Exam Assignments V11

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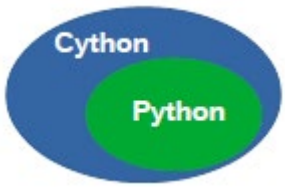
1. What is **Cython**?
   - **Cython** is a **compiled language** used to make **Python code run faster**, or, to **interface with the C** and **C++** libraries.
   - **Cython** is a **superset of Python** ! valid Python is also valid Cython



2. Describe an **approach how Python programs** can be **accelerated with** the help of **Cython**.
   - ➔ put function custom_filter into a separate file (filter.pyx)
   - ➔ add Cython data types to variables
   - ➔ add Cython compiler directives at the start of file filter.pyx (see

3. Describe **two ways** for **compiling** a **.pyx Cython module**.

1） use **pyximport** to **automatically recompile** and **reload.pyx module**.

➔ Useful for building pure Cython modules during development Name and describe **two compiler directives** in **Cython**.
Add the following two lines **at** the **start** of your **Python script**:

```
import pyximport
pyximport.install()
```

2） Compiling with a Jupyter Notebook
enable cython in jupyter notebook with %load_ext cython

4. What is the difference between **def**, **cdef** and **cpdef** when declaring a **Cython function**?
   - **def** — regular python function, calls from Python only.[1]
   - **cdef** — Cython only functions which can't be accessed from python-only code i.e must be called within Cython
   - **cpdef** — C and Python. Can be accessed from both C and Python

[1] Use Cython to get more than 30X speedup on your Python code | by George Seif | Towards Data Science

5. What are **typed memoryviews** especially **useful for** in **Cython**?

   Useful for **passing** Python or Numpy **arrays to Cython**

   Typed memoryviews allow efficient access to memory buffers, such as those underlying **NumPy arrays**, without incurring any Python overhead. Memoryviews are similar to the current NumPy array buffer support [2](`np.ndarray[np.float64_t, ndim=2]`), but they have more features and cleaner syntax.

   Memoryviews are more general than the old NumPy array buffer support, because they can handle a wider variety of sources of array data. For example, they can handle C arrays and the Cython array type (Cython arrays).

   A memoryview can be used in any context (function parameters, module-level, cdef class attribute, etc) and can be obtained from nearly any object that exposes writable buffer through the PEP 3118 buffer interface.

[2] Typed Memoryviews — Cython 3.0.0a10 documentation