HR Analytics
Session 1

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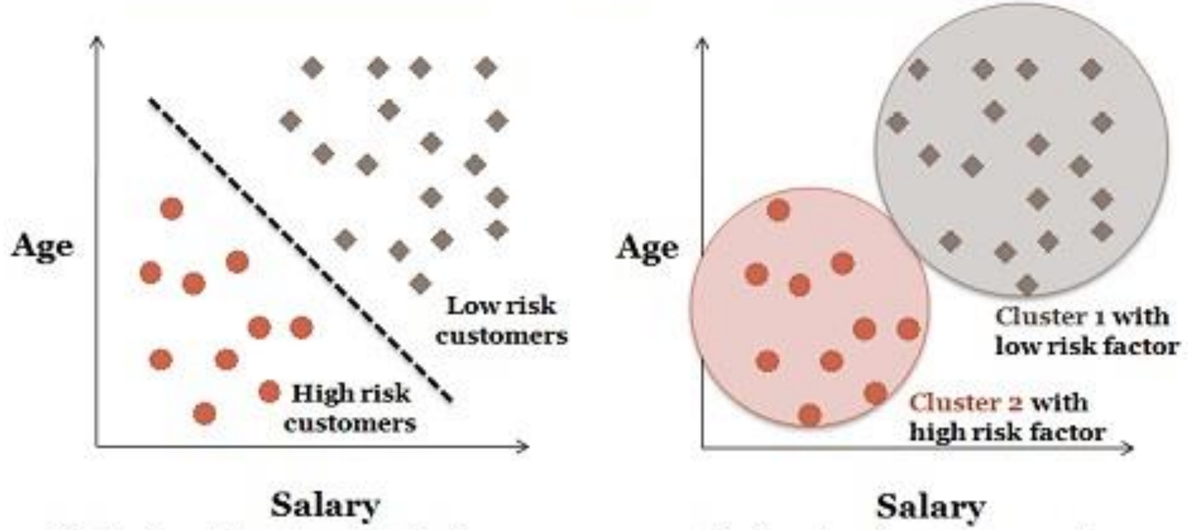
Data Driven Decision Making

