Inspire…Educate…Transform.

Introduction to Data processing in R and Python

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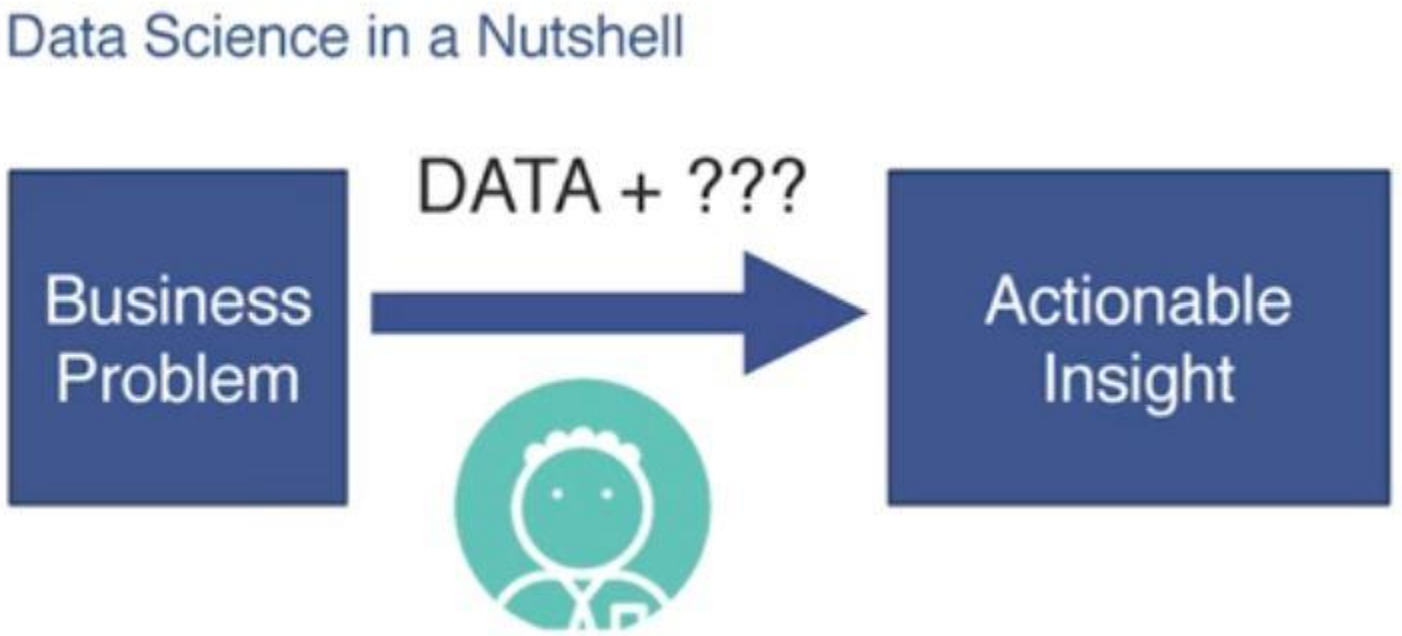
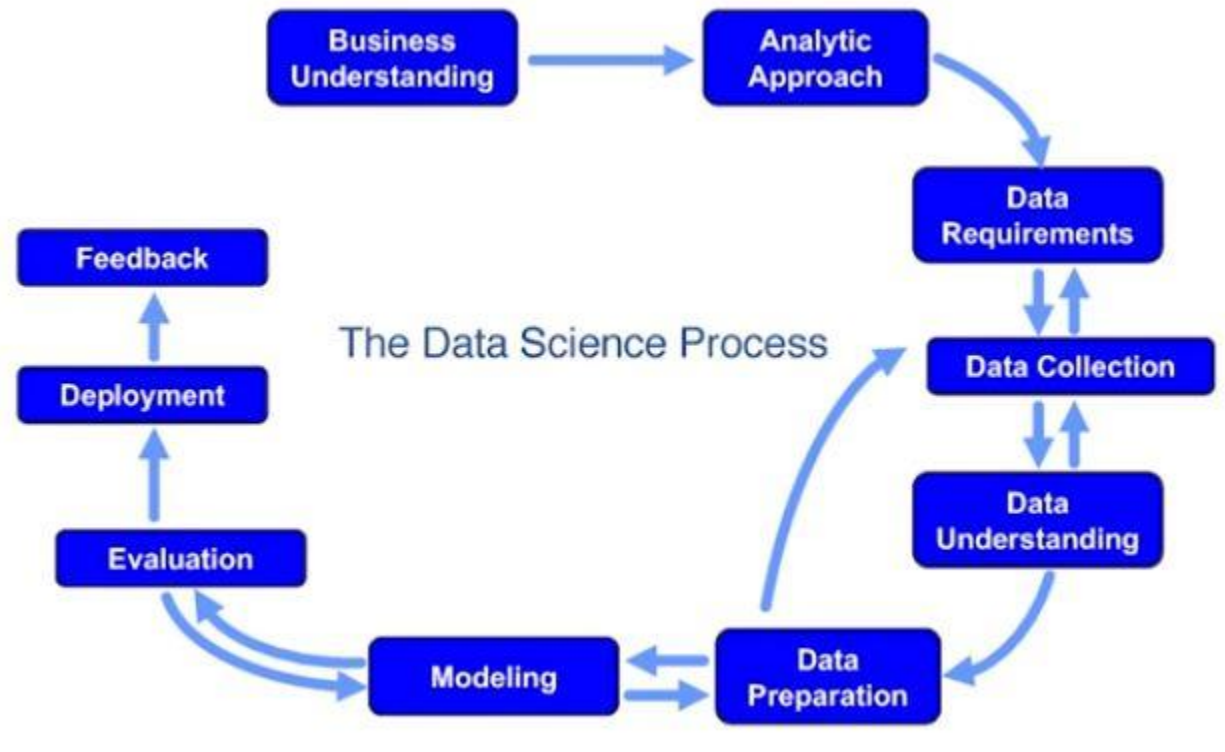
We will learn

