Getting started with Machine Learning

Date : 24th July 2021 | Speaker : Ayon Roy

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Hello **Buddy!**

I am **Ayon Roy**

B.Tech CSE (2017-2021)

Speaker/Mentor/Judge @ 150+ AI/ML/Data Science Events

Brought **Kaggle Days Meetup** Community in India for the 1st time

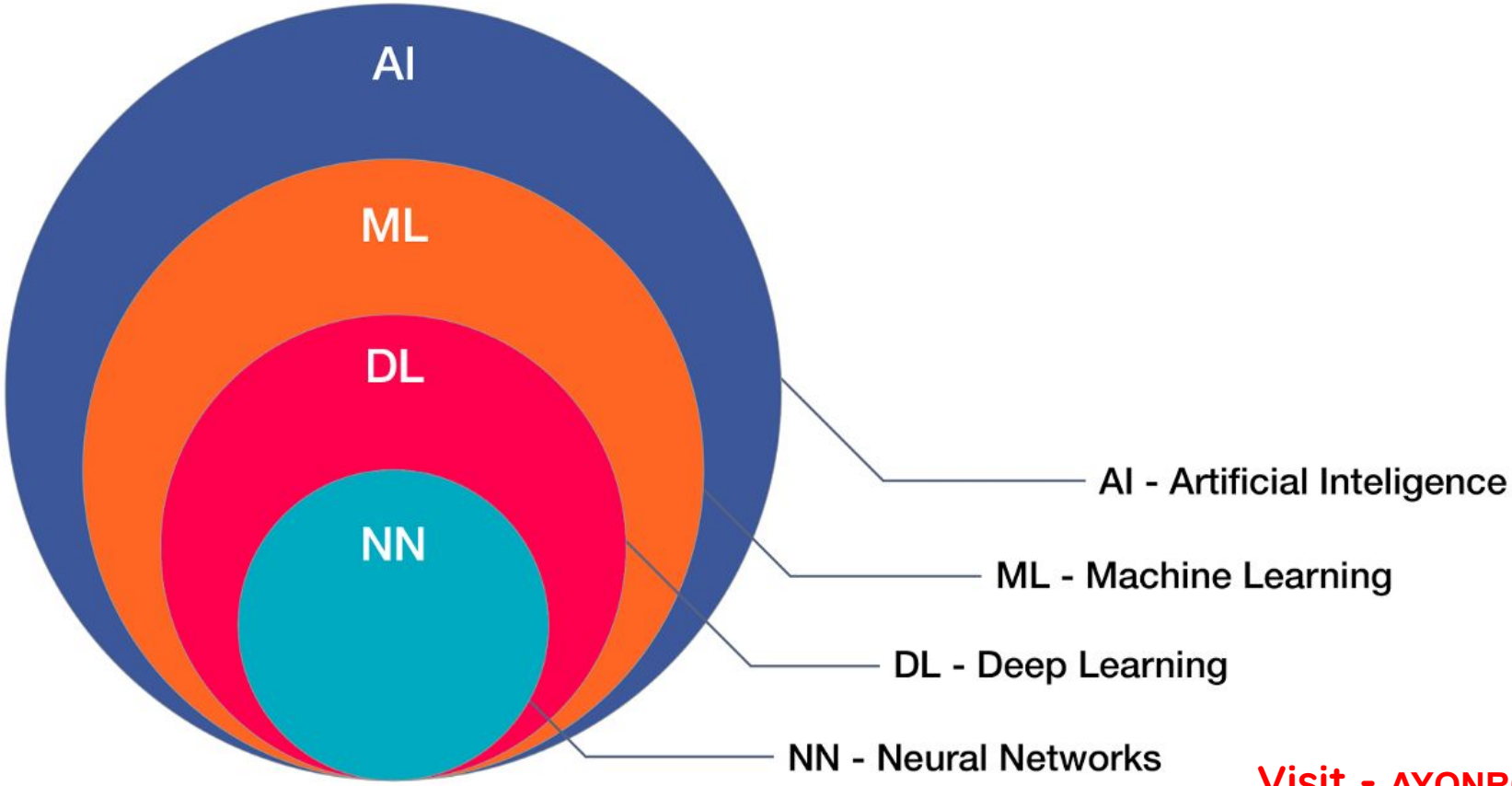
If you haven't heard about me yet, you might have been living under the rocks. Wake up !!

Agenda

- What is Machine Learning ?
- What's the current scenario & the scope of ML ?
- How to start Machine Learning ?
- Initial steps in a Machine Learning Process
- A brief Intro to Data Pre-Processing, Exploratory Data Analysis, Data Visualization [Hands On Tomorrow]

What is
Machine Learning ?

