AI Club Presents

SUMMER SCHOOL 2023

Intro to ML, DL and Computer Vision

Discover The Endless Possibilities of AI with us

SCHEDULE

Data analysis and visualization with Python

7th July, 2023

Intro to ML Regression Models

10th July, 2023

KNNs, SVMs, Naive Bayesian Classifiers

12th July, 2023

Decision Trees & Ensemble methods

14th July, 2023

Intro to Deep Learning Neural Networks

17th July, 2023

Data preprocessing & Optimizers

19th July, 2023

Intro to Computer Vision CNNs

21st July, 2023

Object Detection 101

24h July, 2023

Intro to Reinforcement Learning

26th July, 2023

TIMINGS: 5:00 PM - 7:30 PM

Q&A

AI Club presents

Summer School

What is Python?

Python is a high-level programming language created by Guido Van Rossum.

Why Python?

- Syntax is simple.
- Has a lot of libraries created by third parties which makes Python easier to use.
- And again syntax is very simple.

Data Types

- Variables are classified using data types
- Each data type gives a variable different properties (ex: size)

MOST COMMONLY USED DATA TYPES

Numeric

int (integers)
float (decimal values)
strings (characters, words or sentences)

Sequential Data Types

List
Tuple

Non-Sequential Data Types

Dictionary
Sets

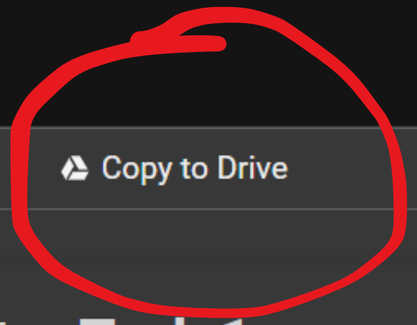
Boolean

True
False

Operators perform processes on variables and constants.

There are mainly 3 types of operators:

1. Arithmetic operators (+, -, /, *, **, %)
2. Comparison operators (>, <, ==, >=, <=)
3. Logical operators (AND, OR, NOT)



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Coordinator Task 1

Welcome to the first coordinator task bois!!

This time we have a task tailored specifically for you guys, not a house price prediction task, not a cat-dog classification task but something much more interesting!

IPL result prediction task!

Yes, you are right. Predict the *scripted* IPL matches using your ML skills! We have shared the IPL dataset spanning from the year 2008-2021. You are expected to predict the results for the year 2022.

Task : Predict the winner of every match conducted in 2023 based on the dataset that we have shared. The coordinator(s) whose model predicts with highest accuracy will be given a treat.

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Conditional Statements

Conditional statements are used in decision making.

The 3 keywords used in conditional statements are:

1. if
2. elif
3. else

LOOPS

Looping means repeating something over and over until a particular condition is satisfied.

There are 2 types of loops in Python:

1. for loop - when the number of iterations are known.
2. while loop - when the number of iterations is not known. The loop is terminated based on a given criteria.

NS FUNCTIONS FU

- Functions are modules of code that accomplish a specific task.
- A function executes only when it is called.
- Functions usually takes inputs , process it, and output (or return) a result.
- once a function is written it can be used any number of times.