- What is Data science & pre-processing
- Data science Process
- Skills required and mapping the skills
- Key steps in the Data processing

What is Data Science



The Data Science Process



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The Data Science Skills

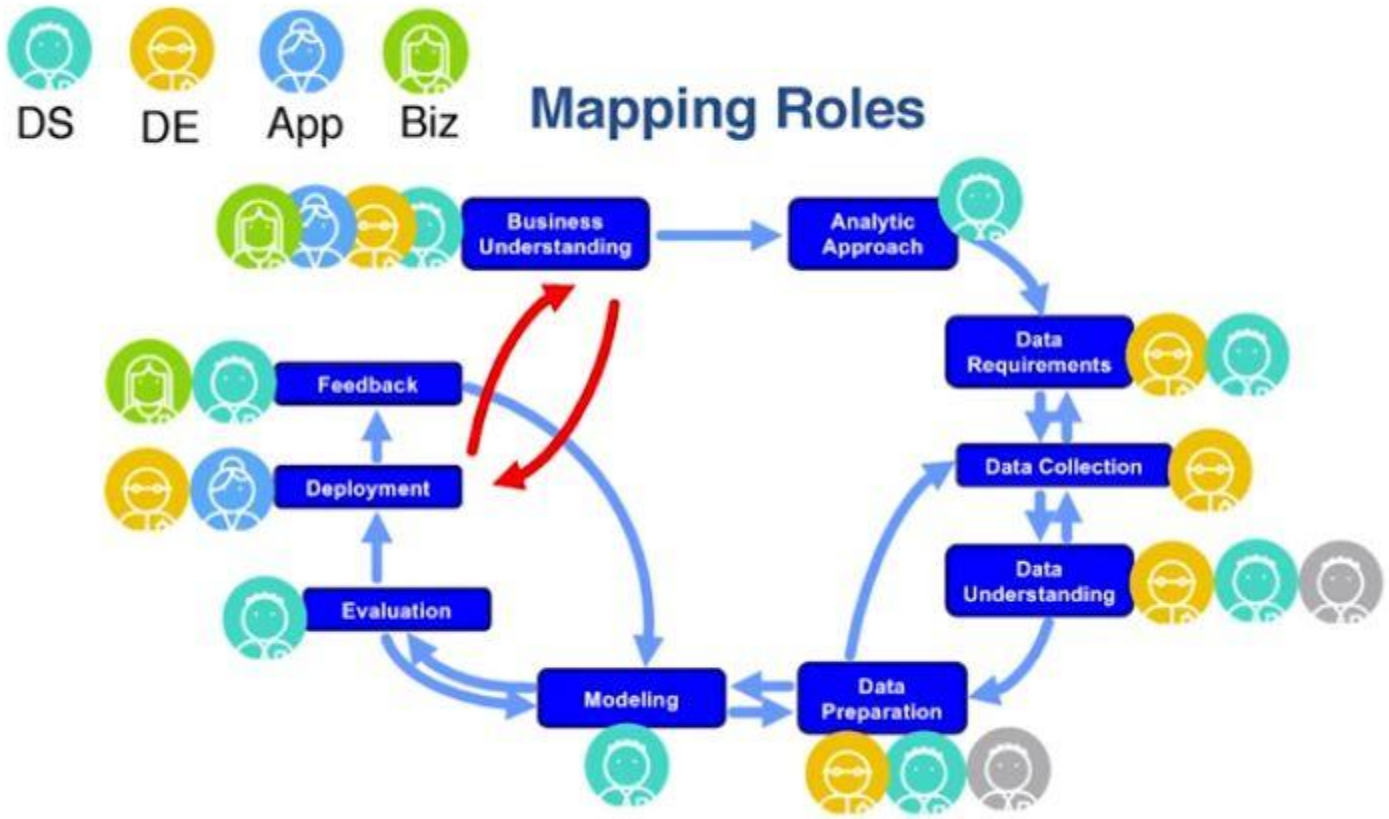
The "Perfect" Hire

Can't hire one person for each role?

- Subject matter expertise & industry experience
- Caught up with the latest tools & technologies
- Experience with big data & big data infrastructure
- Experience with machine learning and building pipelines