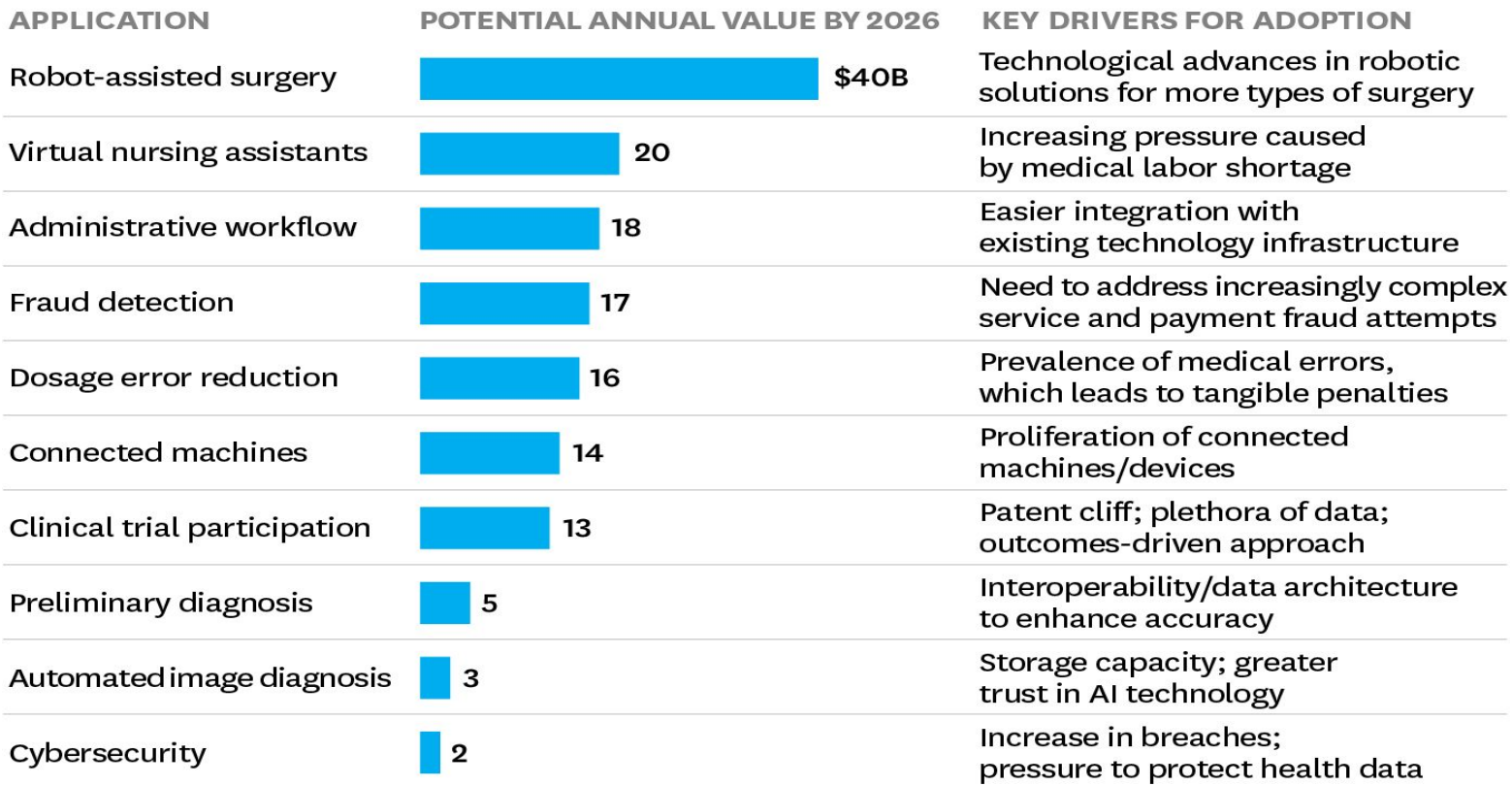
Graphical Representation



A field of study that gives computers the capability to learn without being explicitly programmed.

Machine learning is applied using Algorithms to process the data and get trained for delivering future predictions without human intervention. The inputs for Machine Learning is the set of instructions or data or observations.

