    4    4    50   20   -
30   30   0    -30))
((0  0    0    300  300  0    0    0    0    0    0    0
     0    0    0    0    0    0    ?    ?    ?    500
     500  0    -25  -25  0    0    0    0    50   50   0
     0    0    0))
((6  5    -1   60   120  60   11   15   4    4    4    0
     55   53   -2   10   6    -4   ?    ?    ?    300
     220  -80  -0.112.49 2.6  6    6    0    7    9    2
```

From Data to Decisional Knowledge

DATA <> INFORMATION



DATA Analyse Interprete **INFORMATION**

DECISION MAKING
(new knowledge) .

Metainformation

data about data
what data are
how were measured,
sense of interpretation….

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Metadata

- Data Origin: Secondary source/Primary
- Inclusion criteria: Representativity? Target?
- Size of data: nxK (n>10K?)
- All variables:
    - What is it measuring (Measuring tool or procedure)
    - Measuring unit
    - Representation of missing data
    - Meaning of variable
- Quantitative variables:
    - Range of possible values
- Qualitative variables:
    - Set of possible modalities
    - Representation of modalities
    - Meaning of modalities
- Role of variables: Response/Explanatory

- Software often do not support metadata:
    - Extra document individualy managed as project documentation
    - Relational Data Base for very complex Data Matrices *[Gibert, MMR 92]*

Metadata File

url: *www.xxx.ssss.www*

Inclusion criteria: *People in [18,65] years, no hard attacks, no smoking, no cholesterol, married, with sons or daughters….*

n: *nro of rows*

K: *nro of columns*

Variable	Modalities	meaning	Type	Measuring unit	Missing code	Measuring procedure	Range	Role
Age		Age of marriage	Num	years	“*”		[1,105]	Explanatory
Sex		Gender	Quali		Unknown			Explanatory
	M	Male						
	H	Female						
FeC		Level of Iron in blood	Num	µg/dl	NA	Biochemical analysis on blood sample measuring transferrine ……	[30, 200]	Explanatoyr
Anemy		The person has anemy diagnosis	Boolean		Unknown	Levels of Fec<xxx and …….		Response

First insight to Data

- Look at Metadata
- Determine rows and columns to be kept for the analysis
- Basic descriptive analysis of remanining variables
  - Inspect anomalies, errors, missing data, outliers
- First report about data quality
- Preprocessing
- Verify after each processing step