

Session1-Intro&Numpy (Arrays Part-1)

DAwithPython S1

Training Clarusway

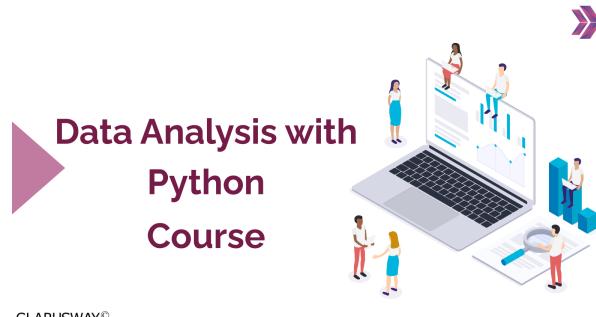
Pear Deck - April 23, 2022 at 10:46AM

Part 1 - Summary

Use this space to summarize your thoughts on the lesson

Part 2 - Responses

Slide 1



Use this space to take notes:

Slide 2



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Course Info



Course Duration
23 April - 13 May
12 Sessions **36 Hours in Total**

Structure of Course



Course Projects



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Slide 4



A slide titled "Data Analysis with Python Session-1". The title is in a dark red font with a large right-pointing arrow icon to its left. Below the title is a subtitle "Session-1". To the right of the text is a 3D-style illustration of a laptop displaying a chart, with several small human figures interacting with the laptop and its data. At the bottom left is the CLARUSWAY logo.

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Use this space to take notes:

Slide 5

▶ Table of Contents ➤

- ▶ Big Picture
- ▶ NumPy

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Slide 6

▶ Big Picture

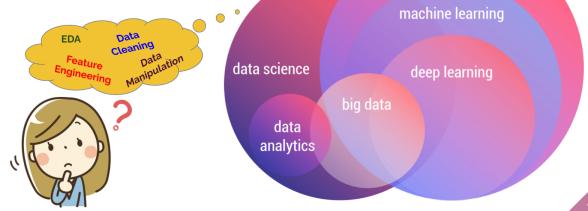
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Slide 7

▶ Big Picture

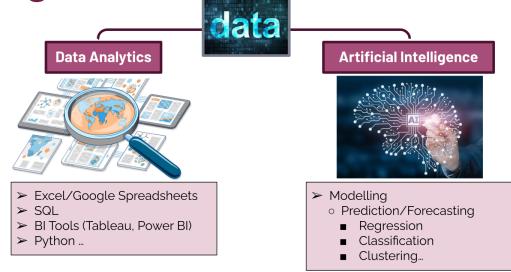
- ▶ Where am I?
- ▶ Why will I learn these?



Use this space to take notes:

Slide 8

► Big Picture



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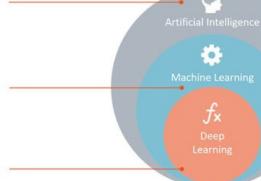
Slide 9

► Big Picture

Artificial Intelligence
Any technique which enables computers to mimic human behavior.

Machine Learning
Subset of AI techniques which use statistical methods to enable machines to improve with experiences.

Deep Learning
Subset of ML which make the computation of multi-layer neural networks feasible.