Applications of Machine Learning



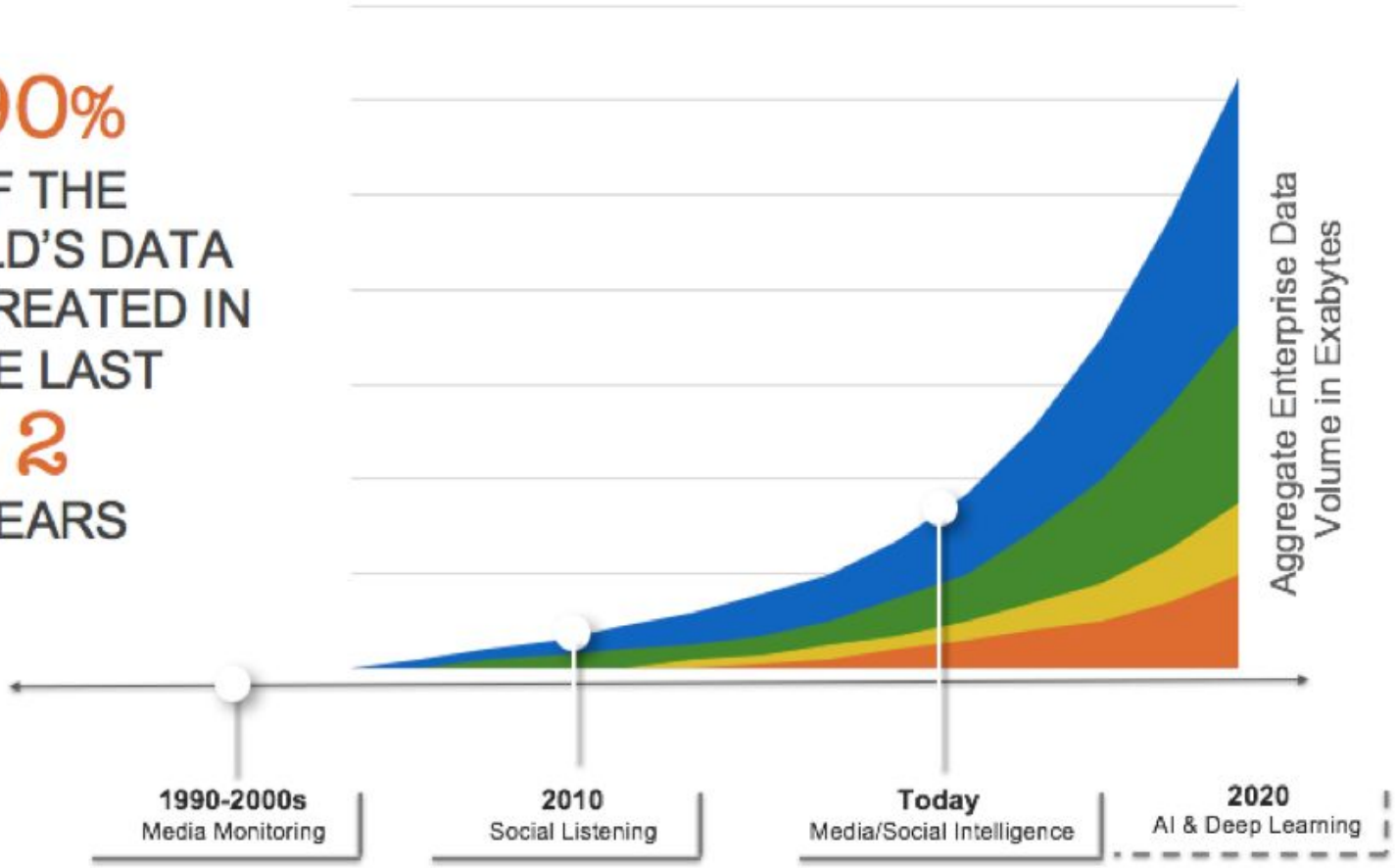
What's the Current Scenario ?

