山东科技大学——测绘与空间信息学院

Python程序设计

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2021年4月19日星期一

课程安排：

36个学时，其中授课24个学时，实验12个学时

成绩：

出勤5% + 实验报告25% + 考试70%

章节内容

第1章 认识Python

第2章 Python编程基础

第3章 函数、类、包和模块

第4章 文件操作

第5章 地图文档管理

第6章 数据链接查找与修复

第7章 地图制图与输出

第8章 地理处理工具的执行

第9章 地理处理工具的创建

第10章 数据查询与选择

第11章 数据访问模块

第12章 获取GIS数据的列表和描述

第12章 获取GIS数据的列表和描述

使用ArcPy列表函数

获取要素类或表中的字段列表

使用Describe()函数返回要素类的描述性信息

使用Describe()函数返回栅格图像的描述性信息

12.1 使用ArcPy列表函数

有些情况下需要遍历磁盘上所有的数据集，并对每个数据集执行某种特定的操作。获取数据列表通常是一项具体的地理处理任务的第一步，可以通过使用ArcPy中的列表函数来完成。

这些列表将作为Python的列表对象返回，可以进一步通过迭代这些返回的列表对象来做下一步的数据处理。

12.1 使用ArcPy列表函数

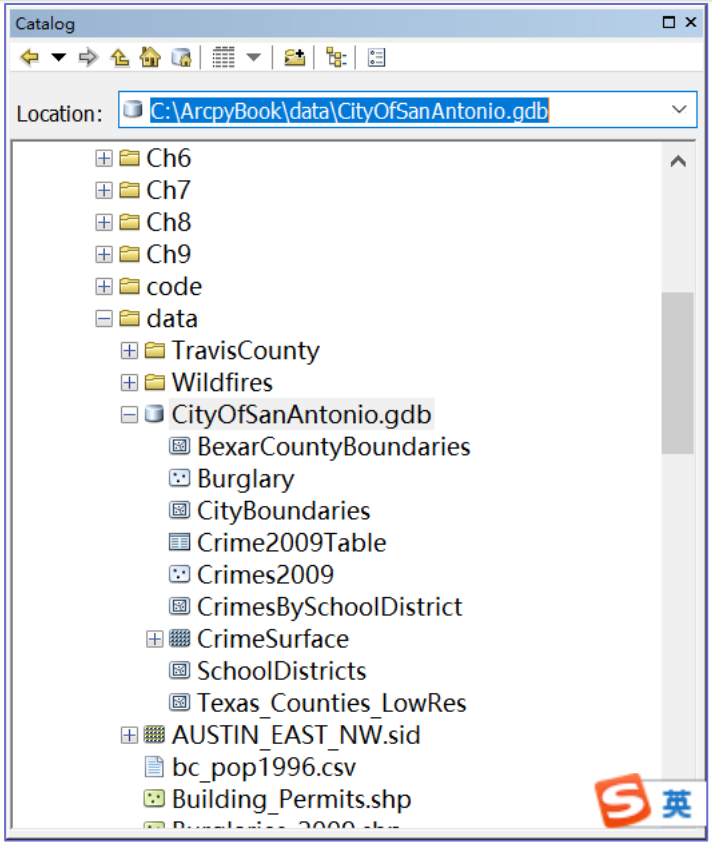
第5章“地图文档管理”中介绍的列表函数是arcpy.mapping模块中的。

本章介绍的列表函数属于ArcPy模块，更为普遍和通用。

12.1 使用ArcPy列表函数

ArcPy中有获取字段、索引、数据集、要素类、文件、栅格、表和其他对象列表的函数，所有的列表函数执行的操作基本相同。

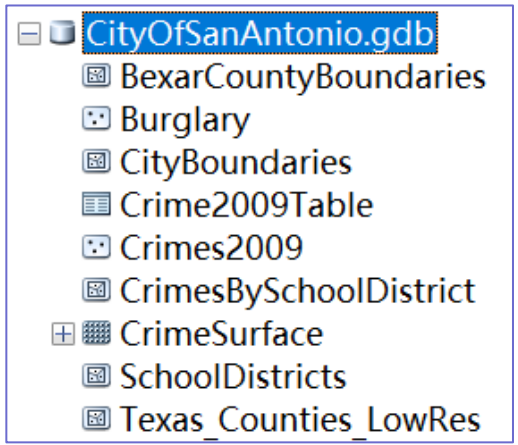
12.1 使用ArcPy列表函数



12.1 使用ArcPy列表函数

Python

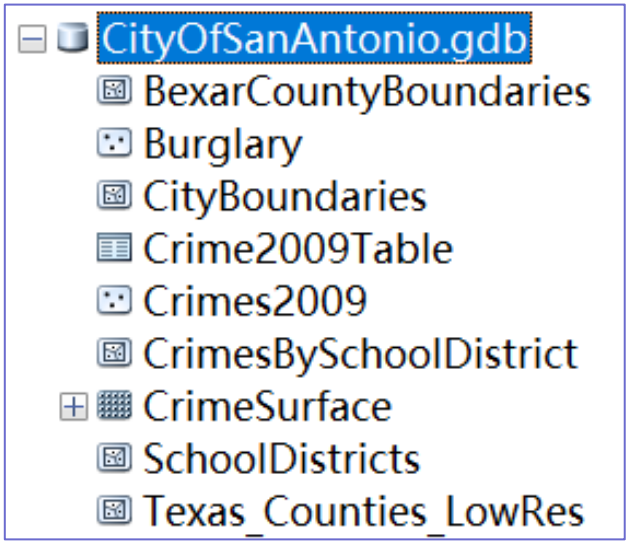
```
>>> import arcpy
>>> arcpy.env.workspace = r'C:\ArcpyBook\data\CityOfSanAntonio.gdb'
>>> fcList = arcpy.ListFeatureClasses()
>>> for fc in fcList:
...     print(fc)
...
Crimes2009
CityBoundaries
CrimesBySchoolDistrict
SchoolDistricts
BexarCountyBoundaries
Texas_Counties_LowRes
Burglary
```



ListFeatureClasses ({wild_card}, {feature_type}, {feature_dataset})

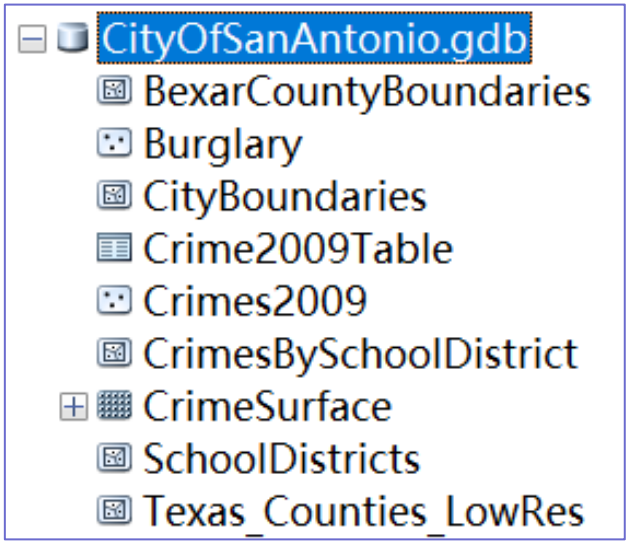
Parameter	Explanation	Data Type
wild_card	The wild card limits the results returned. If no wild card is specified, all values are returned.	String
feature_type	The feature type to limit the results returned by the wild card argument. Valid feature types are: • Annotation —Only annotation feature classes are returned. • Arc —Only arc (or line) feature classes are returned. • Dimension —Only dimension feature classes are returned. • Edge —Only edge feature classes are returned. • Junction —Only junction feature classes are returned. • Label — Only label feature classes are returned. • Line —Only line (or arc) feature classes are returned. • Multipatch —Only multipatch feature classes are returned. • Node —Only node feature classes are returned. • Point —Only point feature classes are returned. • Polygon —Only polygon feature classes are returned. • Polyline —Only line (or arc) feature classes are returned. • Region —Only region feature classes are returned. • Route —Only route feature classes are returned. • Tic —Only tic feature classes are returned. • All — All datasets in the workspace. This is the default value. (The default value is All)	String
feature_dataset	Limits the feature classes returned to the feature dataset, if specified. If blank, only stand-alone feature classes will be returned in the workspace.	String