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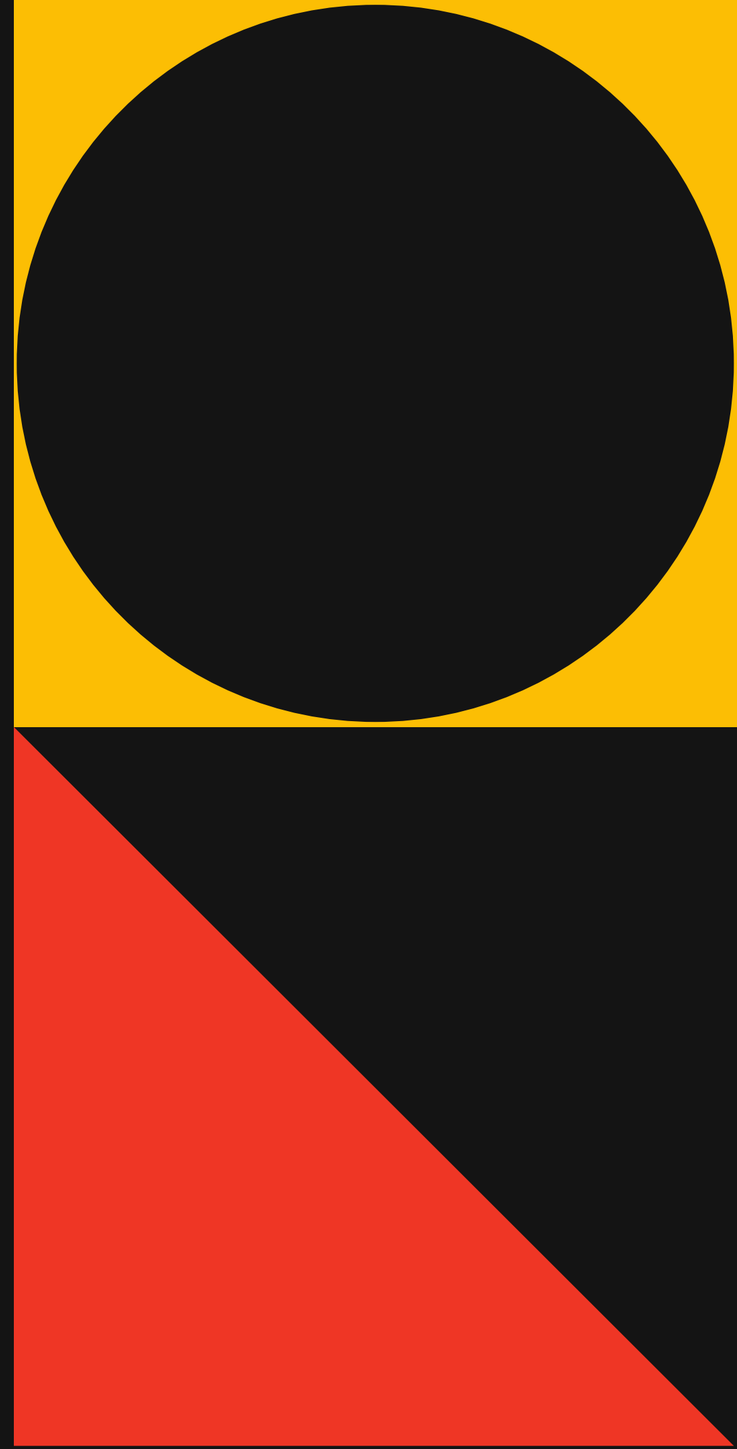
OOP

- OOP stands for object oriented programming.
- In OOP we use objects to contain data in the form of attributes and code in the form of procedures (methods).

WHAT ARE OBJECTS?

Objects are objects.



WHAT ARE CLASSES?