90%

OF THE WORLD'S DATA WAS CREATED IN THE LAST

2

YEARS

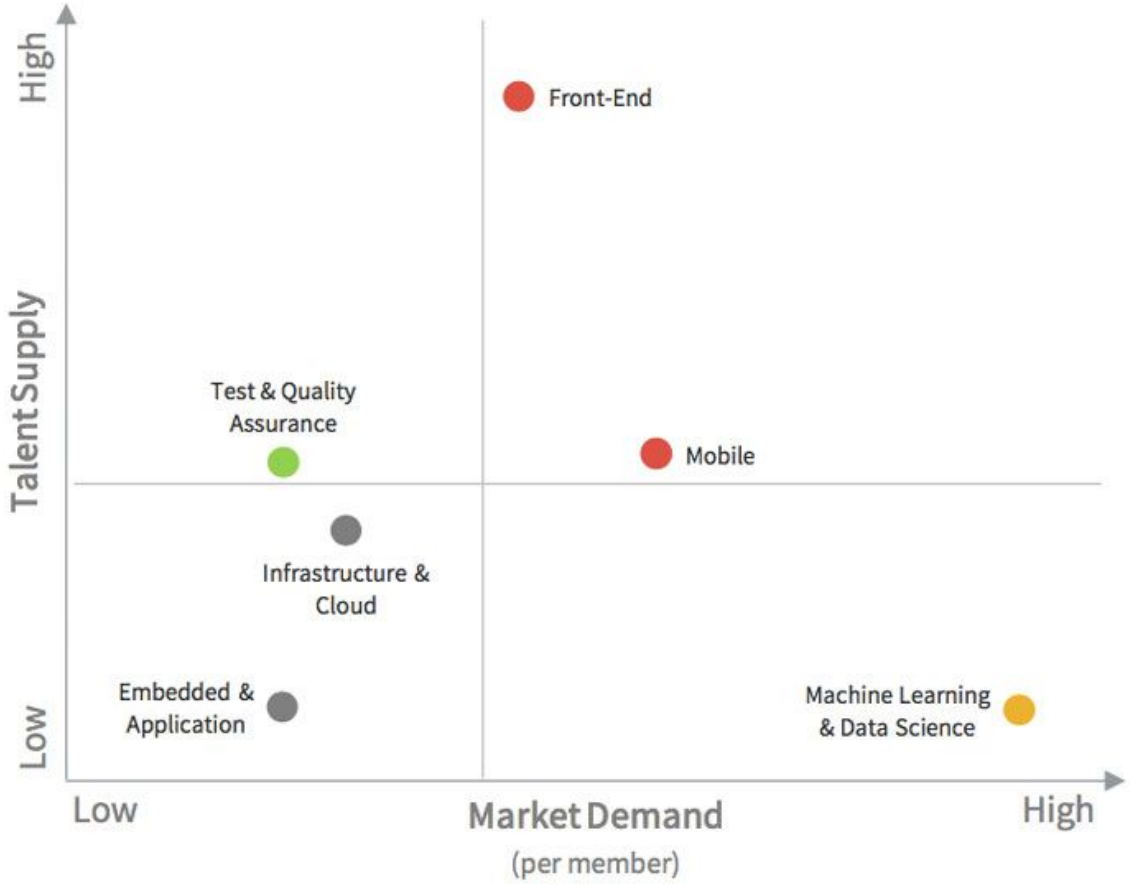


But why Machine Learning now ?

1. The sharp decrease in costs associated with data storage and processing.
2. The advent of the Internet economy and the explosion in mobile apps.
3. The abundance of open-source tools.
4. The development of a wealth of innovative ML and DL algorithms.
5. Availability of GPUs etc.

The
Scope of Machine Learning

Supply & Demand by Specialty



How to start Machine Learning

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Start with

Maths for Machine Learning

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But why should I do Maths first for Machine Learning ?

- Week 1 : Linear Algebra [B] https://www.khanacademy.org/math/linear-algebra
- Week 2 : Calculus [B] https://www.youtube.com/playlist?list=PLZHQObOWTQDMsr9K-rj53DwVRMYO3t5Yr or https://www.mathsisfun.com/calculus/ ; want theoretical notes , find it at https://the-learning-machine.com/article/machine-learning/calculus .
- Week 3 : Probability [B] https://www.edx.org/course/introduction-probability-science-mitx-6-041x-2
- Week 4 : Statistics [B] http://alex.smola.org/teaching/cmu2013-10-701/stats.html
- Algorithms (Only if you want to learn proper software development) [Highly optional]
  This is an overview of what the students study as the subject Data Structures & Algorithm . So if you are fluent with this part , you can skip this !! https://www.edx.org/course/algorithm-design-analysis-pennx-sd3x