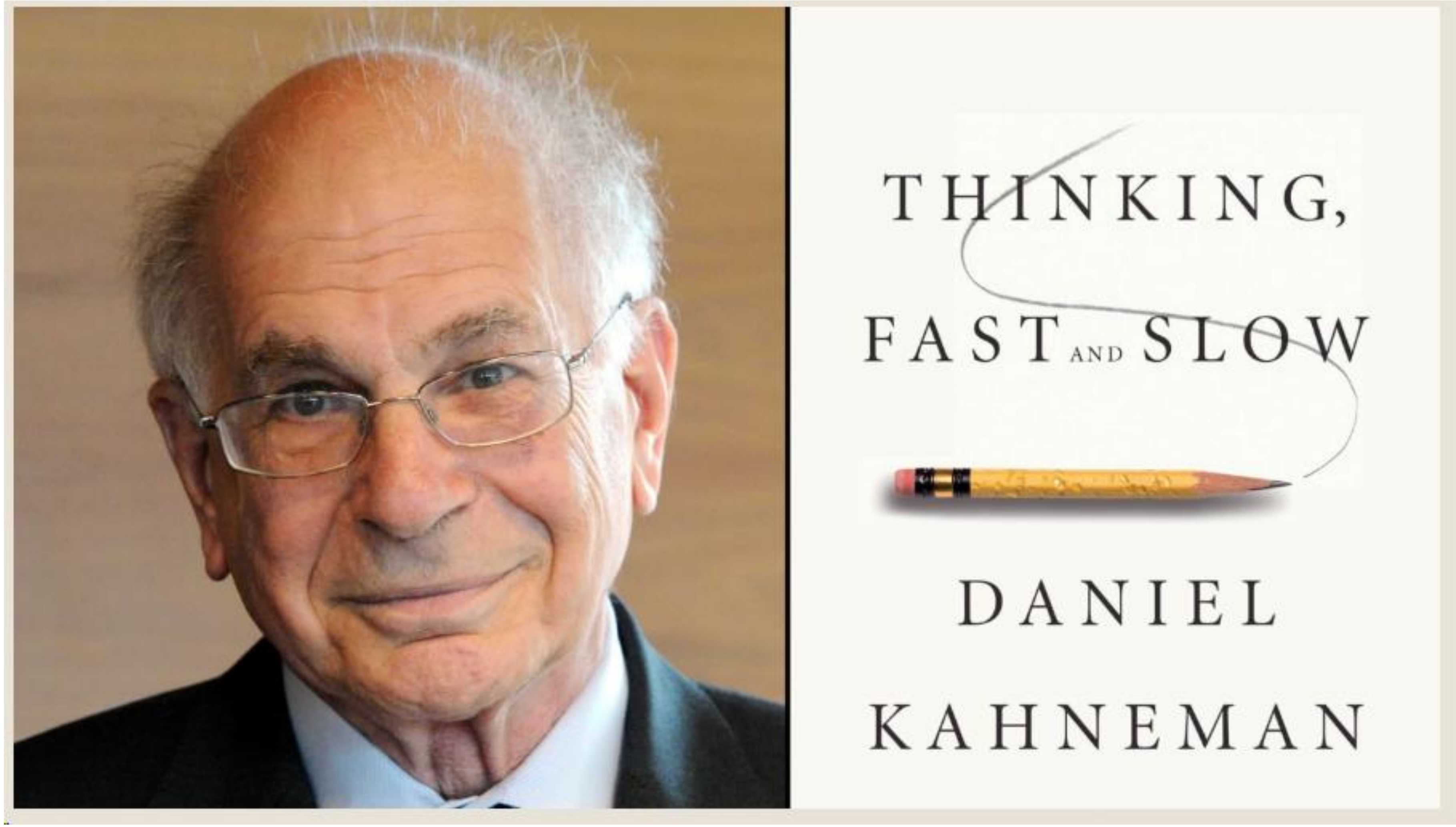
The Study of Dots

Class No : 1



Risk classification for the loan payees on the basis of customer salary

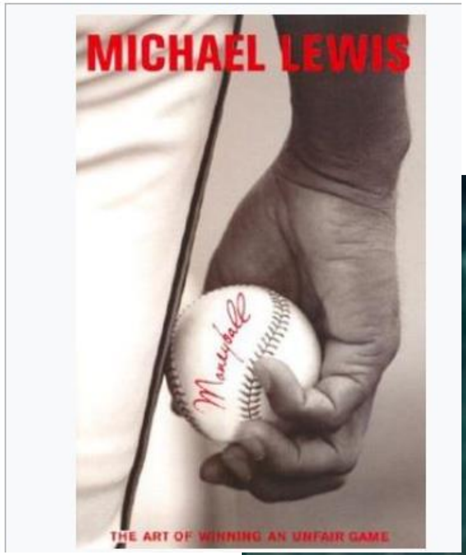
The 2 Approaches



Heuristics = Mental Shortcuts to Avoid

- Recency Effect
- Similarity Effect
- Anchoring Effect
- Confirmation Bias
- Loss Aversion
- Good Enough
- Known Devil is better Effect
- Rare and Scarcity Effect
- Superior Brand Effect
- Feel Good and Bad Effect

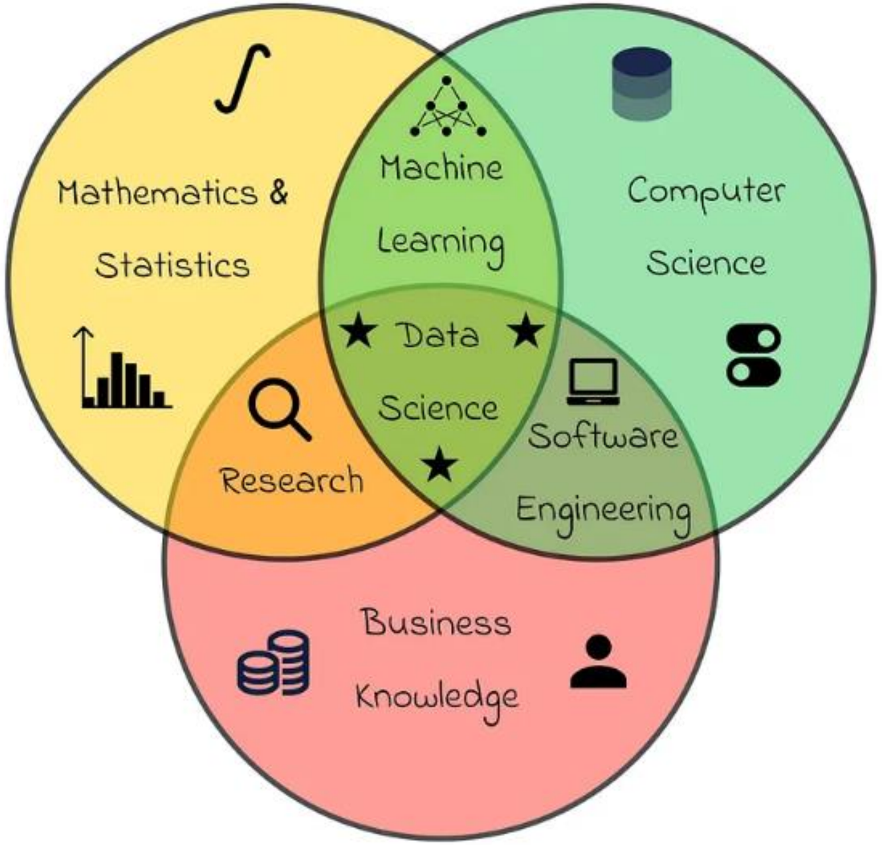
Moneyball
The Art of Winning an Unfair Game



Inspiration the Movie

Bill James, who coined the term "sabermetrics"

Scope

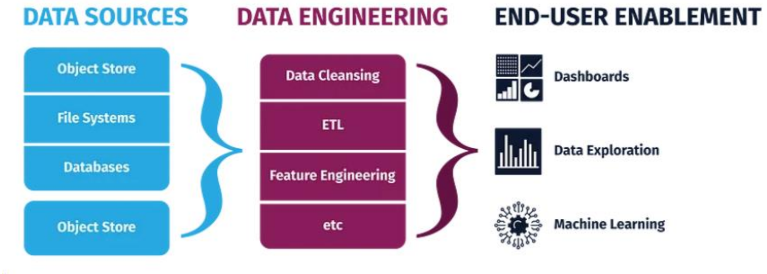


Venn diagram presenting the key Data Science components

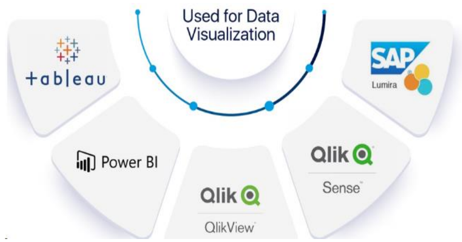
Data Analytics Framework

Data Strategy
(Business Value)