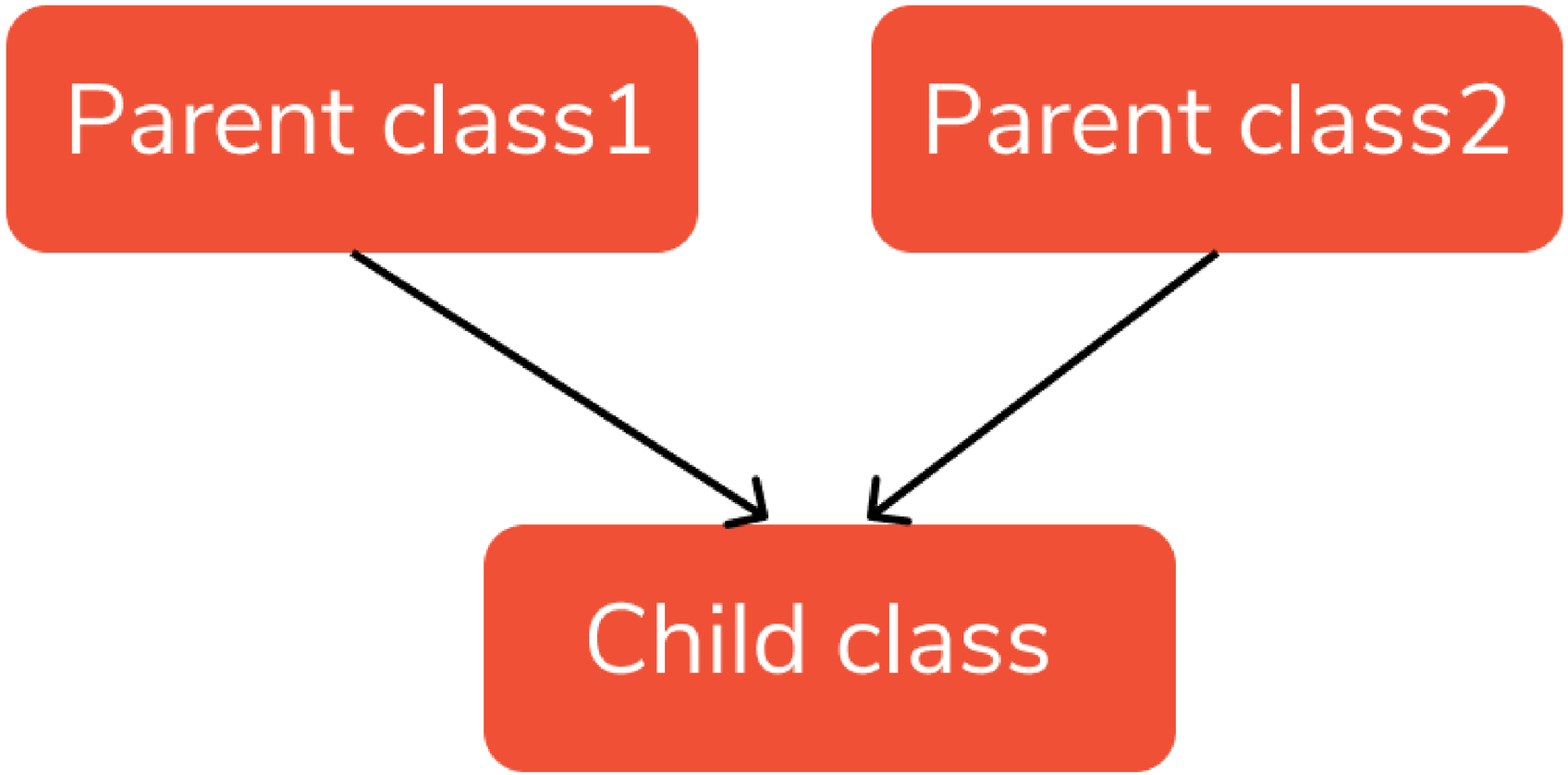
Classes contain blueprints that are used to make objects.

For example,
let's look at a car (object).
A car will have its engine, colour, brand, etc ie the blueprint (classes).

Here these features are the attributes/fields of the car.

And the different driving modes of the car are its methods.

Fields/attributes and methods together make a class.