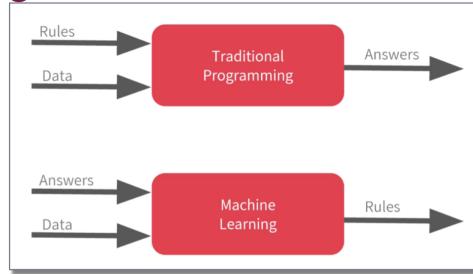


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Slide 10

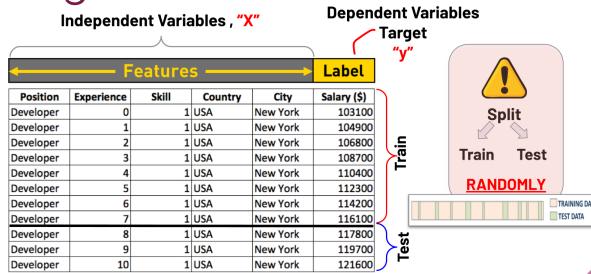
► Big Picture



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Slide 11

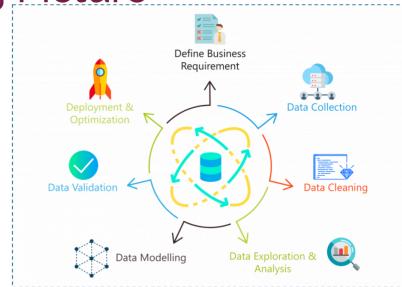
► Big Picture



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Slide 12

► Big Picture



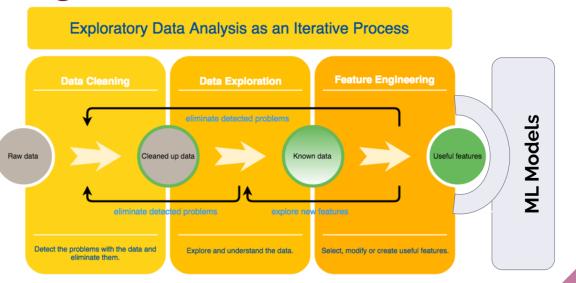
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Use this space to take notes:

Slide 13

► Big Picture



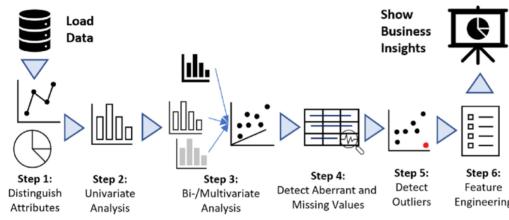
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Use this space to take notes:

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► Big Picture



Use this space to take notes:

Slide 15

► Big Picture

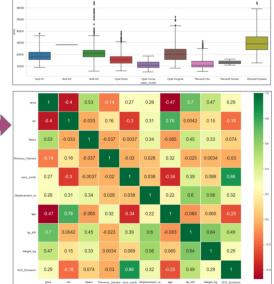
df_head[1].T	E	F	G	A
male	https://www.autoscout24.com/deutschland/autofahrer/autofahrer-a1- Aut.A1	https://www.autoscout24.com/deutschland/autofahrer/autofahrer-a1- Aut.A1		male, model
male, model	Aut.A1	Aut.A1		model, gender
short_descript	Spurtauto mit TDI 80kW, Benzin/Hybrid	1.9 TDI spqr		price
body_type	Limousine	Limousine		vat
year	2017	2016		VAT deductible
km	10700	14000		Price negotiable
vat				Type
tax	85,51 km	80,000 km		User
registration	2018-03-01	2018-03-01		Diesel
prev_owner	2 previous owners	None		Diesel
prev_owner				Contract_Contract
vin	Nahs			Ac conditoning/Automatic climate control
kg	1400	1400		
Type	L (Liquid, Diesel, Petrol/Gasoline)	[L (Liquid, Gasoline)]		Entertainment_Electronics
Pearson_Cars				Entertainment_Electronics
Model_Year	2018	2018		Exterior_Altitude
Inception_Year	[2018-03-01, ..., 2018-03-01]	[2018-03-01, ..., 2018-03-01]		Altitude_Handicap
Mileage	[0, ..., 14000]	[0, ..., 14000]		Altitude_Handicap
Full Service	[0, ..., 14]	[0, ..., 14]		Altitude_Handicap
Non-smoking_Vehicle				Altitude_Handicap
null	E	E		Altitude_Handicap
None	Vehicle	Vehicle		Altitude_Handicap
Model	[Aut.A1, ..., Aut.A1]	[Aut.A1, ..., Aut.A1]		Altitude_Handicap
Offer_Hamlet	[418, 4242418]	[418, 4242418]		Altitude_Handicap
First_Registrations	[in 2016, 19]	[in 2017, 19]		Altitude_Handicap
Body_Color	[in Black, 1]	[in Black, 1]		Altitude_Handicap

Use this space to take notes:

Slide 16

► Big Picture

	A	B
model, model	Gold A	Gold B
body_type	Saloon	Saloon
price	10777	14032
val	10000	10000
vat	VAT deductible	VAT deductible
km	56013.000	60000.000
gear	5 speed	6 speed
Fuel	Diesel	Diesel
Gears	5	7
Comfort_Convenience	All conditioning, Air conditioning, Climate control, Climate control + air, Air conditioning, Air conditioning, Climate control	All conditioning, Air conditioning, Climate control, Climate control + air, Air conditioning, Air conditioning, Climate control
Entertainment_Media	Bluetooth hands free equipment On Board	Bluetooth hands free equipment On Board
Feature	Alloy wheels, Catalytic Converter, Noise Control	Alloy wheels, Sport seats, Sun roof, suspension shock
Safety_Security	ABS, Central door lock, Daytime running light, D.	ABS, Central door lock, Central door lock + r.
Previous_Owners	1	1
hp_AH	66.000	141.000
Impression	1	1
Pain_Type	Model	Model
UpkeepCost	N/A	N/A
Wt_Wt	1.000	1.000
No_of_Seats	5.000	4.000
Quality_Type	Audiophile	Audiophile
Displacement_lt	1422.000	1798.000
Weight_kg	1226.000	1294.000
Drive_Type	Front	Front
cost_cost	3.000	5.000
Ctr_Emissions	90.000	120.000



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Use this space to take notes:

Slide 17

► Big Picture

	A	B
model, model	Gold A	Gold B
body_type	Saloon	Saloon
price	10777	14032
val	10000	10000
vat	VAT deductible	VAT deductible
km	56013.000	60000.000
gear	5 speed	6 speed
Fuel	Diesel	Diesel
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Comfort_Convenience	All conditioning, Air conditioning, Climate control, Climate control + air, Air conditioning, Air conditioning, Climate control	All conditioning, Air conditioning, Climate control, Climate control + air, Air conditioning, Air conditioning, Climate control
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	A	B
price	10777.000	14032.000
km	56013.000	60000.000
Gears	7.000	7.000
hp	66.000	141.000
Previous_Owners	2.000	1.000
hp_AH	66.000	141.000
Impression	1.000	1.000
Displacement_lt	1422.000	1798.000
Weight_kg	1226.000	1294.000
Drive_Type	Front	Front
cost	3.000	5.000
hp_Ah_suspension	0.000	0.000
ex_Ah_Air_suspension	0.000	0.000
ex_Ah_Airbreak	0.000	0.000
ex_Ah_Automatic_clutch	0.000	0.000
ex_Ah_Auxiliary_heating	0.000	0.000
ex_Ah_Cruise_control	0.000	0.000
ex_Ah_Electronic_stabilization	0.000	0.000
ex_Ah_Electric_silencer	0.000	0.000
ex_Ah_Electrical_sun_roof	0.000	0.000
ex_Ah_Electrically_heated_wipers	0.000	0.000
ex_Ah_Electrically_heated_windshield	0.000	0.000
ex_Ah_Hand_dryer	0.000	0.000
ex_Ah_Head_up_Display	0.000	0.000
ex_Ah_Rearview_mirror	0.000	0.000
ex_Ah_Ride_height_adjustment	0.000	0.000

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Use this space to take notes:

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▶ Table of Contents

▶ Introduction to Numpy

- What is NumPy?
- Why is NumPy Fast?
- Installation

▶ Numpy Arrays

- What is Array?
- Advantages of Arrays by Lists
- Creating NumPy Arrays
- Array Methods



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Your Response

You Chose

- **True**

Other Choices

I've completed the pre-class content?

True

False

 Pear Deck

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 Students choose an option

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- False

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Slide 21

▶ Introduction

What is NumPy?

 NumPy → **Numerical Python**

- ▶ NumPy is the **fundamental package for scientific computing in Python**.
- ▶ It is a Python library that provides:
 - A **multidimensional array object**,
 - **Various derived objects** (such as masked arrays and matrices),
 - An assortment of routines for **fast** operations on arrays including mathematical, logical, shape manipulation, sorting, selecting, I/O, discrete Fourier transforms, basic linear algebra, basic statistical operations, random simulation and much more.
- ▶ The core of NumPy is **well-optimized C code**.