- Experience with app development
- Also happy to do simple ad-hoc reports

The Data Science Skill Map

The Data Science Skill Map



Why pre-process

- Poor model on good data is likely to be better than great model on poor data

Raw data

- Normally it is available in multiple tables
  - Merge them
  - Fill missing values

More on attributes

- Type
  - Numeric, Categorical and Ordinal
- Actionable
  - Focus, changeable

Process

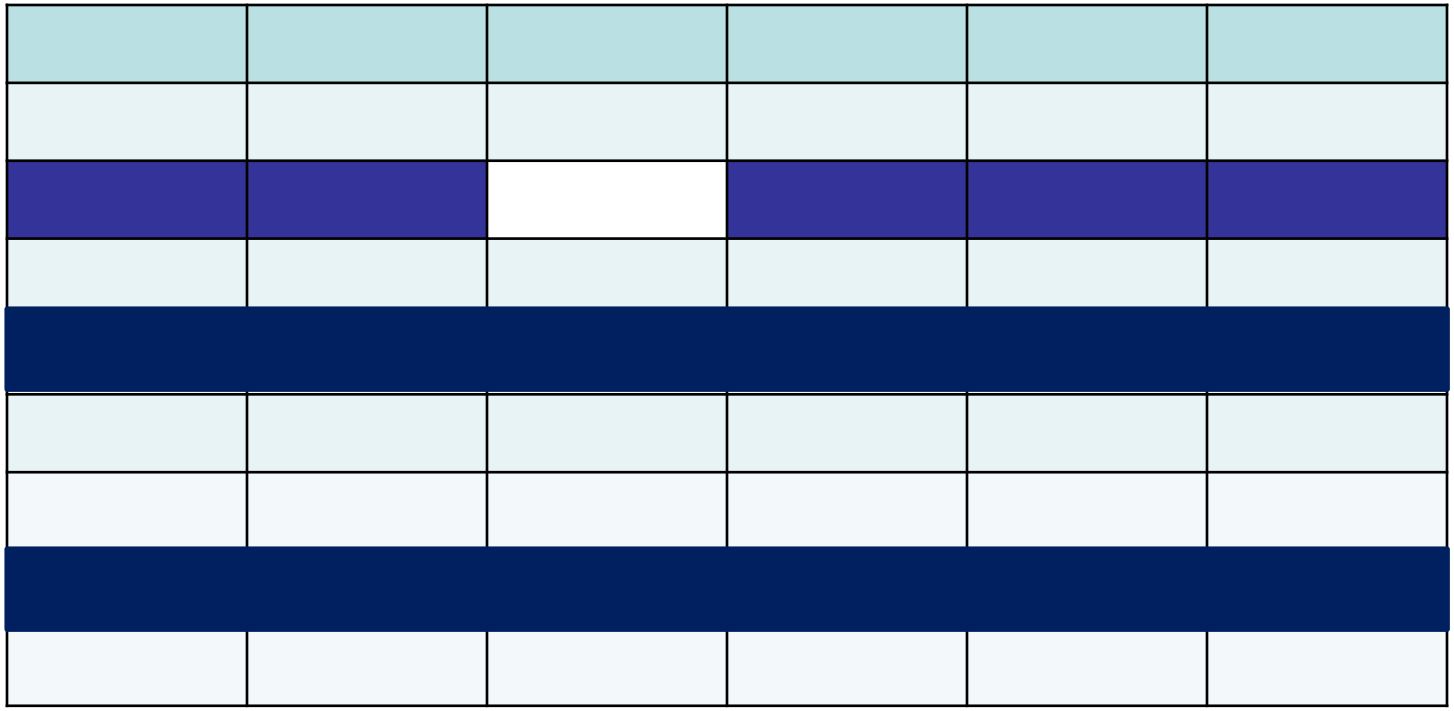
- Take a subset from a table if needed
- Typeset the attributes correctly
- Do descriptive statistics and understand the data

