# Manipulation de données avec Python
## La librairie PANDAS

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# SOMMAIRE

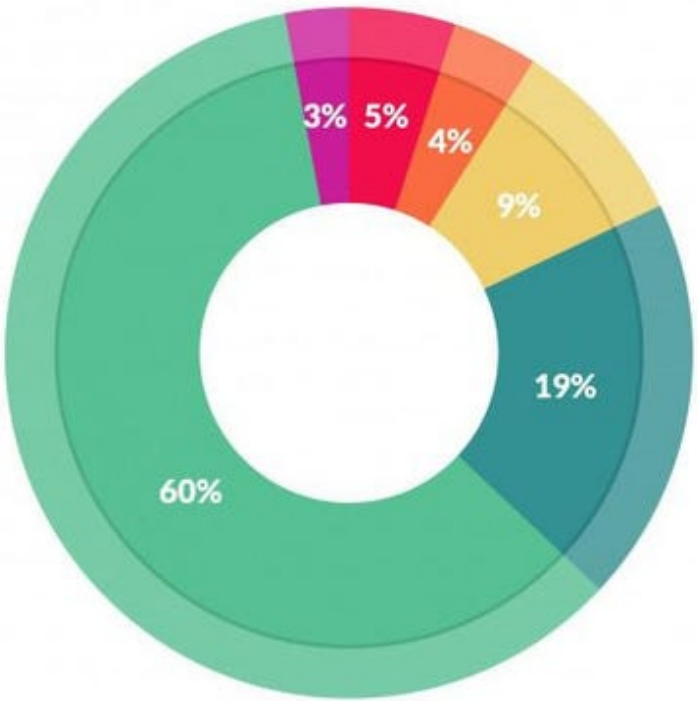
# Contexte

## À propos de ce module

- Cours : Introduction à la science de données
  - **Module 1 :** Langages et Outils de programmations appliqués à la Science de Données -> Zakaria KINDA
  - **Module 2 :** Manipulation de données -> Rodrique KAFANDO

