INNOTECH
INNOVATION | TECHNOLOGY | EVENTS

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Data Cleansing Strategies for Your BigDataOps Team

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Agenda

- How Clean is Your Data? – Raghu George
- Data Cleansing Strategies – Dr. Chuck Wiley
- Demo – Dr. Yuriy Pakhotin
- Q&A

How Clean is Your Data?

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Need Clean Data not Just Data

Mr. C: Really? You do not need data?

Mr. DS: Yes, I do not need data.

Mr. C : **Aren't you working on building an AI Model?**

Mr. DS: Yes, I do not need data. I need features.

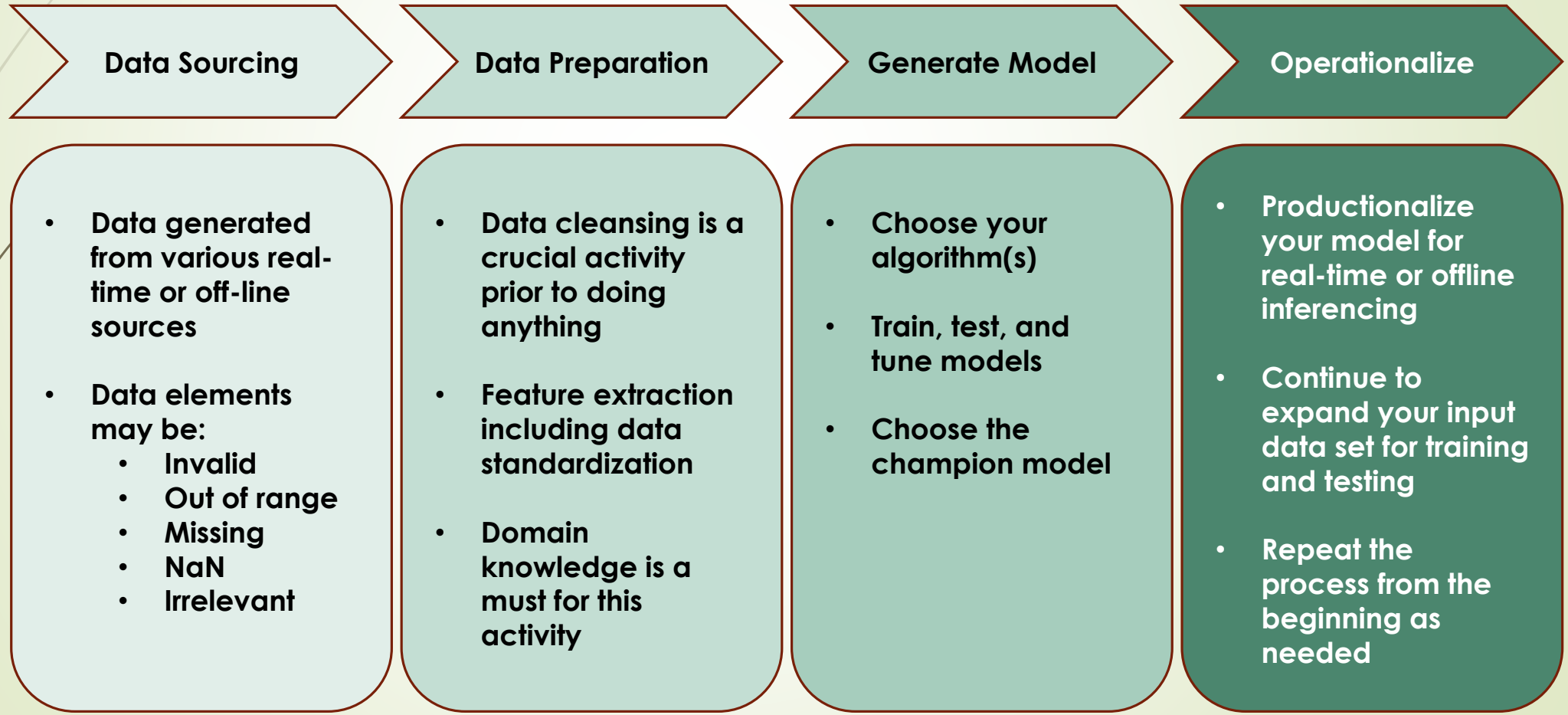
Mr. C : **Well, how you do get features without data?**

Mr. DS: I do not need just data. I need clean data so I can extract the features for a good AI model.