12.1 使用ArcPy列表函数



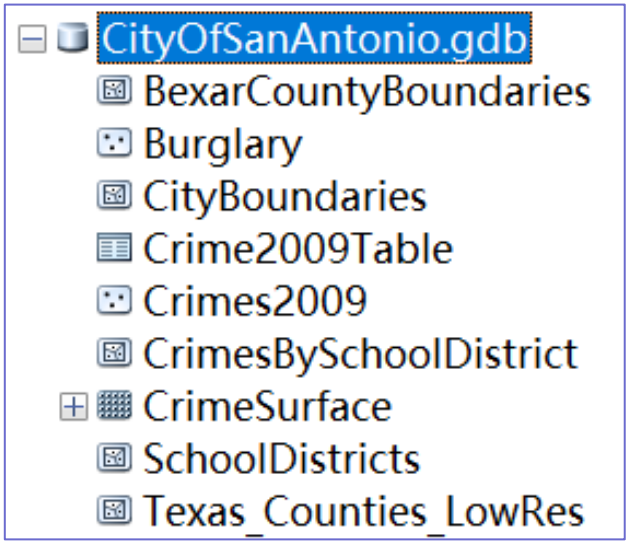
返回以C开头的要素类列表。

12.1 使用ArcPy列表函数



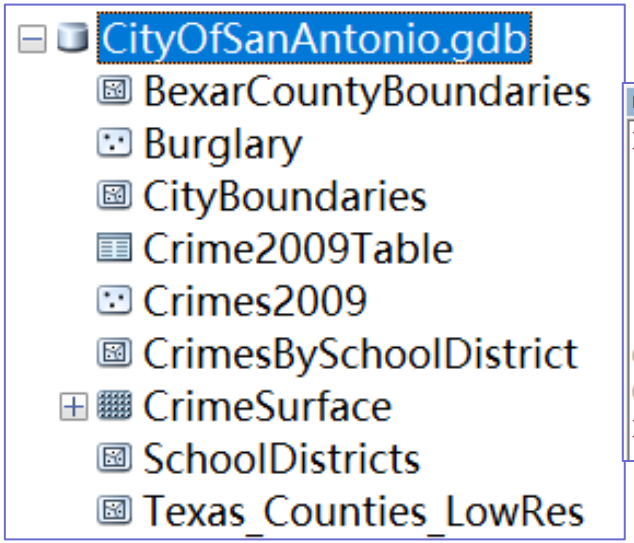

```
>>> import arcpy
... arcpy.env.workspace = r'C:\ArcpyBook\data\CityOfSanAntonio.gdb'
... fcList = arcpy.ListFeatureClasses('C*')
... for fc in fcList:
...     print(fc)
...
Crimes2009
CityBoundaries
CrimesBySchoolDistrict
```

12.1 使用ArcPy列表函数



返回以C开头且数据类型为Polygon的要素类。

12.1 使用ArcPy列表函数



Python

```
>>> import arcpy
... arcpy.env.workspace = r'C:\ArcpyBook\data\CityOfSanAntonio.gdb'
... fcList = arcpy.ListFeatureClasses('C*','Polygon')
... for fc in fcList:
...     print(fc)
...
CityBoundaries
CrimesBySchoolDistrict
>>>
```

12.1 使用ArcPy列表函数

使用IDLE或其他Python开发环境开发脚本时，在调用任何列表函数之前，都需要使用环境设置语句设置工作空间；否则，列表函数将无法确定要获取哪个数据集中的列表。

12.2 获取要素或表中的字段列表

要素类和表中往往包含一个或多个属性信息，可以通过ListFields()函数获取要素类中的字段列表。

ListFields()函数返回一个只包含Field对象的列表，其中的每个字段都来自要素类或表。可以使用通配符参数或字段类型参数来筛选返回的列表。

每个Field对象包含多种只读属性，如Name、AliasName、Type和Length等

无标题 - ArcMap

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

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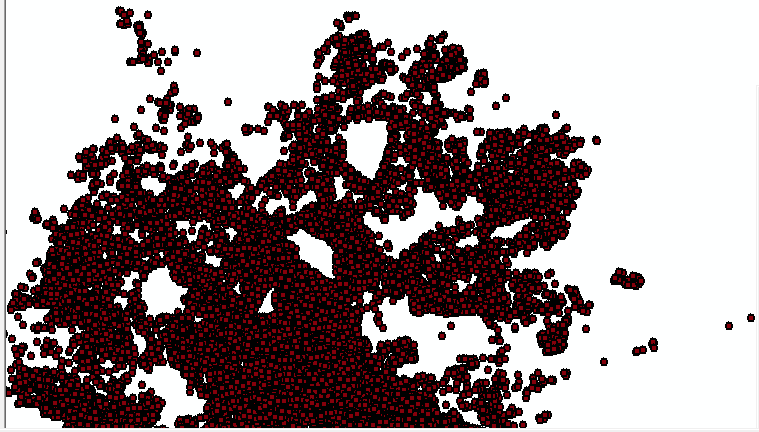
Layers