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▶ Introduction

What is NumPy?



- ▶ At the core of the NumPy package, is the **ndarray** object.
- ▶ **Differences between NumPy arrays and the standard Python sequences:**
 - NumPy arrays **have a fixed size** at creation, unlike Python lists. Changing the size of an ndarray will create a new array and delete the original.
 - The elements in a NumPy array are all required to be of the **same data type**, and thus will be the **same size** in memory.
 - **Advanced mathematical operations** are executed more efficiently and with less code than is possible using Python's built-in sequences.

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Slide 23

▶ Introduction

Why is NumPy Fast?



- ▶ Numpy draws its power from its **vectorization** and **broadcasting** features.
- ▶ **Vectorization** describes the absence of any explicit looping, indexing, etc., in the code. Vectorized code has many advantages, among which are:
 - Vectorized code is **more concise and easier to read**.
 - **Fewer lines of code** generally means **fewer bugs**.
 - The code more closely resembles **standard mathematical notation** (making it easier, typically, to correctly code mathematical constructs)
 - Vectorization results in more "**Pythonic**" **code**. Without vectorization, our code would be littered with inefficient and difficult to read for loops.

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▶ Introduction



Why is NumPy Fast?

- ▶ **Broadcasting** is the term used to describe the implicit element-by-element behavior of operations.
- ▶ in NumPy all operations, not just arithmetic operations, but logical, bit-wise, functional, etc., behave in this implicit element-by-element fashion, i.e., they broadcast.

https://www.tutorialspoint.com/numpy/numpy_broadcasting.htm

<https://erdincuzun.com/numpy/05-numpy-broadcasting/>

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Link(s) on this slide:

- https://www.tutorialspoint.com/numpy/numpy_broadcasting.htm
- <https://erdincuzun.com/numpy/05-numpy-broadcasting/>

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▶ Introduction

Installation



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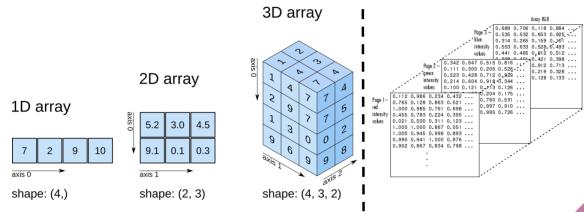
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▶ Numpy Arrays

What is Array?

- ▶ Array is a data structure that contains a group of elements. Typically these elements are all of the same data type, such as an integer or string.



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▶ Numpy Arrays

Advantages of Arrays by Lists

- ▶ Less memory
- ▶ Much faster
- ▶ Convenient
- ▶ Computations



*let's see its
implementation
in notebook*



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Your Response

Write down 4 of the built-in methods for creating an array in NumPy.



Students, write your response!



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Slide 29

▶ Numpy Arrays

- ▶ Built-in Array Creation Methods
 - `arange`
 - `zeros, ones, full`
 - `linspace`
 - `eye`
 - `random.rand`
 - `random.randn`
 - `random.randint`



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Your Response

Write down 4 of the array attributes in NumPy.



Students, write your response!



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Slide 31

▶ Numpy Arrays

- ▶ Array Methods & Attributes
 - `reshape`
 - `max, min, argmax, argmin`
 - `ndim`
 - `shape`
 - `size`
 - `dtype`
 - `itemsize`



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Data Analysis with Python



let's start the
hands-on phase

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Your Response

Did you find this lesson interesting and challenging?



Three circular icons representing feedback levels. From left to right: a teal icon with a thumbs-down and the text "Too hard"; a green icon with a thumbs-up and the text "Just right"; and a red icon with a thumbs-down and the text "Too easy".

Students, drag the icon! ●

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Slide 34

THANKS!

Any questions?

You can find us at:

steve_w@clarusway.com
michael_g@clarusway.com



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