Mr. C : **OK!**

Image source: https://www.clipartwiki.com/iclipmax/ihhJmx/

Data to Model to Operations



Overloaded Definition of Data Cleansing

Data cleansing or **data cleaning**

- is the process of detecting and *correcting* (or *removing*) corrupt or inaccurate records from a record set, table, or database

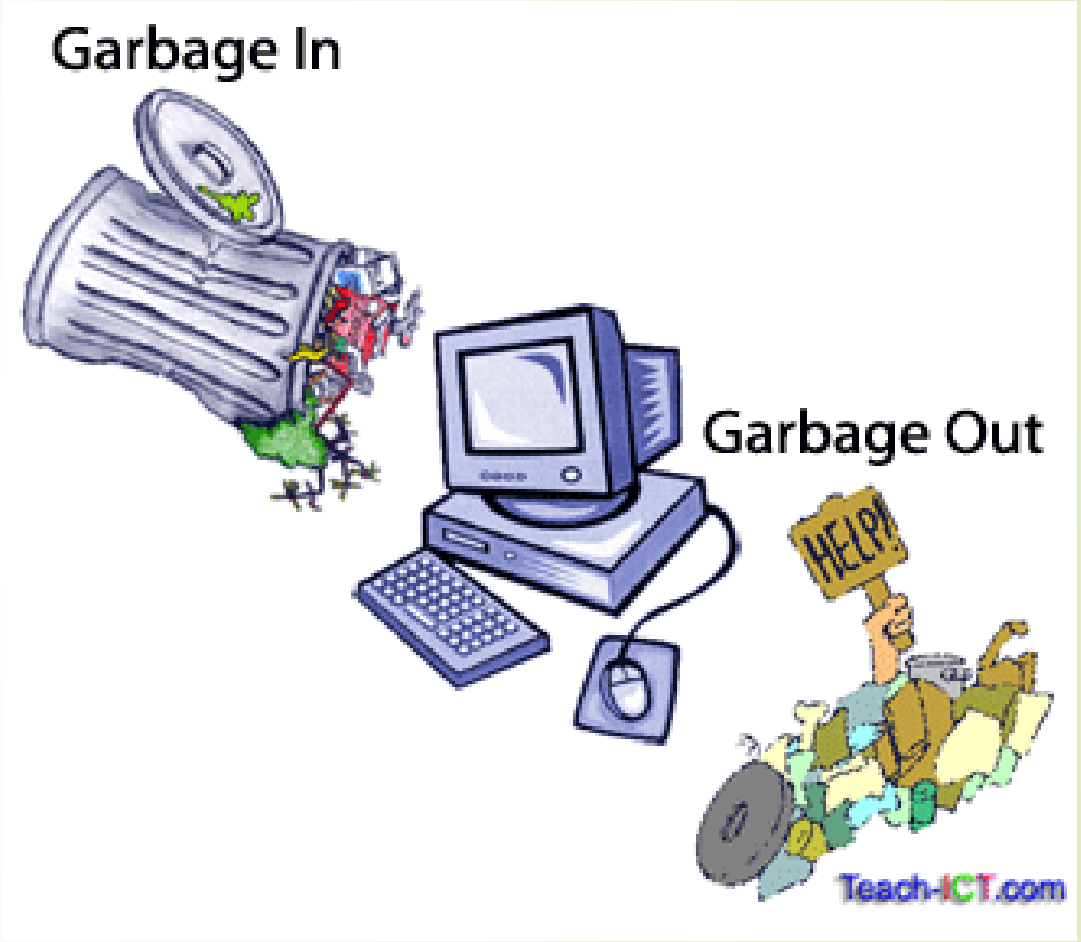
and

- refers to identifying *incomplete*, *incorrect*, *inaccurate* or *irrelevant* parts of the data and then *replacing*, *modifying*, or *deleting* the dirty or coarse data.