Data Engineering /Management
(Infrastructure)



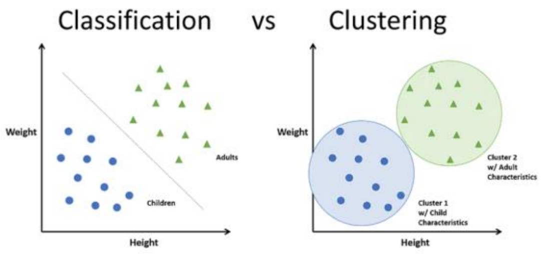
Data Visualization
(Descriptive)

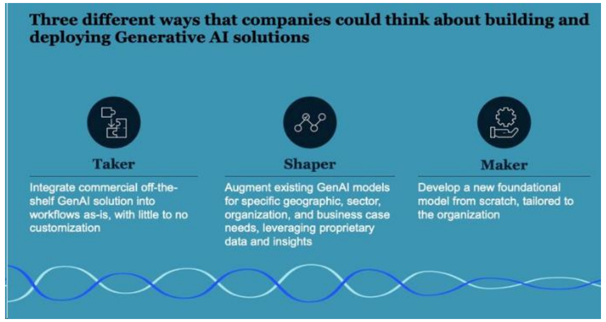


Data Modeling
(Discriminative and Generative)

Discriminative

Generative





FOUR CATEGORIES OF ANALYTICS

Data analytics techniques are commonly described as part of four distinct categories: **descriptive**, **diagnostic**, **predictive** and **prescriptive**

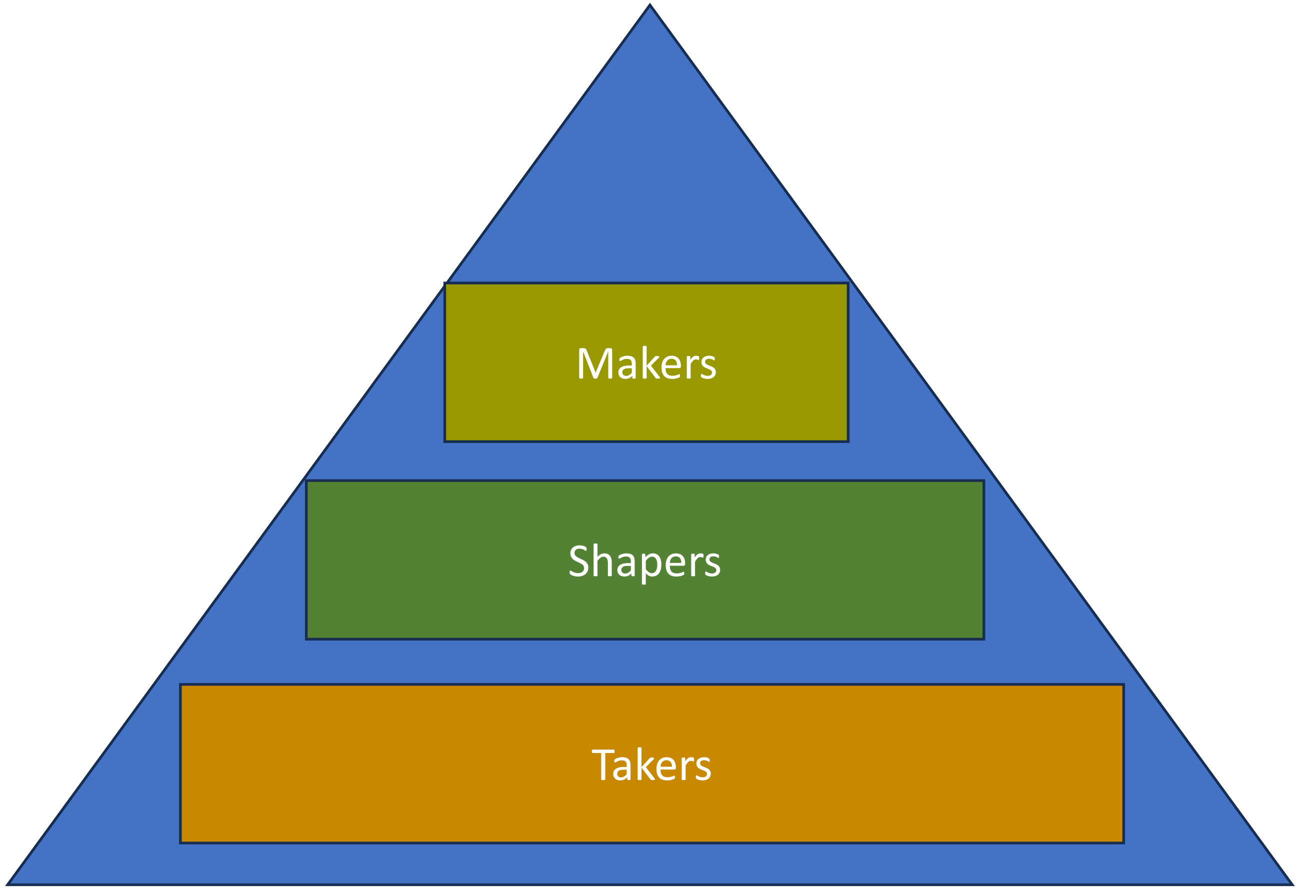
DESCRIPTIVE
What happened?

DIAGNOSTIC
Why did it happen?

PREDICTIVE
What will happen next?

PRESCRIPTIVE
What's our course of action?