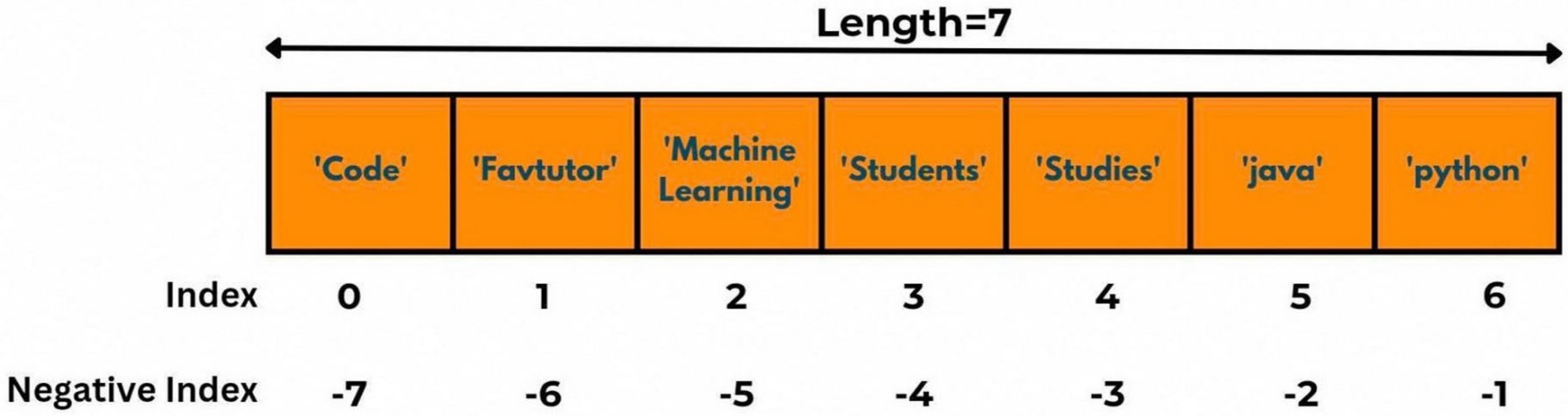

Parent class1
Parent class2
Child class

Data Structures

Ways you can store data

LISTS

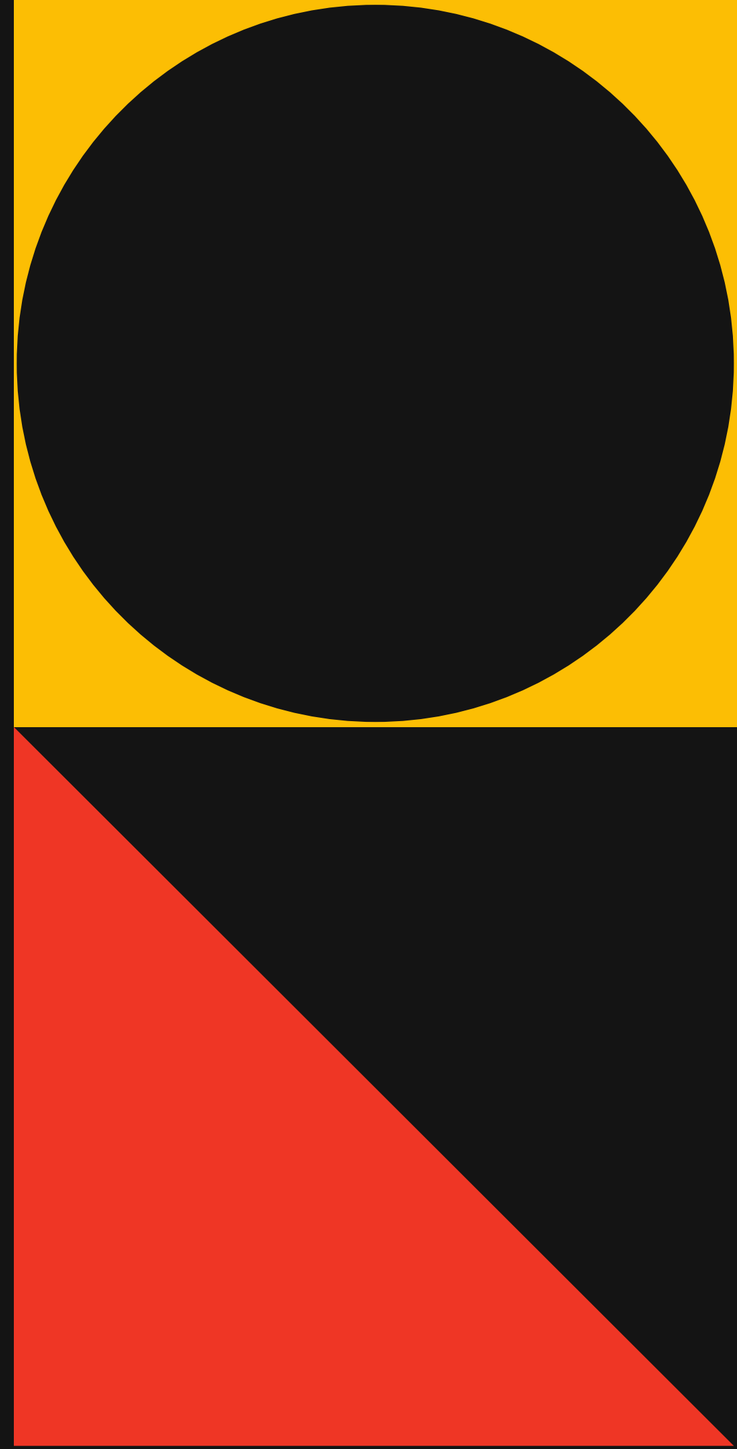
A list is a collection of entries that is ordered and can be changed. They also allow duplicate entries. Entries of list need not be of a same datatype.