Start with Python

&

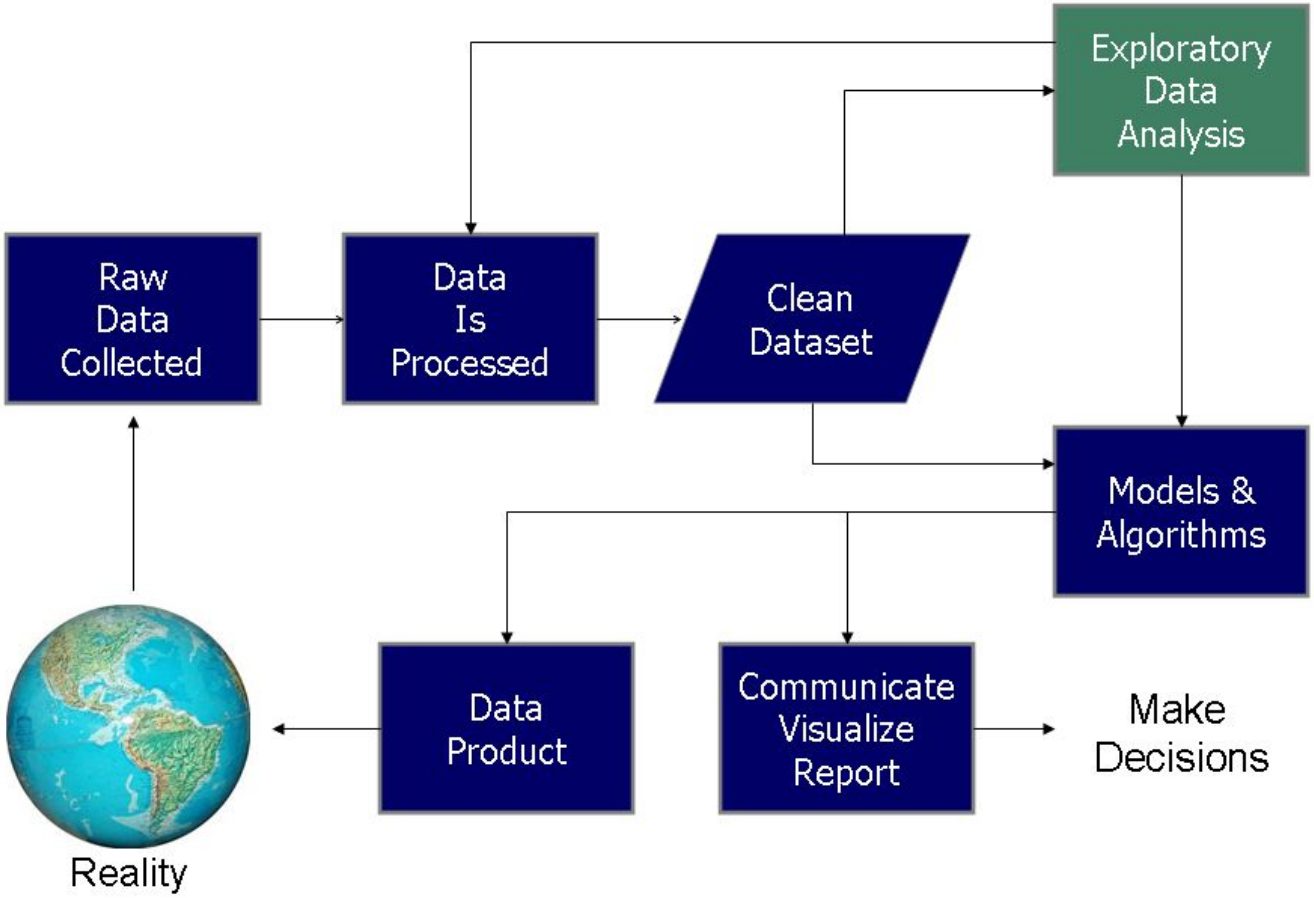
try to implement those

Mathematical Concepts

Start exploring Libraries & then start Machine Learning Courses

- Introduction to python for data science [B] https://www.datacamp.com/courses/intro-to-python-for-data-science
- Want to dive deeper into Data Visualization & Pre-Processing ? Look into Data Visualization & Pre-Processing section in miscellaneous resources . [Highly optional]
- Want to explore the field of Deep Learning ? See the Deep Learning Section in miscellaneous resources . [Highly optional]
- Want to explore the field of Natural Language Processing [NLP } ? See the Natural language Processing Section in miscellaneous resources . [Highly optional]
- See how ML codes are written and made to work at - > https://github.com/maykulkarni/Machine-Learning-Notebooks or https://github.com/GokuMohandas/practicalAI/blob/master/README.md . [Highly optional]
- Find useful resources here at https://github.com/ujjwalkarn/Machine-Learning-Tutorials/blob/master/README.md . [Highly optional]

Initial Steps in a Machine Learning Process



What is

Data Pre-Processing ?

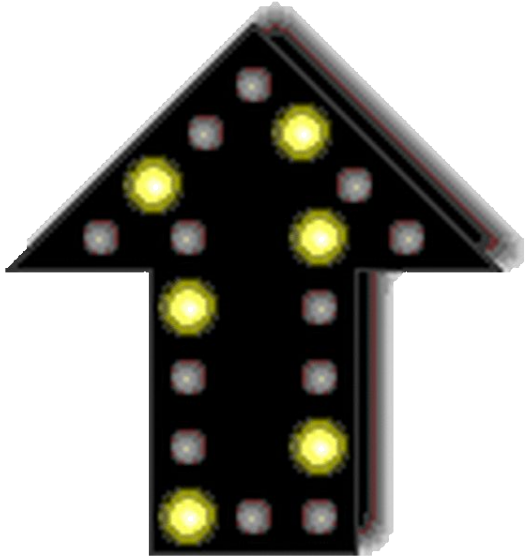
It is a technique that transforms raw data into an understandable format.