# Contexte

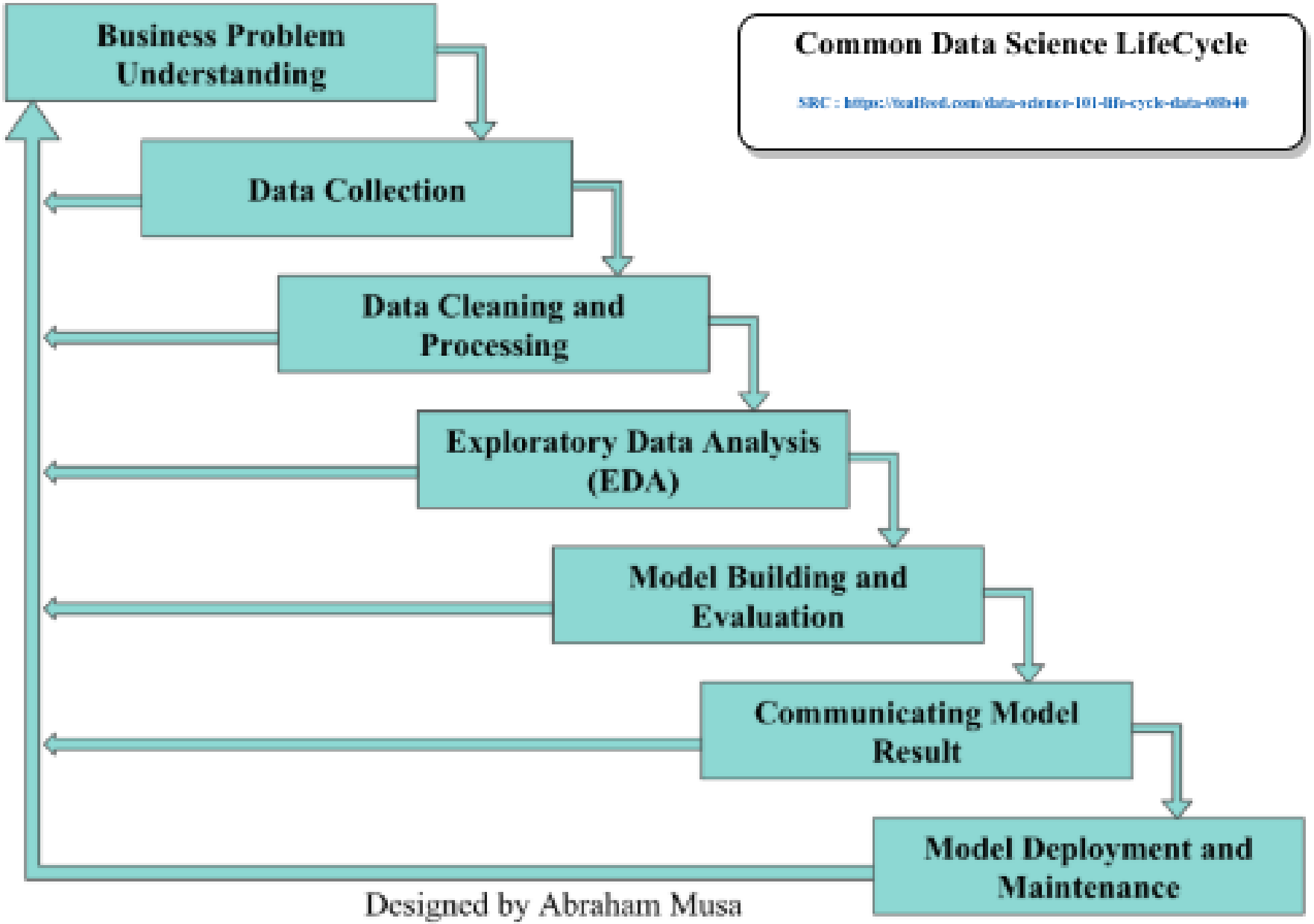
## Bon à savoir! D'après Forbes



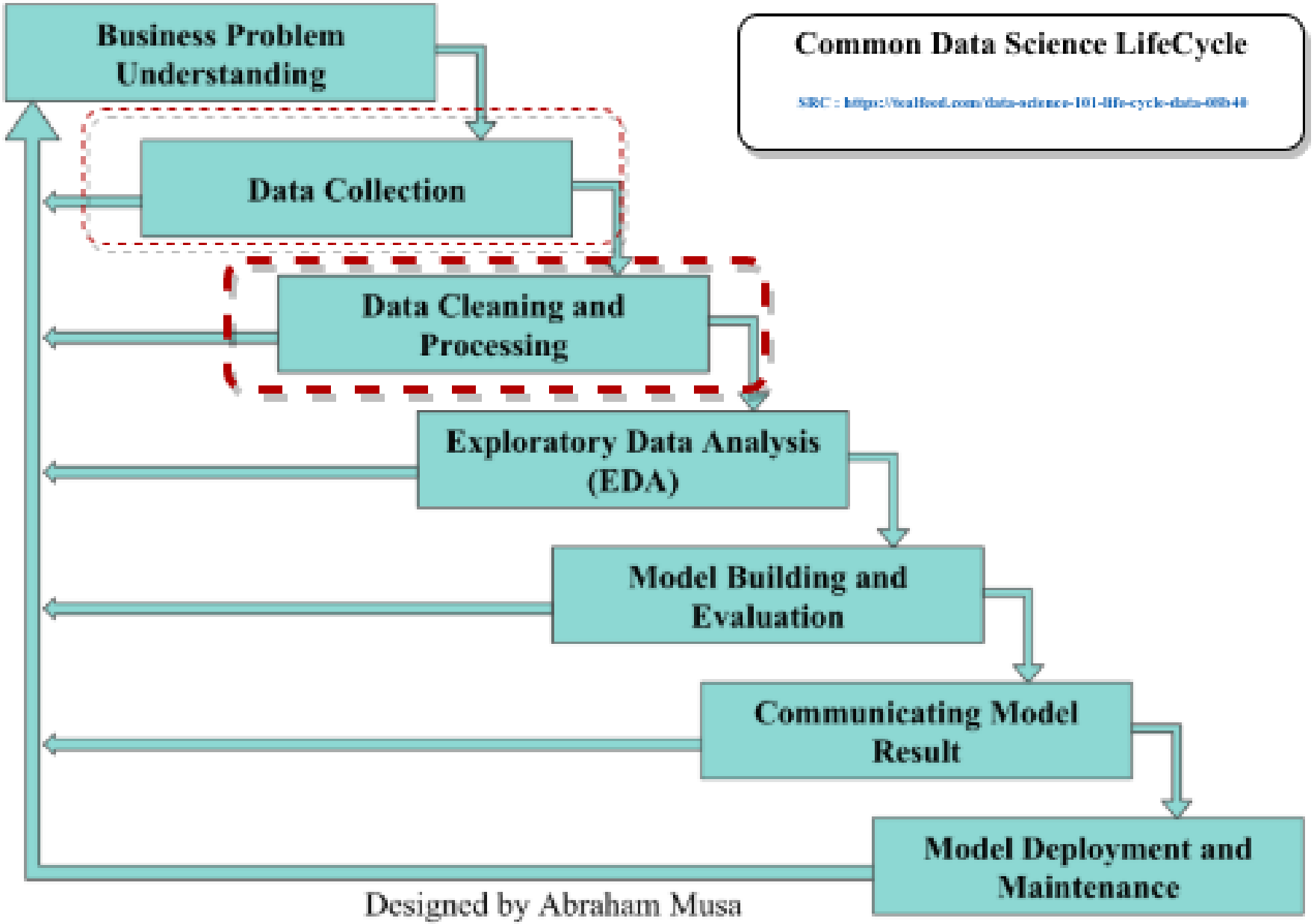

**What data scientists spend the most time doing**

- *Building training sets: 3%*
- *Cleaning and organizing data: 60%*
- *Collecting data sets; 19%*
- *Mining data for patterns: 9%*
- *Refining algorithms: 4%*
- *Other: 5%*

# Contexte 3


Common Data Science LifeCycle