Quoted from: https://en.wikipedia.org/wiki/Data_cleansing

Impact of Poor Quality Data to Your AI Model

- When it comes to Machine Learning, poor quality data is enemy number one.[1]
- Poor quality leads to "Garbage In Garbage Out" scenario. [1]
- Poor quality can be in the historical data used in training the predictive model and in the new data used for future decisions. [1]
- To fully exploit AI and its promises of truthful and correct predictions and advice, you need data with the right quality. [2]



References:
1.https://hbr.org/2018/04/if-your-data-is-bad-your-machine-learning-tools-are-useless
2.https://www.capgemini.com/2017/10/quality-data-a-must-have-for-ai/#

Data Cleansing Strategies

Dr. Chuck Wiley
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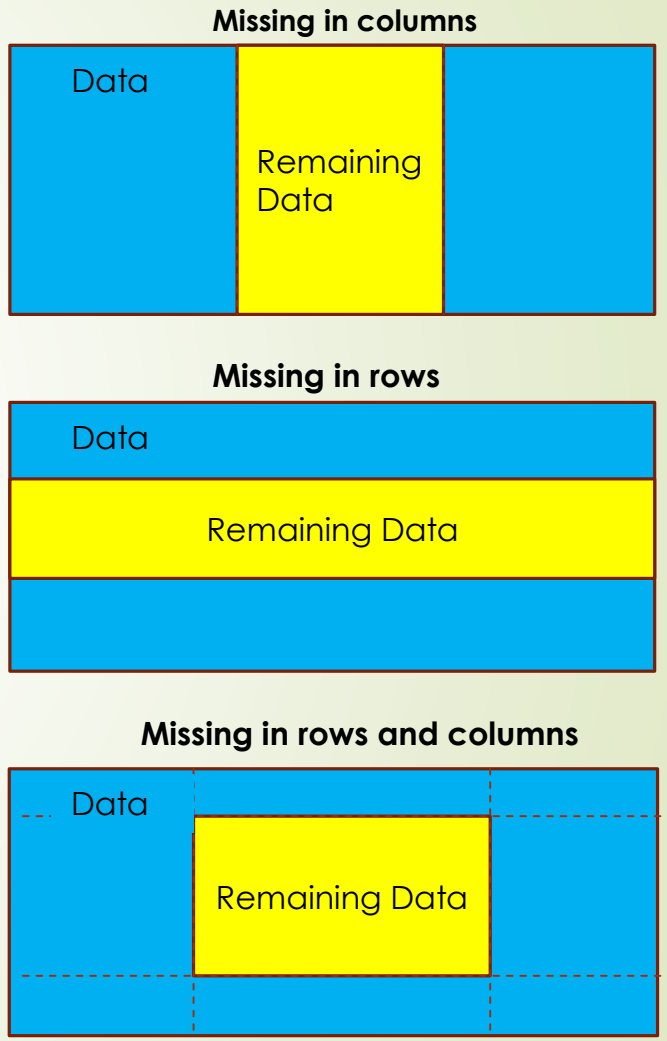
Data cleansing Strategies

- Better data will beat fancier algorithms (Garbage in Garbage out)
- Fix structural errors
  - e.g. Typos, Inconsistent capitalization
- Remove unwanted values
  - e.g. Duplicates, Irrelevant observations
- Filter outliers
- Most AI algorithms do not allow missing values
- Handle incomplete/missing data
  - Do nothing
  - Remove rows and columns with missing values
  - Impute or fill in values