Why do we need it ?

Raw data (Real world data) is always messy and that data cannot be sent through a model. That would cause certain errors.

So we need to preprocess data before sending through further analysis.

Steps to be followed



Read the data

```
# Read the data in the CSV file using pandas
df = pd.read_csv('../input/creditcard.csv')
df.head()
```

	Time	V1	V2	V3	V4	V5	V6	V7	V8	V9	...	V21	V22	V23	V24	
0	0.0	-1.359807	-0.072781	2.536347	1.378155	-0.338321	0.462388	0.239599	0.098698	0.363787	...	-0.018307	0.277838	-0.110474	0.066928	0.12
1	0.0	1.191857	0.266151	0.166480	0.448154	0.060018	-0.082361	-0.078803	0.085102	-0.255425	...	-0.225775	-0.638672	0.101288	-0.339846	0.16
2	1.0	-1.358354	-1.340163	1.773209	0.379780	-0.503198	1.800499	0.791461	0.247676	-1.514654	...	0.247998	0.771679	0.909412	-0.689281	-0.32
3	1.0	-0.966272	-0.185226	1.792993	-0.863291	-0.010309	1.247203	0.237609	0.377436	-1.387024	...	-0.108300	0.005274	-0.190321	-1.175575	0.64
4	2.0	-1.158233	0.877737	1.548718	0.403034	-0.407193	0.095921	0.592941	-0.270533	0.817739	...	-0.009431	0.798278	-0.137458	0.141267	-0.20

Fig 1 : Dataset

Checking the Missing Values

```
# Looking at the ST_NUM column
print df['ST_NUM']
print df['ST_NUM'].isnull()


Out:
0    104.0
1    197.0
2      NaN
3    201.0
4    203.0
5    207.0
6      NaN
7    213.0
8    215.0

Out:
0    False
1    False
2     True
3    False
4    False
5    False
6     True
7    False
8    False
```

Replacing the Missing Values

A very common way to replace missing values is using a median.

```
# Replace using median
median = df['NUM_BEDROOMS'].median()
df['NUM_BEDROOMS'].fillna(median, inplace=True)
```

Standardizing the data

```
# Standardizing the features
df['Vamount'] =
StandardScaler().fit_transform(df['Amount'].values.reshape(-1,1))
df['Vtime'] =
StandardScaler().fit_transform(df['Time'].values.reshape(-1,1))

df = df.drop(['Time','Amount'], axis = 1)
df.head()
```

V22	V23	V24	V25	V26	V27	V28	Class	Vamount	Vtime
0.277838	-0.110474	0.066928	0.128539	-0.189115	0.133558	-0.021053	0	0.244964	-1.996583
-0.638672	0.101288	-0.339846	0.167170	0.125895	-0.008983	0.014724	0	-0.342475	-1.996583
0.771679	0.909412	-0.689281	-0.327642	-0.139097	-0.055353	-0.059752	0	1.160686	-1.996562
0.005274	-0.190321	-1.175575	0.647376	-0.221929	0.062723	0.061458	0	0.140534	-1.996562
0.798278	-0.137458	0.141267	-0.206010	0.502292	0.219422	0.215153	0	-0.073403	-1.996541

Fig 7 : Standardized dataset

Exploratory Data Analysis

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What is Exploratory Data Analysis ?

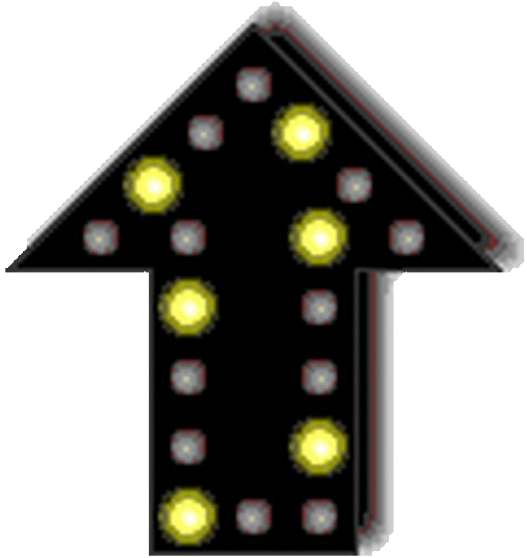
A critical process of performing initial investigations on data so as to discover patterns,to spot anomalies,to test hypothesis and to check assumptions with the help of summary statistics and graphical representations.