Adoption Levels



Required

- Google Account
- Collab Access
- Sam’s Github Access
- Datasets
- ChatGPT
- Ananconda Distribution
- Vscode
- Terminal (Windows)

Dataset – for Descriptive Analytics

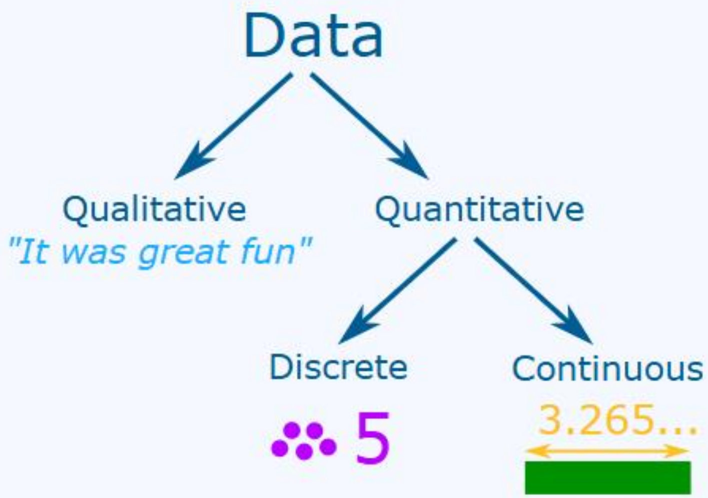
Employee No	Name	Tier	Designation	Gender	Salary
Columns					
Features					
Properties					
Dimensions					

Data Types

Qualitative vs Quantitative

Data can be qualitative or quantitative.

- **Qualitative data** is descriptive information (it *describes* something)
- **Quantitative data** is numerical information (numbers)



Data type	Description	Example
`int`	To store integer values	`n = 20`
`float`	To store decimal values	`n = 20.75`
`complex`	To store complex numbers (real and imaginary part)	`n = 10+20j`
str	To store textual/string data	`name = 'Jessa'`
bool	To store boolean values	`flag = True`
list	To store a sequence of mutable data	`l = [3, 'a', 2.5]`
tuple	To store sequence immutable data	`t =(2, 'b', 6.4)`
dict	To store key: value pair	`d = {1:'J', 2:'E'}`
set	To store unorder and unindexed values	`s = {1, 3, 5}`
frozenset	To store immutable version of the set	`f_set=frozenset({5,7})`
range	To generate a sequence of number	`numbers = range(10)`
bytes	To store bytes values	`b=bytes([5,10,15,11])`

Python Data Types

Data Types : Categorical & Numerical

p1	p2	p3	p4
Manager	48	25,000	Male
Executive	25	45,000	Female
Consultant	33	64,000	Male

Governance : Data Dictionary

Dataedo

DATA

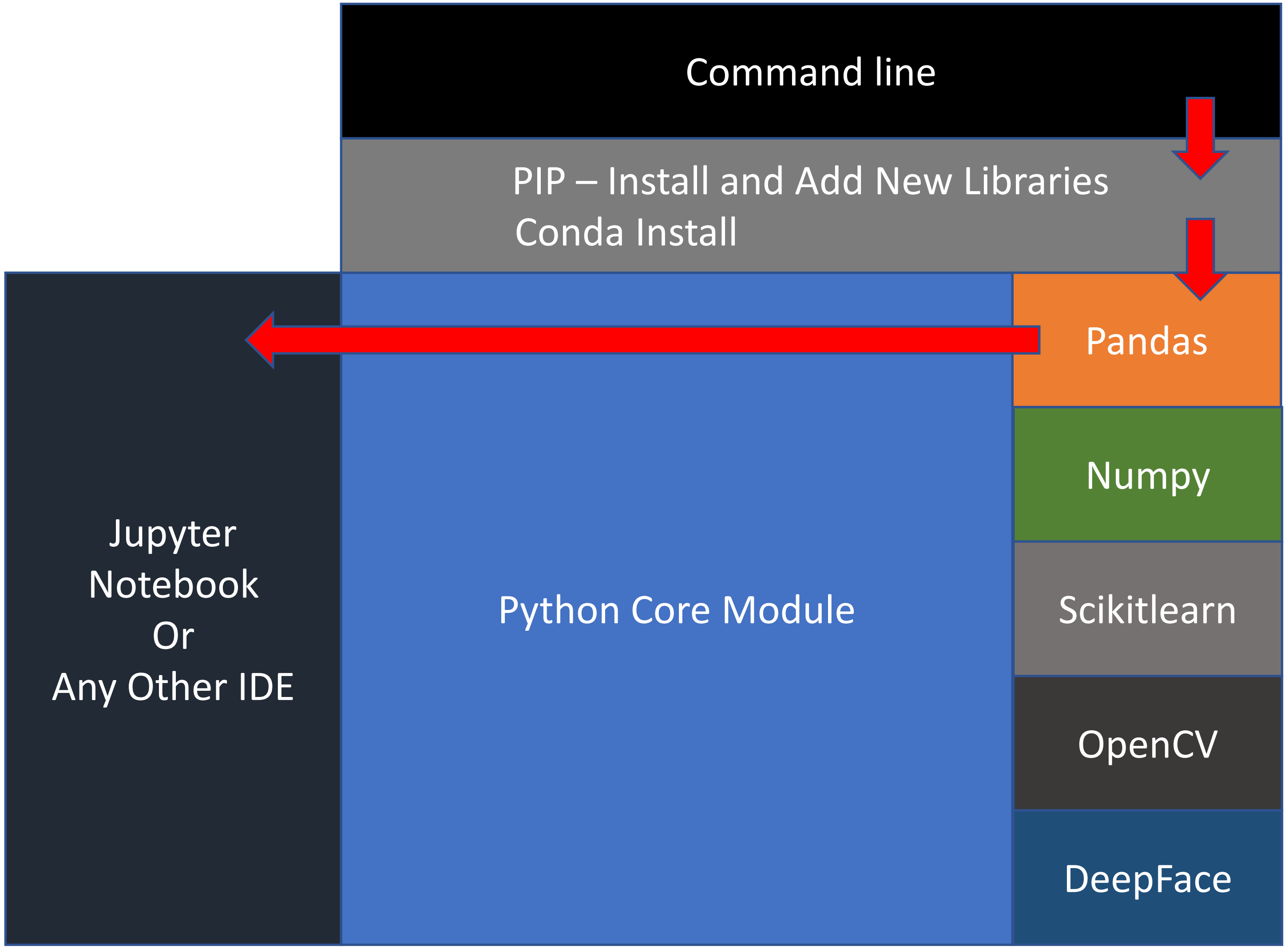
lployee_id	first_name	last_name	nin	dept_id
	Simon	Martinez	HH 45 09 73 D	1
	Thomas	Goldstein	SA 75 35 42 B	2
	Eugene	Comelsen	NE 22 63 82	2
	Andrew	Petculescu	XY 29 87 61 A	1
	Ruth	Stadick	MA 12 89 36 A	15
	Barry	Scardelis	AT 20 73 18	2
	Sidney	Hunter	HW 12 94 21 C	6
	Jeffrey	Evans	LX 13 26 39 B	6
	Doris	Berndt	YA 49 88 11 A	3
	Diane	Eaton	BE 08 74 68 A	1

