Python-Modules and Packages

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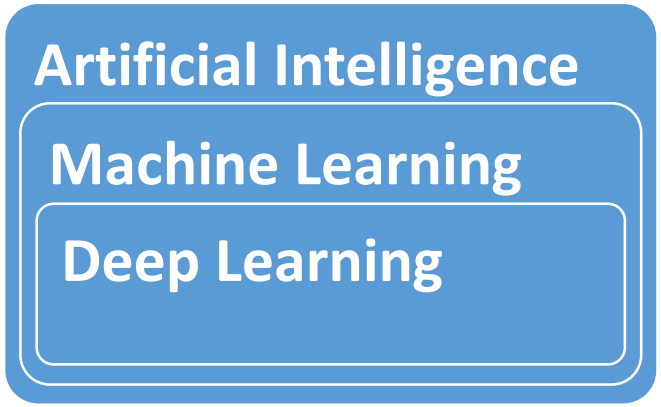
Agenda

- Modules
- Packages
- Creating and using modules
- Creating and using packages



One guiding principle of Python code is that
"explicit is better than implicit"

"Success is more a function of consistent common sense than it is of genius"
(An Wang, Computer engineer and inventor, 1920 - 1990)

Python - Modules

*Every file, which has the file extension .py and consists of proper Python code, can be called as a **module***

- **module** is a **Python** object with arbitrarily named attributes that programmer can bind and reference.
- **module** is a file consisting of **Python** code.
- **module** can define functions, classes and variables.
- **module** can also include runnable code.
- The objects, i.e. files, classes or attributes contained in a module can be accessed after import.

```
import math
math.pi
```

```
3.141592653589793
```

Package in Python

- **package** is a collection of **Python modules**
- **package** is a directory of **Python modules** containing an additional __init__.**py** file,

- Modules are used to break down large programs into small manageable and organized files.
- modules provide reusability of code.
- Python has a ton of standard modules available.
- User-defined modules can also be imported in same way as Standard modules are imported.

Import with renaming

- import math as m
- print("The value of pi is", m.pi)

Import specific names from a module without importing the module as a whole.

- from math import pi
- from math import pi, e
- from math import *

  print("The value of pi is ", pi)

Creating own modules

- Create a file name myModule.py having

```
def hiModule():
        print('This is Module calling')
        print('Inside hiModule')
```

```
%run myModule.py
```

```
hiModule
```

```
<function __main__.hiModule>
```

```
hiModule()
```

```
This is Module calling
Inside hiModule
```

Open new notebook

- Try using hiModule()

  error is generated

```
hiModule()
```

```
---------------------------------------------------------
NameError                                 Traceback (mo
<ipython-input-1-4d63db864d68> in <module>()
----> 1 hiModule()

NameError: name 'hiModule' is not defined
```

import myModule

myModule.hiModule()

```
import myModule
myModule.hiModule()
```

```
This is Module calling
Inside hiModule
```

Another way to use function :

import myModule import hiModule

hiModule()

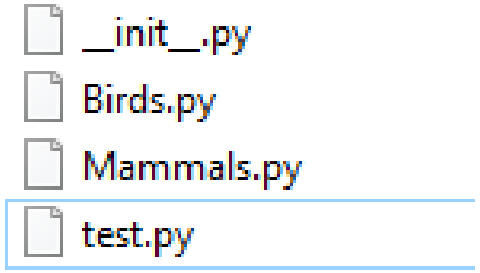
```
from myModule import hiModule
hiModule()
```

```
This is Module calling
Inside hiModule
```

Creating own package

- Create a directory having new package's name.
- Put all classes in it.
- Create a **__init__.py** file in the directory. This is important to differentiate package directory from the ordinary directories.
- import statements to *import* classes from newly created package are written in this file

Animals directory contains



- Birds.py file having Birds class
- Mammals.py file having Mammals class

__init__.py file contains

from Mammals import Mammals
from Birds import Birds

```
class Birds:
    def __init__(self):
        ''' Constructor for this class. '''
        # Create some member animals
        self.members = ['Sparrow', 'Robin', 'Duck']


    def printMembers(self):
        print('Printing members of the Birds class')
        for member in self.members:
            print('\t%s ' % member)
```

```
class Mammals:
    def __init__(self):
        ''' Constructor for this class. '''
        # Create some member animals
        self.members = ['Tiger', 'Elephant', 'Wild Cat']


    def printMembers(self):
        print('Printing members of the Mammals class')
        for member in self.members:
            print('\t%s ' % member)
```

Using classes from package

```
import Animals
#import classes from new Package
from Animals import Mammals
from Animals import Birds
newMammal = Mammals()
newBird = Birds()
newMammal.printMembers()
newBird.printMembers()
```

```
Printing members of the Mammals class
        Tiger
        Elephant
        Wild Cat
Printing members of the Birds class
        Sparrow
        Robin
        Duck
```

```
%run Animals/test.py
```

```
Printing members of the Mammals class
        Tiger
        Elephant
        Wild Cat
Printing members of the Birds class
        Sparrow
        Robin
        Duck
```