TUPLES

Tuples are collections of entries which are ordered in the same way as lists but cannot be changed.

All the regular list operations apply to tuples except for those who attempt to change it's own value.



Dictionaries

- A dictionary is a collection of key-value pairs which is changeable and does not allow duplicate members.
- Keys of a dictionary are unique.
- In dictionaries, keys are immutable and the values are mutable.

```
# Create a dictionary

my_dict = {'Alex': 5,
           'Ben' : 10,
           'Carly': 12,
           'Danielle': 7,
           'Evan' : 6}
my_dict
```

```
{'Alex': 5, 'Ben': 10, 'Carly': 12, 'Danielle': 7, 'Evan': 6}
```

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Intro to Numpy

Table of Contents

Background

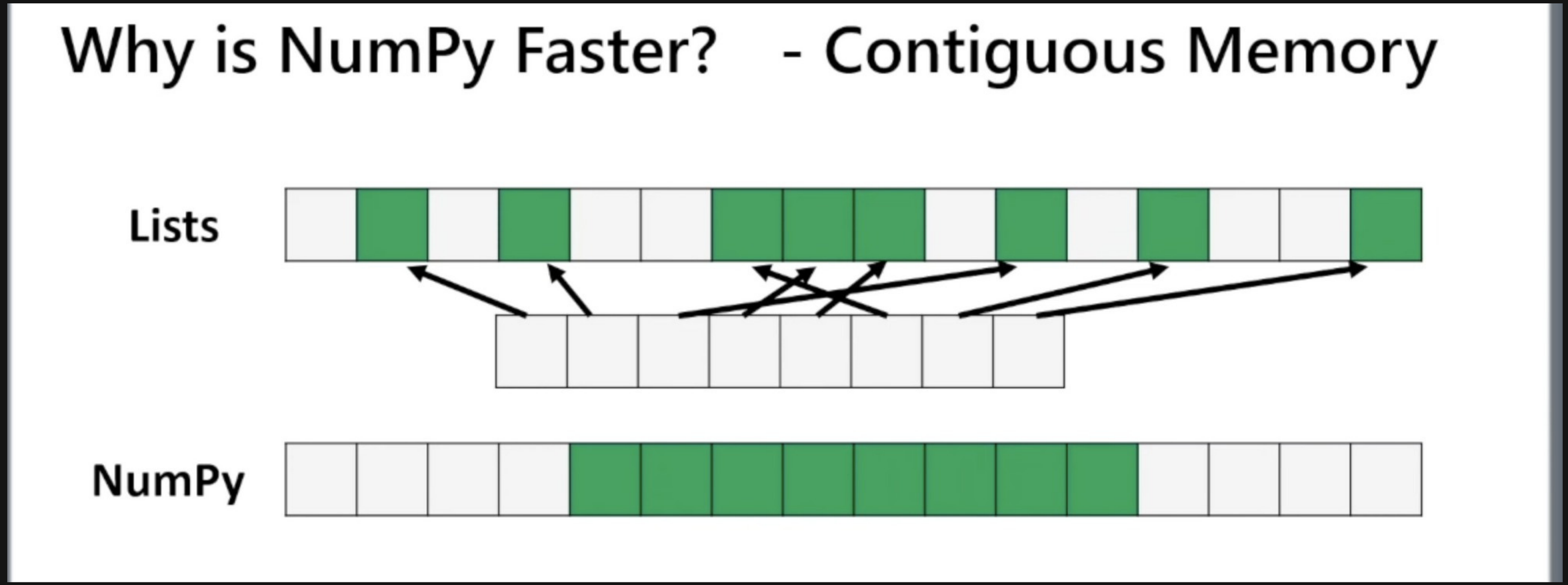
Numpy is an open source library concerned with array manipulation. It has various functions for mathematical operations such as arithmetic, trigonometric, fourier analysis, matrices .... the list just goes on !