SRC : https://kualfood.com/data-science-101-life-cycle-data-08b48
Business Problem Understanding
Data Collection
Data Cleaning and Processing
Exploratory Data Analysis (EDA)
Model Building and Evaluation
Communicating Model Result
Model Deployment and Maintenance
Designed by Abraham Musa

# Contexte


Common Data Science LifeCycle
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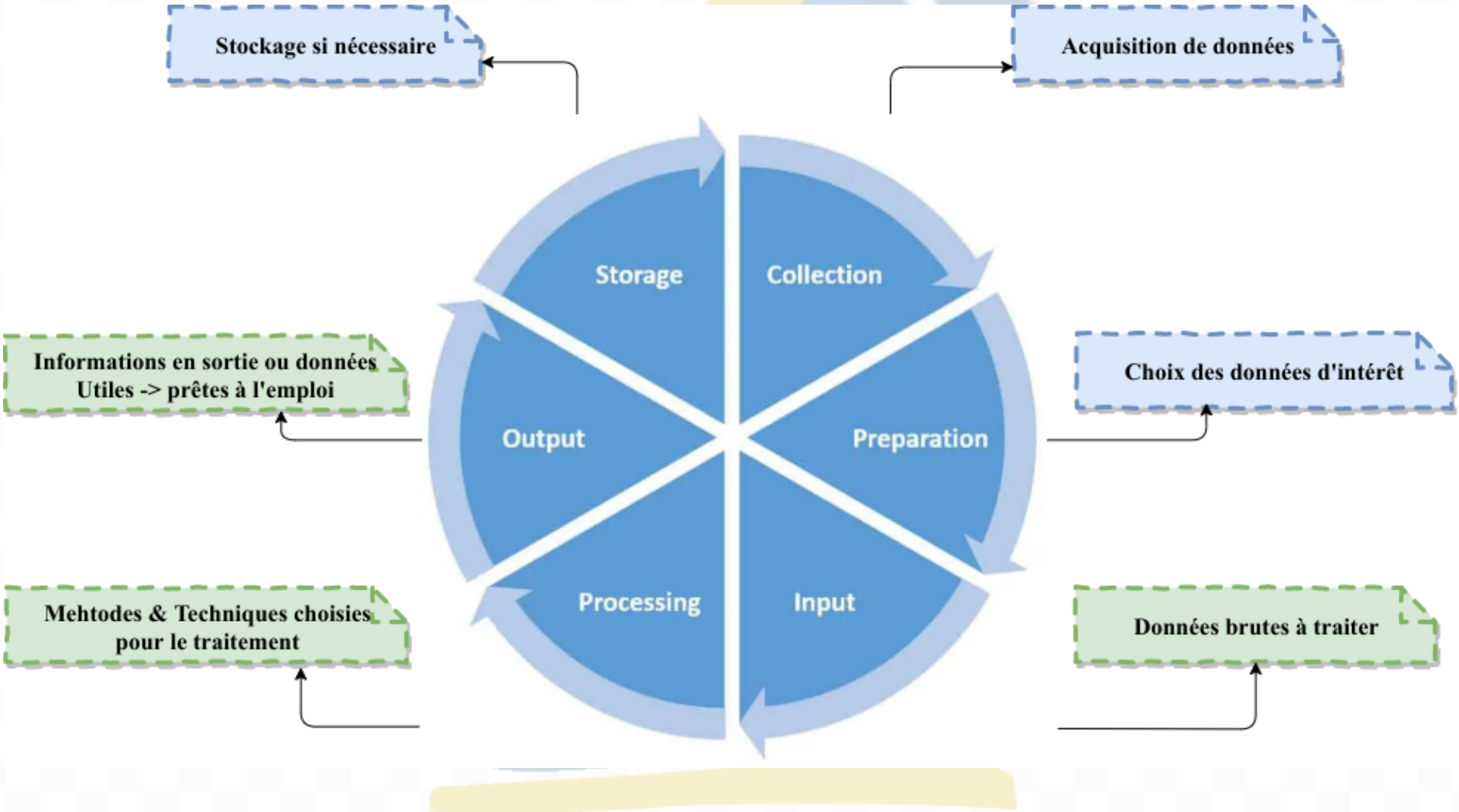
# Définitions