Image source: https://www.slideshare.net/databricks/the-key-to-machine-learning-is-prepping-the-right-data-with-jean-georges-perrin

Handling Incomplete Data

- Methods to handle missing data
  - Do nothing
  - Remove rows and columns with missing values
  - Impute or fill in values
- Removing data can result in significant reduction of your data set

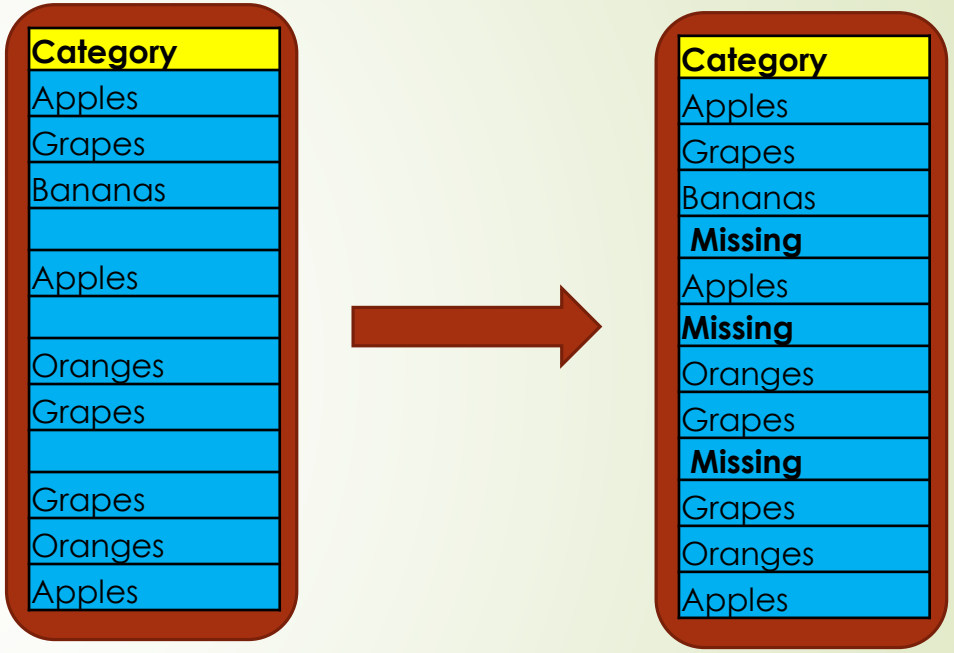


Impute Missing Values

- Many methods for filling missing values
  - Fill with an arbitrary value
  - Fill with the most frequent value (works with category and numeric features)
  - Fill with mean or average
  - K nearest neighbors – rows most similar
- "Missingness" itself is information
- No matter how complex your method of imputing missing entries, you are not adding information

Can you tell your algorithm data is missing?

- "Missingness" itself is information
- Category/enumeration feature: Just add an additional category such as "Missing"



Can you tell your algorithm data is missing?

- Numeric feature: flag and fill
  - Add an additional column with presence/absence of data
    - Doesn't have to be a Boolean indicator (Present, Missing, Suspected Outlier)
  - Fill with a constant (0) to meet requirement of having a value
- Allow your algorithm to determine the best constant for missing

number
1
3.1415
Nan
2.71
2
Inf
-Inf
6
45
1

fill

number
1
3.1415
0
2.71
0
2
0
0
6
45
1

boolean

category
TRUE
TRUE
FALSE
TRUE
FALSE
TRUE
FALSE
FALSE
TRUE
TRUE
TRUE

category
valid
valid
not a num
valid
missing
valid
infinity
-infinity
valid
valid
valid

category
valid
Valid
missing
valid
missing
valid
missing
missing
valid
valid
valid

annual income	reason missing?
10000	??
120000	valid
55000	valid
0	missing
0	missing
115000	valid
36000	valid
0	missing
110000	valid

Demo

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https://github.com/pakhotin/Data-Cleansing-Innotech

Q & A