DATA DICTIONARY (METADATA)

Column	Data Type	Description
emlployee_id	int	Primary key of a table
first_name	nvarchar(50)	Employee first name
last_name	nvarchar(50)	Employee last name
nin	nvarchar(15)	National Identification Number
position	nvarchar(50)	Current postion title, e.g. Secretary
dept_id	int	Employee depamtnet. Ref: Departmetns
gender	char(1)	M = Male, F = Female, Null = unknown
employment_start_date	date	Start date of employment in organization.
employment_end_date	date	Employment end date.

Dataedo

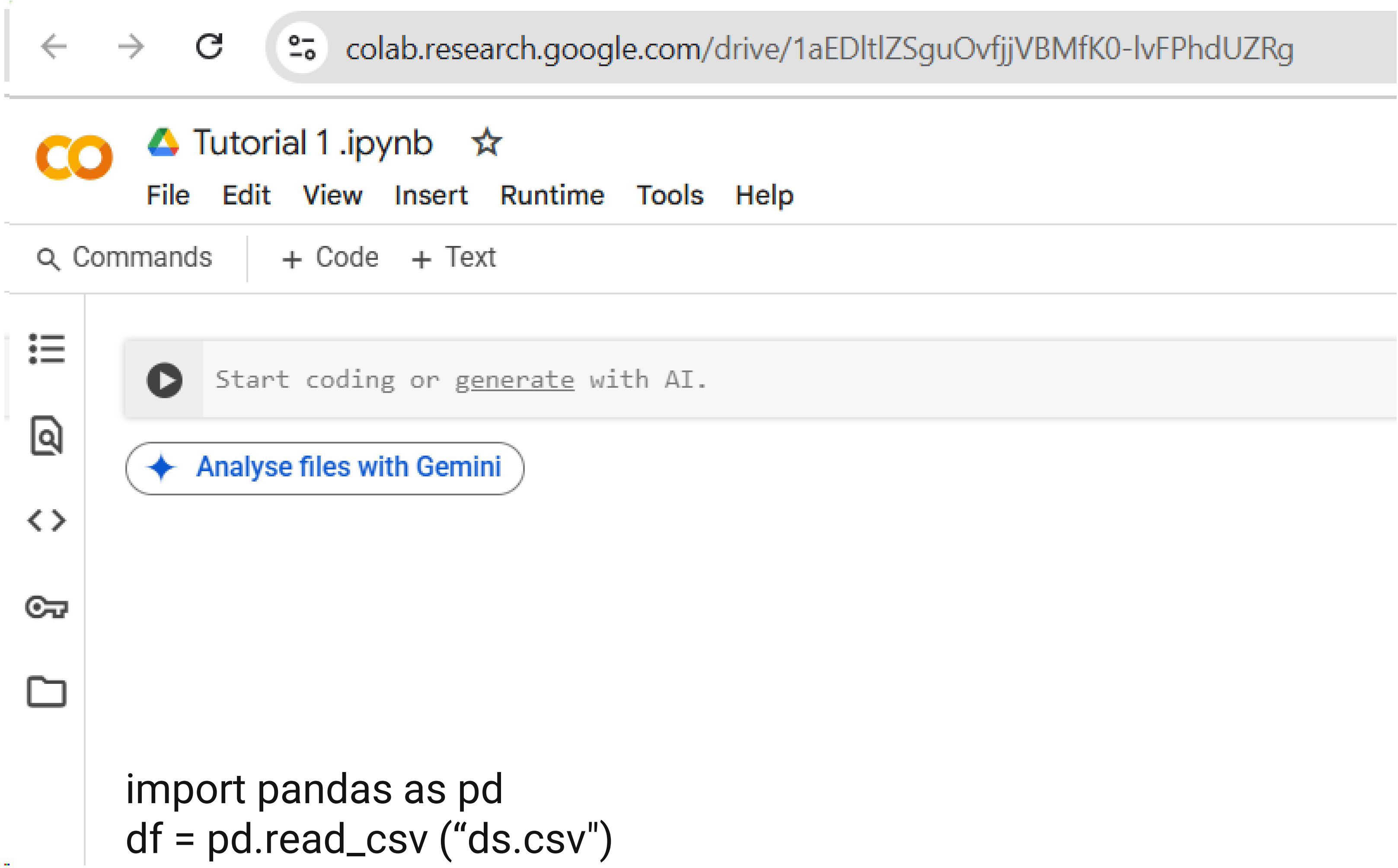
Python Data Science Suite



Prompt Engineering

You **Can't** Do Prompting if you **Don't** Know the **Basics** and the **Subject**