- Data Processing Cycle : Ensemble de séquences ou le processus utilisé pour traiter les **données brutes** et les transformer en une forme **lisible/utilisable**.
- Les principaux étapes :
  - **Input :** constitue l'ensemble des données brutes obtenues après la phase de collecte
  - **Processing :** constitue l'ensemble des méthodes/techniques utilisées pour traiter les données. C'est l'une des importantes étape
  - **Output :** c'est la sortie produite par l'étape de traitement. Cette étape donne déjà des informations, qui seront utilisées pour les études spécifiques à venir dans le projet

# Définitions

- Data Processing Cycle



# Objectifs

## Objectifs & Pré-requis

- Objectif Général
  - À la fin de ce cours, vous serez capable de manipuler et de traiter correctement des données avec la librairie Pandas sous Python
- Pré-requis
  - connaissances basiques sur le tableurs connaissances basiques en python

Confère Scénario Pédagogique pour plus de détails

**NB** : Nous allons aussi introduire la notion de gestion de versions sur Github

# Séances

## Environnement de travail

- Installer Anaconda selon votre OS (recommandé)
- Installer Jupyter-Notebook
- Installer Pandas

### Introduction sur Jupyter-Notebook

- Cellules
- commentaires
- Raccourcis
- Librairies

# Séances



## Une petite révision sur Python

- Variables, Data types,
- Build In & Custom Functions
- String, Index Position & Slicing
- List, Dictionaries
- Etc.

# Séances

## Pandas Series

- Series Object from List and Dictionary
- Attributs & Methods on Series
- Series Object Parameters & Arguments
- Create Series from Dataset with pd.read_csv() method
- Head() & tail() Methods
- Sort_values(), Sort_index(), inplace parameter
- Extract Series Values by Index Label and Position
- The get() Method
- Math Methods on Series
- Find Greatest or Smallest values with idxmax or idxmin Mehthods
- Apply() and Map() Methods
- Final Test

# Séances

## DataFrames I : Introduction

- Intro to DataFrames
- Shared Methods and Attributes between Series & DataFrames
- Difference between shared Methods
- Select a given column from a DF
- Add new column to a DF
- Broadcasting Operations on DF
- Value_counts() Method
- Dropna() Method for rows with null values
- Fill in Null values with fillna()
- Use astype() to convert DF column type
- Sort_values() Methods to sort DF columns

