Programming fundamentals with Python
Session 6

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Plan for today

- Files refresher

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- Learn about JSON

the **open** function

We can use **open()** to open a file in Python, we only need to pass the path of the file we want to open. Let's say there's a file named hello.txt in my desktop that I want to open and read from Python, I can do it as follows:

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```python
file = open("/Users/pepe/Desktop/hello.txt")
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Reading the contents of a file

Now that we know how to open and close files, we can read the contents of a file. Let's do that line by line.

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for line in file:
    print(line)

file.close()
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Reading the contents of a file

Now that we know how to open and close files, we can read the contents of a file. Let's do that line by line.

```python
file = open("/Users/pepe/Desktop/hello.txt")

for line in file:
    print(line)

file.close()
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As you can see, we're treating `file` as a list of lines.

Interlude, **with**

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the file will always be closed, **with**:

```python
with open("file_path") as file:

    for line in file:
        #do something with line
        print(line)
```

Handling files. modes

When opening a file, we can choose in which **mode** we open it depending on how we're going to use it.

I/O Mode	Syntax	Behavior
Read	'r'	Opens the contents of a file for reading into the file interface, allowing for lines to be read-in successively.
Write	'w'	Creates a file with the specified name and allows for text to be written to the file; note that specifying a pre-existing filename will overwrite the existing file.
Append	'a'	Opens an existing file and allows for text to be written to it, starting at the conclusion of the original file contents.
Read and Write	'r+'	Opens a file such that its contents can be both read-in and written-to, thus offering great versatility.

Python's available file-access modes are summarized here.

doi:10.1371/journal.pcbi.1004867.t004

Figure 1: file modes

Writing files

We can write into files in a way similar to the one used for reading them.

Writing files

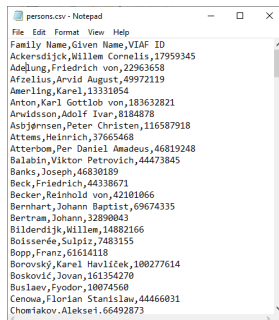We can write into files in a way similar to the one used for reading them.

```python
with open('/Users/pepe/Desktop/goodbye.txt', 'w') as file:
    file.write("goodbye y'all!")
```

CSV

CSV is a data interchange format used for representing tabular data.

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- We separate entries by adding a new line

CSV files - reading

The **csv** library is based on the idea of readers and writers. One can read all lines in a file like so:

```python
import csv

with open("file.csv") as f:
    reader = csv.reader(f)
    for line in reader:
        print(line)  #line is a list
```

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- first we open the file normally
- Then we create a reader using **csv.reader()**
- Finally, we operate with the reader

CSV files - writing
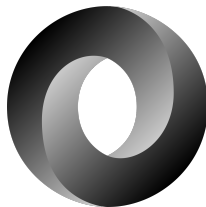
writing is not very different from reading:

```python
lines = [
  ["asdf", "qwer"],
  ["hello", "world"]
]

with open("file.csv", "a") as f:
    writer = csv.writer(f)
    for line in lines:
        writer.writerow(line)
```

JSON

JSON (http://json.org) is a data interchange format, like CSV
The main difference is that with JSON we can represent arbitrary data, not only tabular data.

JSON - how does it look like?

```json
{
    "orders": [
        {
            "orderno": "748745375",
            "date": "June 30, 2088 1:54:23 AM",
            "trackingno": "TN0039291",
            "custid": "11045",
            "customer": [
                {
                    "custid": "11045",
                    "fname": "Sue",
                    "lname": "Hatfield",
                    "address": "1409 Silver Street",
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- supports **primitive** datatypes (**int, str, bool, float**).
- supports collections of elements with **lists**
- supports mapping of elements with **dictionaries**

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Some valid JSON values are:

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[1, 2, 3]
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true
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- dictionaries

JSON

JSON is very similar to how we declare our data in Python but the cool thing about it is that it can be used **from any language**.

You will find the data files for these exercises in this repository:
https://github.com/pfp-2020/session-6

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