Convert to a Data Frame / Table




```
import pandas as pd
df = pd.read_csv (“ds.csv")
df.head()
```

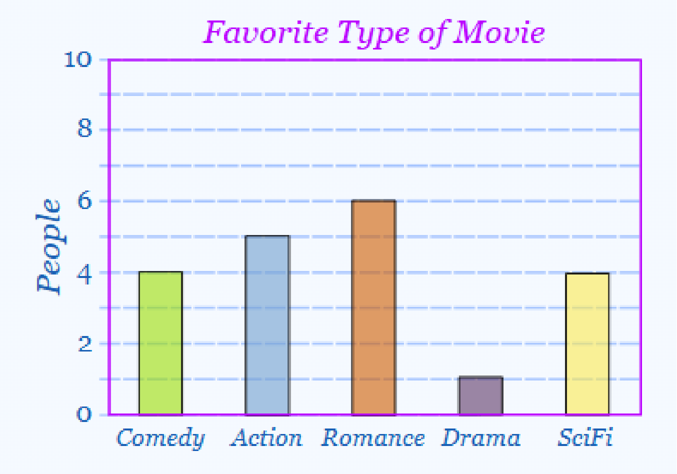
Descriptive & Predictive Analytics

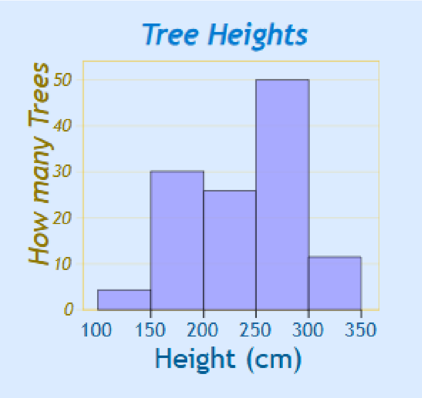
- Univariate Analysis – Analysis of Only 1 Variable (Salary)
- Bi-Variate – Analysis of 2 Variables and Relationship (Salary & Competency)
- Muti-Variate – Analysis of More than 2 Variables and their Relationships (Salary, Age, Competency, Education)

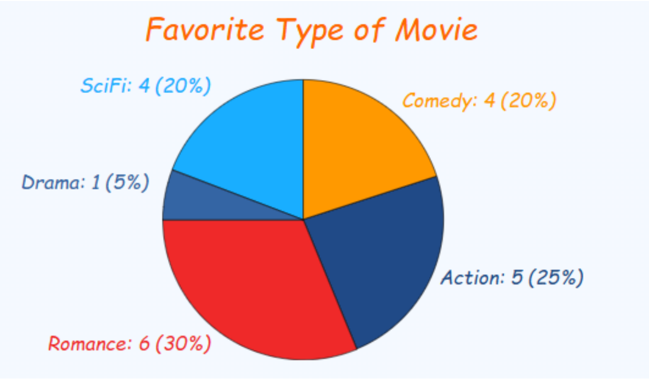
Uni-Variate Data Analysis (One Column)

We can do lots of things with univariate data:

- Find a central value using mean, median and mode
- Find how spread out it is using range, quartiles and standard deviation
- Make plots like Bar Graphs, Pie Charts and Histograms







Import Statistics Library
&
Basic Central Tendency Measures

```
import statistics

# Calculating mean, median, and mode
mean_value = statistics.mean(a)
median_value = statistics.median(a)
mode_value = statistics.mode(a)
std_dev = statistics.stdev(a)


# Displaying results
print("Mean:", mean_value)
print("Median:", median_value)
print("Mode:", mode_value)
print("Standard Deviation:", std_dev)
```

Measures of Dispersion

Uni-Variate Analytics

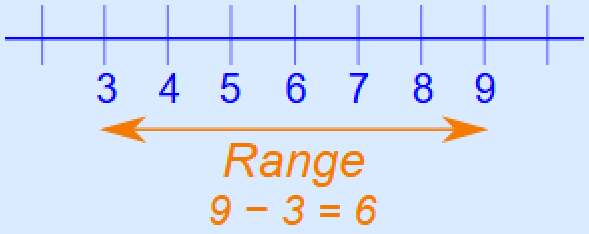
Range

The Range (Statistics)

The Range is the difference between the lowest and highest values.

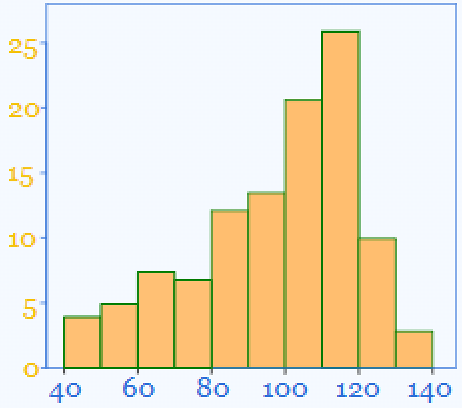
Example: In **{4, 6, 9, 3, 7}** the lowest value is 3, and the highest is 9.