# Séances

## DataFrames I : Introduction

- Sort_index() for DF index
- Rank method on Series values
- Final Test

# Séances

## DataFrames II : Filtering Data

- Memory optimization
- Filter a DF based on a Condition & more than one Condition (AND->, OR->|)
- The isin() Method for inclusion
- Isnull() & Notnull() Methods -> check Null
- Inclusion within a range -> Between() Method
- Check for duplacted rows in DF with duplicated() method
- Delete duplicated rows with drop_duplicated() Method

# Séances

## DataFrames III : Data Extraction

- Import Dataset with pd.read_csv() method
- Define new DF index -> set_index() and reset_index() methods
- Retrieve DF rows with loc() and iloc() accessors
- Second argument for loc() and iloc()
- Set new value for a specific cell/cells in Rows
- Set multiples values in DF
- Rename Index Labels or Columns in a DF
- Delete Rows or Columns in a DF
- Use sample() method to create a sample of Data
- nsmallest/nlargest -> get rows whith smallest/largest values
- Filetr a DF with where() and query() methods

# Séances

## DataFrames III : Data Extraction

- A review on Apply() Method on Series
- Apply method on every row of DF
- Create copy of a DF with copy() method

# Séances

## Données Textuelles

- Introduction
- Common methods for String -> lower(), upper(), len(), title()
- The str.replace() to replace all occurrences of a given character with another
- Filter a DF Rows with String Methods
- More String Methods -> strip(), lstrip(), rstrip()
- Usgae of String Methods on DF columns or Index
- Split Strings by Caracter with str.split() Method
- Split() method on Series
- The expand and n Parameters on str.split() Method

# Séances

## Multi_Index

- Intro to Multi_index
- Create Multi_index on a DF with set_index() Method
- Extract index levels values with get_level_values() method
- Change Index Level name with set_names() method
- Sort_index() method for multi_index DF
- Extract rows from MultiIndex DF
- Transpose method on DF
- The .swaplevel() method -> change multi-index level
- The .stack() & .unstack() methods
- Pivot() Method
- Pivot_table() & pd.melt() Methods on DF

# Séances

## GroupBy Object

- Intro to GroupBy Object
- Use get_group() -> retrieve a group from a Gropby Object
- Methods on GroupBy Objects and DF
- GroupBy Multiple Columns
- THe .agg() Method on GroupBy Object
- Itterating through a Groups of a GroupBy Object

# Séances

## Merging|Concatenating|Joining sur DF

- The pd.concat() Method on DFs
- The inner/outer joins
- Left joins
- The left_on & right_on Parameters
- Left_index/right_index -> merging by Indexes
- .Join() and pd.merge() Methods

# Séances

## Dates & Times

- Dates and Times Module
- Python DateTimes module - intro
- Pandas Timestamp and DateTimeIndex Object
- Pandas to_datetime Method
- .date_range() Method -> create a range of date
- Accessor for date -> .dt
- Usage of pandas-datareader library -> à installer
- Attributs & Methods for Timestamp Object
- The pd.DateOffset Object of pandas
- Offsets for Timeseries
- TimeDelta Object

## Input & Output avec Pandas

- Pass a URL to pd.read_csv() Method
- Quick Object convertion -> tolist & to_dict
- Export CSV file with to_csv() Method
- Thhe xlrd and openpyxl libraries -> for Excel files
- Read and export Excel file -> read_excel() and to_excel() Methods

# Séances

## Visualisation

- Intro to Visualization
- Plot() Method to render line chart
- Matplotlib template
- Bar Graphs to show Counts
- Pie chart to show Distributions/Proportions

# Séances

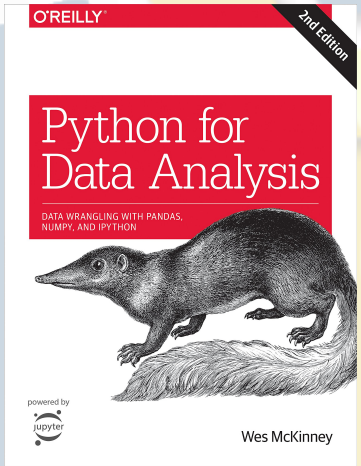


## Fichiers

- Read for specific extension
- Loop in a repertory
- Loop within more than one repertory
- Get Path, filename

# Ressources Utilisées

- Python for Data Analysis




- Online :pandas.pydata.org

# MERCI POUR VOTRE ATTENTION!