Why do we need it ?

1. Detection of mistakes & missing data
2. Checking of assumptions
3. Preliminary selection of appropriate models
4. Determining relationships among the explanatory variables

With EDA, we can make sense of the data we have and then figure out what questions we want to ask and how to frame them

Major Steps to be followed



Import the Libraries

```
# Importing required libraries.
import pandas as pd
import numpy as np
import seaborn as sns #visualisation
import matplotlib.pyplot as plt #visualisation
%matplotlib inline
sns.set(color_codes=True)
```

Check the type of Data

```
# Checking the data type
df.dtypes
```

```
Make                object
Model               object
Year                 int64
Engine Fuel Type    object
Engine HP          float64
Engine Cylinders   float64
Transmission Type   object
Driven_Wheels       object
Number of Doors    float64
Market Category     object
Vehicle Size        object
Vehicle Style       object
highway MPG          int64
city mpg             int64
Popularity           int64
MSRP                 int64
dtype: object
```

Dropping Irrelevant Columns

```
# Dropping irrelevant columns
df = df.drop(['Engine Fuel Type', 'Market Category', 'Vehicle Style',
'Popularity', 'Number of Doors', 'Vehicle Size'], axis=1)
df.head(5)
```

	Make	Model	Year	Engine HP	Engine Cylinders	Transmission Type	Driven_Wheels	highway MPG	city mpg	MSRP
0	BMW	1 Series M	2011	335.0	6.0	MANUAL	rear wheel drive	26	19	46135
1	BMW	1 Series	2011	300.0	6.0	MANUAL	rear wheel drive	28	19	40650
2	BMW	1 Series	2011	300.0	6.0	MANUAL	rear wheel drive	28	20	36350
3	BMW	1 Series	2011	230.0	6.0	MANUAL	rear wheel drive	28	18	29450
4	BMW	1 Series	2011	230.0	6.0	MANUAL	rear wheel drive	28	18	34500

Dropping irrelevant columns.

Renaming the Columns

```
# Renaming the column names
df = df.rename(columns={“Engine HP”: “HP”, “Engine Cylinders”:
“Cylinders”, “Transmission Type”: “Transmission”, “Driven_Wheels”:
“Drive Mode”,”highway MPG”: “MPG-H”, “city mpg”: “MPG-C”, “MSRP”:
“Price” })
df.head(5)
```

	Make	Model	Year	HP	Cylinders	Transmission	Drive Mode	MPG-H	MPG-C	Price
0	BMW	1 Series M	2011	335.0	6.0	MANUAL	rear wheel drive	26	19	46135
1	BMW	1 Series	2011	300.0	6.0	MANUAL	rear wheel drive	28	19	40650
2	BMW	1 Series	2011	300.0	6.0	MANUAL	rear wheel drive	28	20	36350
3	BMW	1 Series	2011	230.0	6.0	MANUAL	rear wheel drive	28	18	29450
4	BMW	1 Series	2011	230.0	6.0	MANUAL	rear wheel drive	28	18	34500

Renaming the column name.

Removing the Duplicates

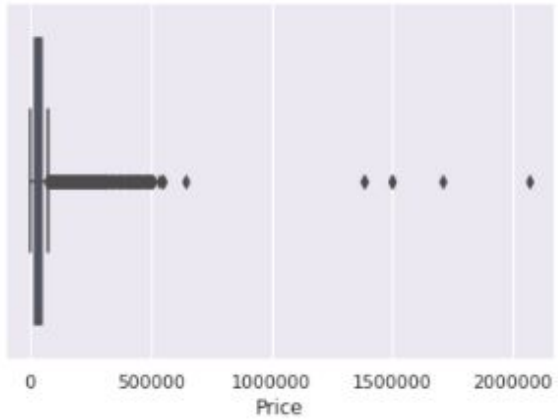
```
# Dropping the duplicates
df = df.drop_duplicates()
df.head(5)
```

	Make	Model	Year	HP	Cylinders	Transmission	Drive Mode	MPG-H	MPG-C	Price
0	BMW	1 Series M	2011	335.0	6.0	MANUAL	rear wheel drive	26	19	46135
1	BMW	1 Series	2011	300.0	6.0	MANUAL	rear wheel drive	28	19	40650
2	BMW	1 Series	2011	300.0	6.0	MANUAL	rear wheel drive	28	20	36350
3	BMW	1 Series	2011	230.0	6.0	MANUAL	rear wheel drive	28	18	29450
4	BMW	1 Series	2011	230.0	6.0	MANUAL	rear wheel drive	28	18	34500

Detecting the Outliers

```
sns.boxplot(x=df['Price'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f69f68edc18>
```



Correlation Matrix etc.