So the range is 9 − 3 = **6**.



Histograms

Histogram: a graphical display of data using bars of different heights.



It is similar to a Bar Chart, but a histogram groups numbers into **ranges**.

The height of each bar shows how many fall into each range.

And you decide what ranges to use!

Ranges or Bins on X Axis and Values on Y Axis

Quartiles

Quartiles

Quartiles are the values that divide a list of numbers into quarters:

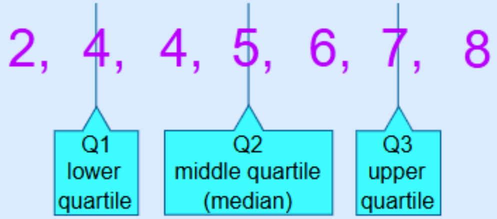
- Put the list of numbers **in order**
- Then cut the list into **four equal parts**
- The Quartiles are at the "cuts"

Like this:

Example: 5, 7, 4, 4, 6, 2, 8

Put them in order: 2, 4, 4, 5, 6, 7, 8

Cut the list into quarters:

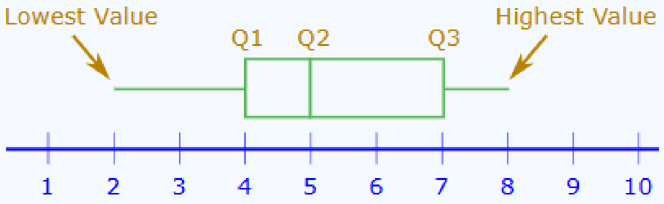


And the result is:

- Quartile 1 (Q1) = **4**
- Quartile 2 (Q2), which is also the Median, = **5**
- Quartile 3 (Q3) = **7**

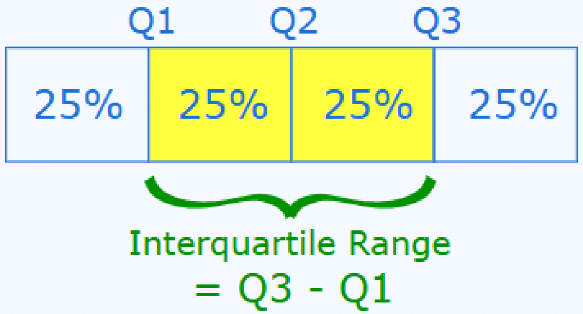
Box and Whisker Plot

We can show all the important values in a "Box and Whisker Plot", like this:

