Python Programming for Arcgis 1

Daniel Sheehan
dsheehan@mit.edu, gishelp@mit.edu

9:30-12:30
January 31, 2013

This class was originally developed by David Quinn and taught by David and Daniel in IAP 2010 and 2011.
Outline

• Introduction to Python and Arcgis

• Programming Principles and Modules

• Model Builder

• Read and Writing data
Python

Python is a language that lets you work more quickly and integrate your systems more effectively \(^1\)

Documentation at [http://docs.python.org](http://docs.python.org) and look for Python 2.7 (used in Arcgis 10.1)

\(^1\) [http://www.python.org](http://www.python.org)
Python + Arcgis

- Python can interact with Arcgis and be used to repeat many types of analyses.
- Why Python?
  - It is an integral part of Arcgis
  - Easy to read syntax
  - Large user community
  - Useful for scripts to control other programs
How does Python work with Arcgis

- At Arcgis 10.1
  - Fully integrated into Arcgis
  - Largely Geoprocessing functions
  - Automated mapping is not possible, yet
Logistics

• We will be using the IDLE programming environment

• Windows: START -> Programs -> Arcgis -> Python 2.7 -> IDLE

• We are using Arcgis 10.1 on lab computers and assume that you are using 10.1 if you are using your own laptop
Programming concepts

• Variables

• Control Structures (IF statements and FOR loops)

• Functions

Python is case sensitive and reads whitespace for defining programming blocks – use space bar, not tabs.
The Print Function and Strings

# this is a comment
print “hello world”

""" Alternative
    Commenting
    Style """

The Print function and Strings

# this is a comment
print “hello world”

# this is a variable that contains a string
name = “Daniel”
print name
Integers and Floats

# declare variables
int_sample = 10
float_sample = 10.0

# printing variables
# cast non-string variable as a string using str()
print "The value of this integer is: " + str(int_sample)
print "The value of this float is: " + str(float_sample)
if statement

x = 2

# Condition checks if statement is true

If x == 1:
    print ‘x is 1!’
if / elif / else statement

x = 2

# Condition checks if statement is true
if x == 1:
    print 'x is 1!'
elif x == 2:
    print 'x is 2!'
else:
    print 'x is not known'
for loop

for i in range(3):
    # convention is to use 4 spaces to indent
    # python reads whitespace at the beginning of a line
    print i

Python, like most programming languages, uses arrays that are zero based.
while loop

# define j
j = 1

# ‘while’ less than some condition
while j < 3:
    print j
    # increment j
    j += 1
Three ways to access a folder

# Accessing a folder

path = "C:\\folderName\\"

path = "C:/folderName/"

path = r""C:\folderName\""
Importing Modules

Use the *import* command:

```python
# count the number of files in a directory

import os
files = os.listdir(path)
len(files)
```

A module is a list of Python programs that can be accessed. Commonly used modules are *os*, *sys*, *glob*.
import glob # use the glob module
path =
    "C:\users\dsheehan\2012_work\JPAL"
# loop through all files
for i in glob.glob(path + "*"):
    print i

Try replacing '*' with '*.shp'
Importing the Arcgis module

At 10.0 and 10.1

import arcpy

At 9.3:

import arcgisscripting
Exercise 1: Reading folder contents

• Download zip file from course site:

• Using the glob module, print out:
  – a list of all of the files
  – a list of shapefiles
Model Builder
Exercise 2: ModelBuilder

Using ModelBuilder:

• Buffer interstateHighways.shp (500 meters)
  – Units of data is meters
• Clip cambridgeSchools.shp with buffer
• Export model as ‘Python’
Catching exceptions

Try:

<your code>

except:
    print arcpy.GetMessages()
    raise
Overwriting files

• from arcpy import env

• env.overwriteOutput = True
Exercise 3: Convert ModelBuilder Code into a loop

• Using the code from ModelBuilder
• Identify relative filepaths and restructure code
• Iterate through this loop 2 times, buffering 500 meters, 1000 meters
• Intersect cambridgeSchools.shp with buffer and make 2 new shapefiles
Writing to a text file

# Create a file ('w' means create a new file, 'a' appends to an existing file, will create it if it doesn't already exist)
f = open("C:\\users\\dsheehan\\test.txt", 'w')
# Write to a file
f.write("Contents of file" + "\n")

f.flush() # flushes buffer
f.close() # closes file
Exercise 4: File Manipulation

Create a folder called “temp_folder”:

• Make 5 text files called File1.txt, File2.txt, etc.
• Write a string in each file