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What's Data Visualization ?

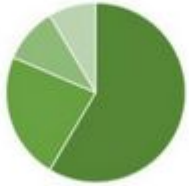
Data visualization is the graphical representation of information and data.

By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

Difft. Types of Data Visualization methods

Charts ->

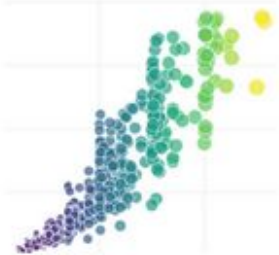
Line



Pie

Bar

Plots ->



Bubble

Scatter

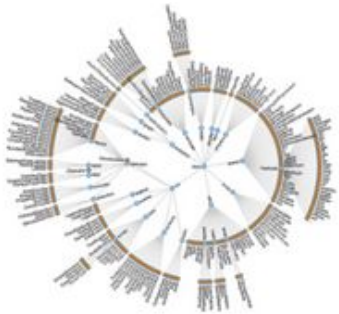
Difft. Types of Data Visualization methods

Maps ->

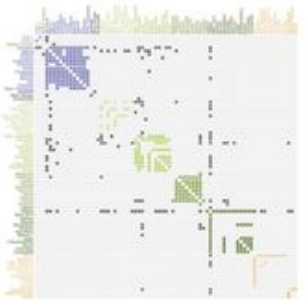
Heat

Dot distribution

Trees & Matrix ->



Tree



Matrix

Basic Level

Hands-On Session Tomorrow

Get the resources at

1. https://github.com/aayoonn/100DaysOfMLCode
2. https://blog.ayonroy.ml/2020/12/01/personalized-guide-by-ayon-roy

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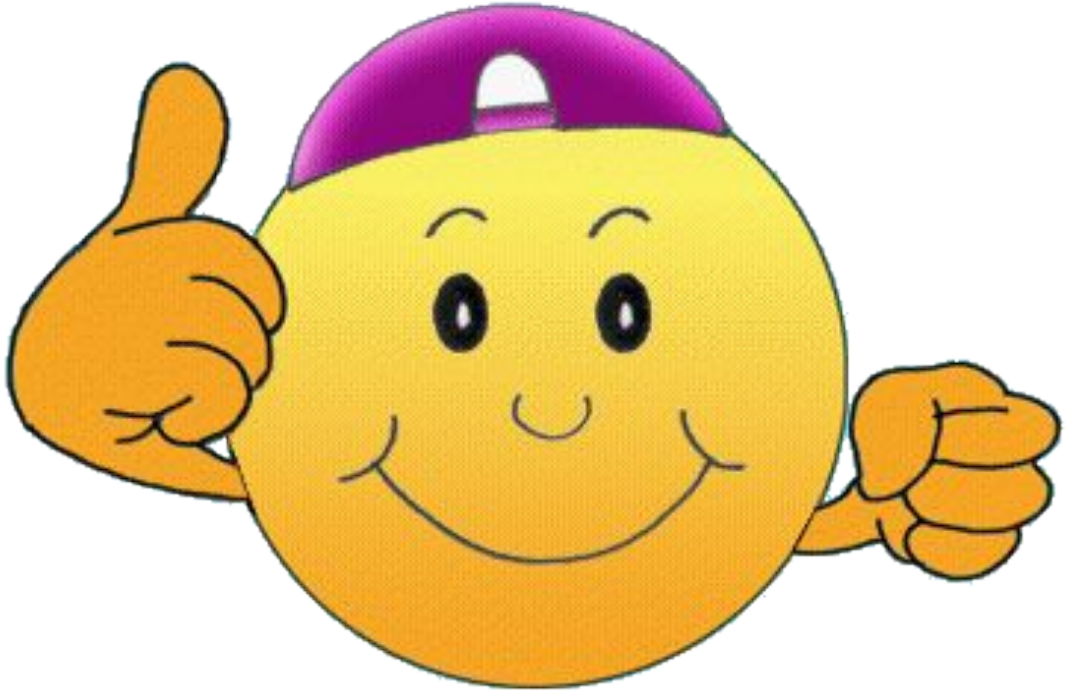
GO FOR IT !



GOOD LUCK !

Let me answer your Questions now.

Finally, it’s your time to speak.

Danke Schoen

Questions ? Any Feedbacks ? Did you like the talk?
Tell me about it.

If you think I can help you,
connect with me via

Email : aayoonn@gmail.com

LinkedIn : https://www.linkedin.com/in/aayoonn/

Website : https://AYONROY.ML/