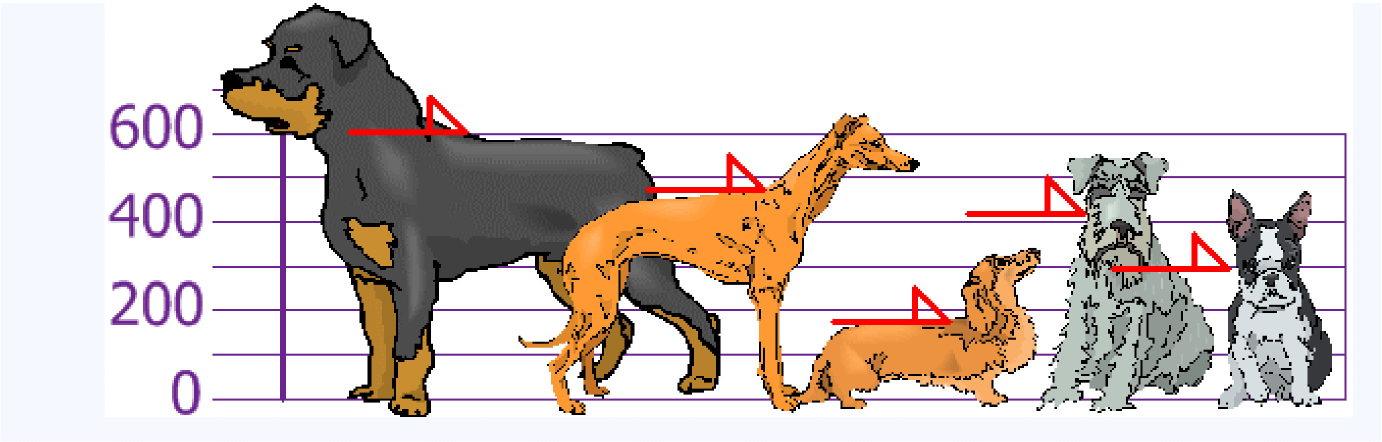


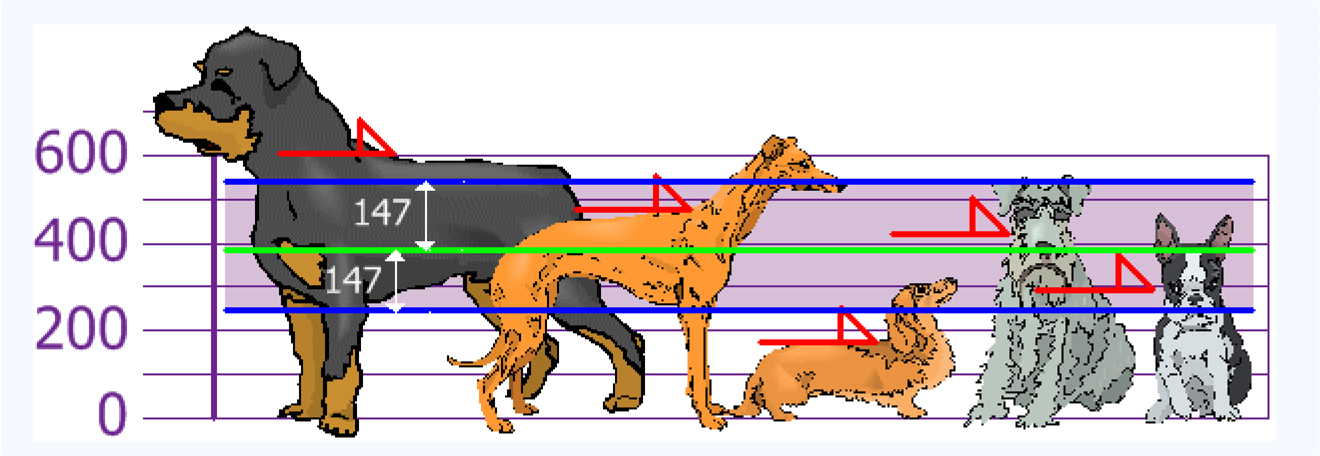
Interquartile Range

The "Interquartile Range" is from Q1 to Q3:



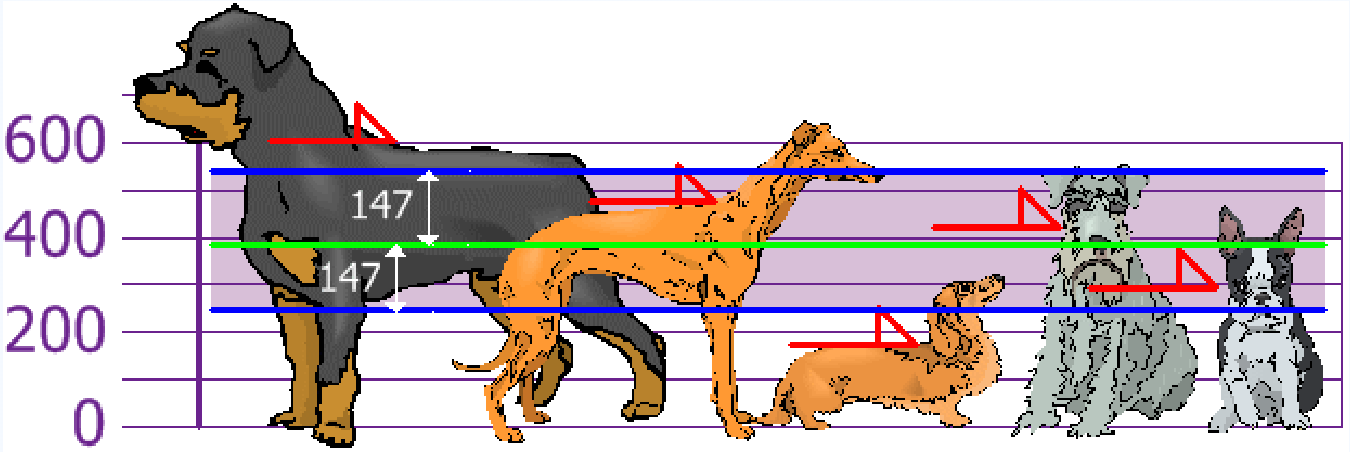
Measures of Variation





Standard Deviation

And the good thing about the Standard Deviation is that it is useful. Now we can show which heights are within one Standard Deviation (147 mm) of the Mean:



So, using the Standard Deviation we have a "standard" way of knowing what is normal, and what is extra large or extra small.

Rottweilers **are** tall dogs. And Dachshunds **are** a bit short, right?

Code

```
import statistics
```

Assign data column to variable “a”

```
std_dev = statistics.stdev(a)

print("Standard Deviation:", std_dev)
```

Standard Deviation

Whether a standard deviation is "low" or "high" is relative to:

- The **mean** of the dataset
- The **range** of possible values
- The **real-world tolerance or variability** that's acceptable

For **normally distributed data:**

- About **68%** of values lie within **±1 standard deviation** of the mean
- About **95%** within **±2 standard deviations**
- About **99.7%** within **±3 standard deviations**

This helps you judge whether the variation you're seeing is **typical** or **extreme.**

So, a **rule of thumb** is to express SD as a **percentage of the mean:**

Relative SD (%) = (Standard Deviation / Mean) × 100

Field	**Low SD Example**	**High SD Example**
Manufacturing	<2% of mean	>10% of mean
Agriculture (growth)	<5% of mean	>20% of mean
Financial returns	<5% volatility	>15% volatility

So What ?

HR Analytics

HR Analytics

Measure	Use Case	Description
Mean (Average)	**Average Time to Hire**	Calculate the mean number of days taken to hire across departments to assess recruitment efficiency.
	Average Employee Tenure	Helps in understanding retention trends and planning succession.
Median	**Median Salary**	Gives a better central value when salaries have outliers (e.g., a few very high executive salaries).
	Median Performance Score	Useful when performance scores are skewed or contain extreme values.
Mode	**Most Common Job Title**	Understand which roles are most prevalent in the organization.
	Most Frequent Reason for Exit	Identify the most common reason employees leave (e.g., resignation, retirement).

Now use AI Prompts to do a Univariate Analysis

- Highest
- Lowest
- Mean
- Mode
- Median
- Range
- Histograms
- Line Chart - Skewness
- Quartiles
- Percentiles