Missing values

- Ignore
- Fill with a central statistic

KNN Imputation

- Find nearest neighbors based on existing attributes



Euclidian for numeric and 1 or zero for categorical

- Take an average of only the nearest neighbors
  - Mean for numeric
  - Mode for categorical

Data standardization

- Let us say, we are measuring distance between records for some purpose

Employee	Age	Income
1	24	50000
2	25	55000
3	60	51000

This dominates completely

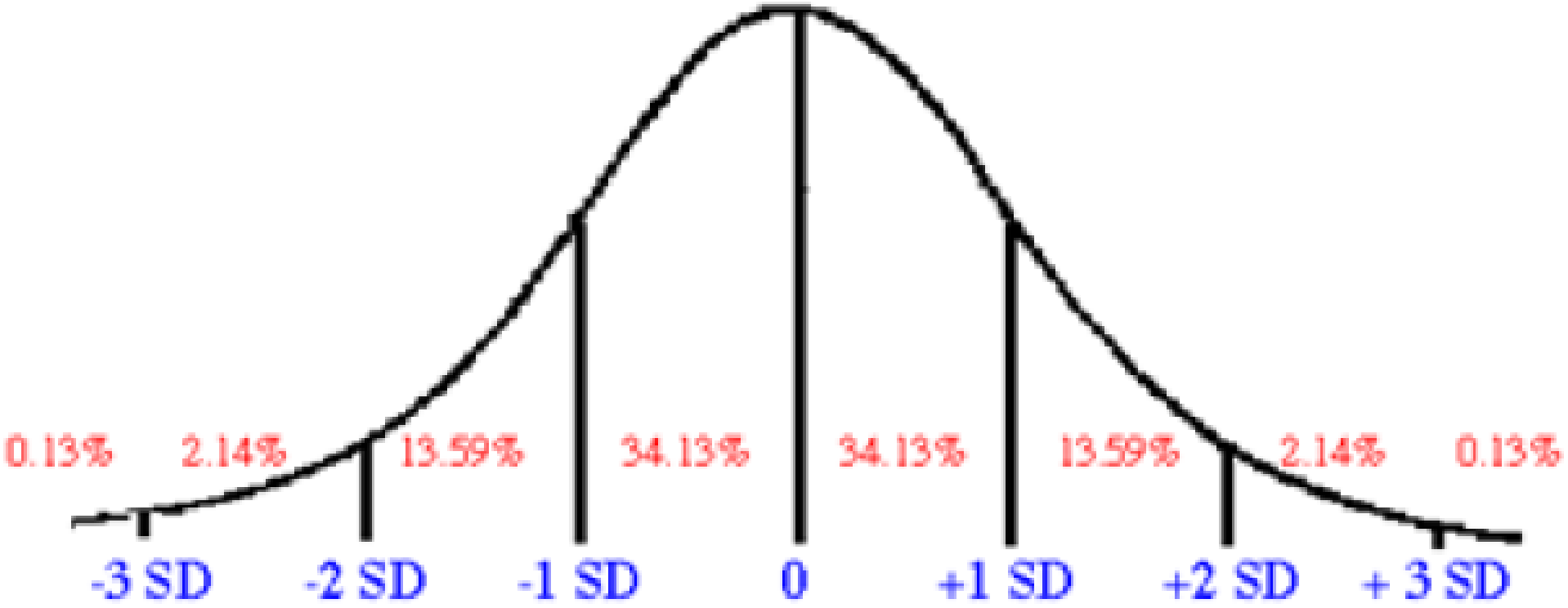
Bring to same range

$$Value_{new} = \frac{Value - minValue}{maxValue - minValue}$$ Range is 0 to 1

$$Min\ \max\ for\ 25: \frac{25 - 24}{60 - 24}$$

- Min-Max is extremely sensitive to the outliers.

- Min-max of : (1, 2, 1001) is (0, 0.001, 1)


0.13%
2.14%
13.59%
34.13%
34.13%
13.59%
2.14%
0.13%
-3 SD
-2 SD
-1 SD
0
+1 SD