So what makes it so useful?

Numpy is a very important, useful and famous library as it offers multi-dimensional array capabilities. Lists store values, numpy arrays have built in functions that we can use to manipulate data on a large scale.

Much faster than lists --
Lists store a lot more values than NumPy for
the same value.
You don’t have to do type checking any time
you read objects.
Numpy uses contiguous memory, so it’s easier
to go through them and faster.

Research Background & Motivationt



INDEXING AND SLICING

Indexing

Array indexing is the same as accessing an array element. You can access an array element by referring to its index number. The indices in NumPy arrays start with 0, meaning that the first element has index 0, and the second has index 1 etc.

Unsupervised Learning

Slicing in python means taking elements from one given index to another given index. We pass slice instead of index like this: [start:end]

Numpy offers several built in arithmetic operations. Some of these are listed below

- Raising the power- numpy.power() is a function that allows the user to raise the value of every single element to a power n. This is useful for large scale data manipulation

- Trigonometric - Apply trigonometric functions to all elements

- Add, subtract, multiply – numpy.add,
  numpy.subtract,
  numpy.multiply etc

Shape-

Shape of a numpy array is determined by the number of elements along each 'axis' .
eg- [[2, 3],[3,4],[4,5]] has a shape (3,2)

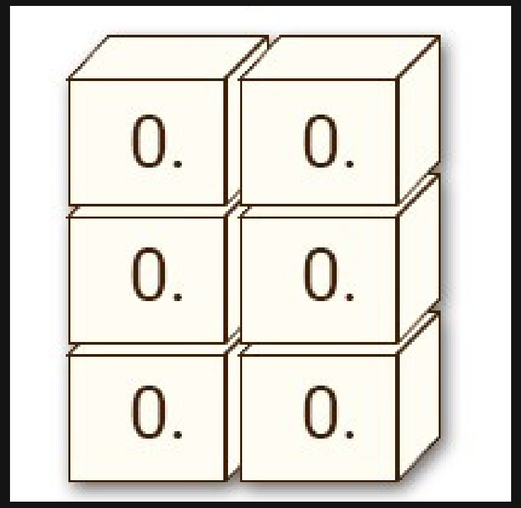
Stacking-

Stacking is basically arranging arrays along axes to form bigger new arrays.
eg- a = [[2,3], [3,4]] and b = [[1,8], [0,4]] stacking along the vertical axis,
c = [[2,3],
[3,4],
[1,8],
[0,4]]

Shape manipulation refers to modififying the shape of an array.