+2 SD
+ 3 SD

$$newValue = \frac{Value - mean}{standard\ deviation}$$

Changing the type

- Neural networks
  - All attributes must be numeric
- Naive Bayes
  - All attributes must be categorical

Numeric to categorical

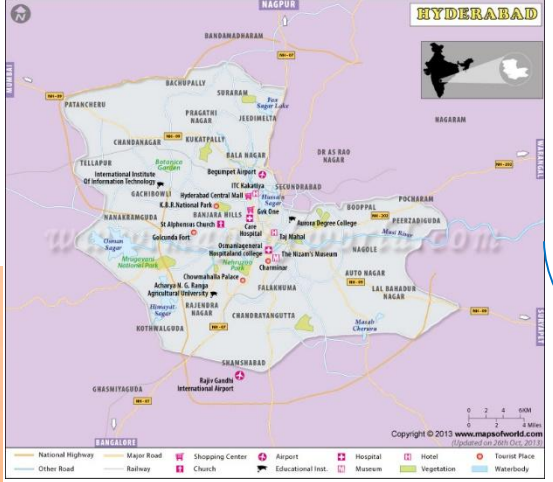
- Manual
- Equal frequency
  - Number of samples in each bin
- Equal width
  - Interval is same (good for uniform distributions)

Ordered and categorical

- Merging multiple bins
  - Verify the frequencies
  - Convert them to numeric and recode

Categorical to numeric

- How do we set up categorical variables in distance metrics
  - Create as many dummy variables as there are options
  - Code as 100, 010,…



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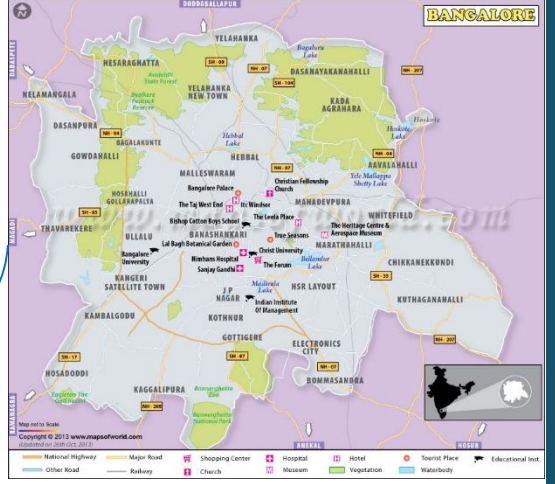

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