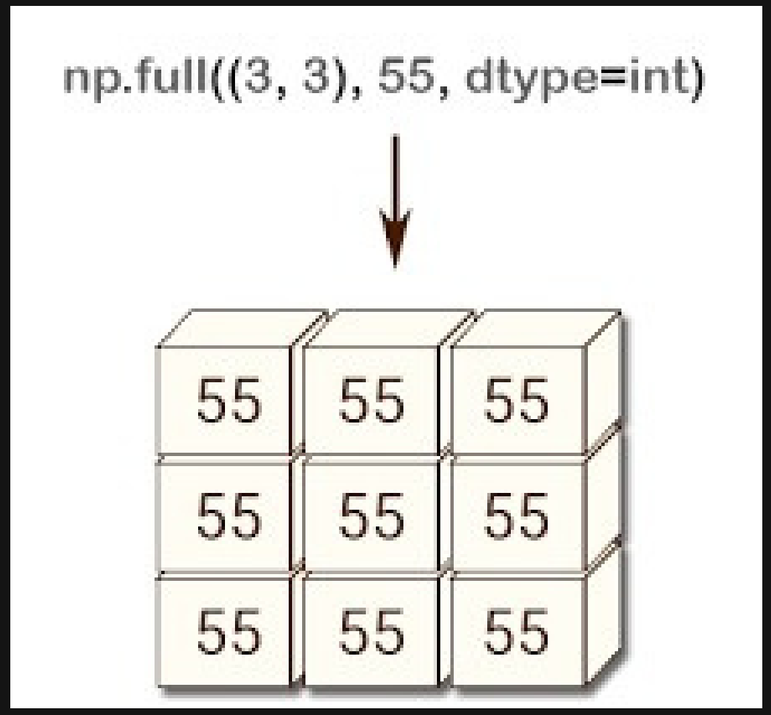
There are different way of doing this as per the situation. Some of the commonly used functions are:

- array.ravel() - This method unravels a multidimensional array essentially flattening it. This functions creates a new array without affecting the original
- array.reshape() - This method reshapes the array without affecting the original array
- array.resize() - This method resizes/reshapes the array thereby affecting the original array itself.



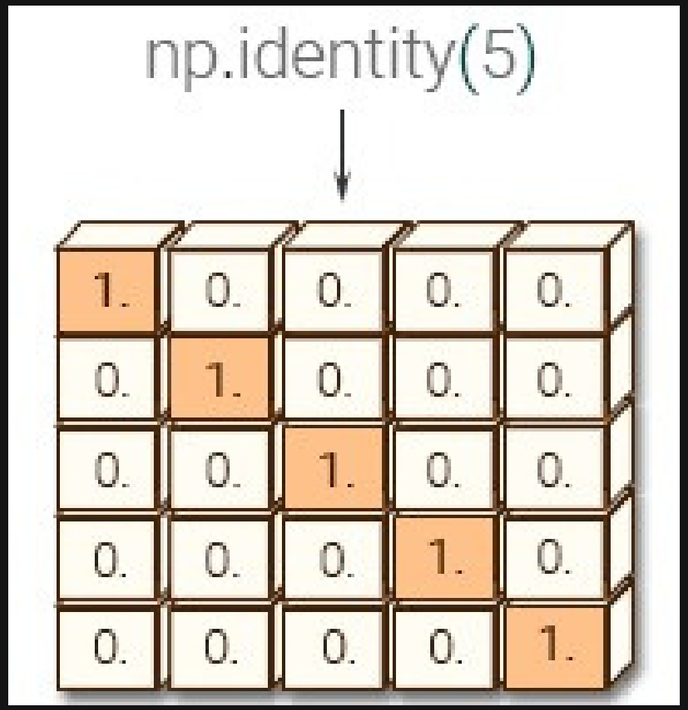
numpy.zeroes()

This is a function that allows the user to create an array of specific size with all 0 values. It is useful for initialization purposes.



numpy.full()

SImilarly , this function initializes an array with all entries as a number of the user's choice.



numpy.identit
y

An identity matrix is generated. This is especially useful when dealing with matrix multiplication and other matrix operations.

Numpy can also be used to read directly from a file :

```
filedata  =  np.genfromtxt('data.txt',  delimiter=',')
filedata = filedata.astype('int32')
print(filedata)
```

Now supposing we want to track the elements that were, say greater than 100 in this array, we just need to do :

```
print(filedata>100)
```

The issue in dealing with this function is that reading csv files is not feasible. This is where Pandas comes in.....