C:\ArcpyBook\data\CityOfSanAntonio.gdb

Burglary



Catalog

Location: Burglary

Ch6
Ch7
Ch8
Ch9
code
data
TravisCounty
Wildfires
CityOfSanAntonio.gdb
BexarCountyBoundaries

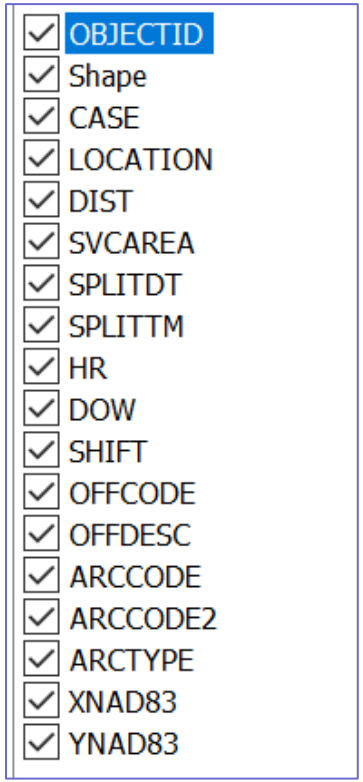
Table

Burglary

OBJECTID *	Shape *	CASE	LOCATION	DIST	SVCAREA	SPLITDT	SPLITTM	HR	DOW	SHIFT
1	Point	9069434301	1533 AUSTIN HWY	3320	North	2009/9/15	0:00:00	0	Tue	C
2	Point	9069844401	4801 GUS ECKERT	7150	Prue	2009/9/15	0:00:00	17	Tue	B
3	Point	9069844801	4002 BELLE GROVE ST	7220	Prue	2009/9/15	0:00:00	18	Tue	B
4	Point	9069845801	2313 NW MILITARY HY	7230	Prue	2009/9/15	0:00:00	18	Tue	B
5	Point	9069846601	4070 SUNRISE PASS	4180	East	2009/9/15	0:00:00	13	Tue	A
6	Point	9069847301	9904 ARDASH LN	7110	Prue	2009/9/15	0:00:00	18	Tue	B
7	Point	9069849501	3301 CATO BLVD	6230	South	2009/9/15	0:00:00	13	Tue	A
8	Point	9069849901	826 RIVAS ST	2310	Central	2009/9/15	0:00:00	16	Tue	B
9	Point	9069852601	314 CRAVENS AV	4240	East	2009/9/15	0:00:00	13	Tue	A
10	Point	9069854301	2334 AUSTIN HWY	3330	North	2009/9/15	0:00:00	15	Tue	B
11	Point	9069861801	134 TWILIGHT TE	3260	North	2009/9/15	0:00:00	19	Tue	B
12	Point	9069868701	308 CORONADO ST	5110	West	2009/9/15	0:00:00	15	Tue	B
13	Point	9069868801	7300 JONES MALTSBRG	3310	North	2009/9/15	0:00:00	19	Tue	B
14	Point	9069874101	4023 SUNRISE COVE	4180	East	2009/9/15	0:00:00	19	Tue	B
15	Point	9069874601	10362 SAHARA DR	3110	North	2009/9/15	0:00:00	20	Tue	B
16	Point	9069875001	100 MILITARY DR SW	6260	South	2009/9/15	0:00:00	16	Tue	B

-98.65 29.573 Decimal Degrees

12.2 获取要素或表中的字段列表




```
>>> import arcpy
... arcpy.env.workspace = r'C:\ArcpyBook\data\CityOfSanAntonio.gdb'
... fieldList = arcpy.ListFields('Burglary')
... for fld in fieldList:
...     print('%s is a type of %s with a length of %i' %(fld.name,
 fld.type, fld.length))
...
OBJECTID is a type of OID with a length of 4
Shape is a type of Geometry with a length of 0
CASE is a type of String with a length of 11
LOCATION is a type of String with a length of 40
DIST is a type of String with a length of 6
SVCAREA is a type of String with a length of 7
SPLITDT is a type of Date with a length of 8
SPLITTM is a type of Date with a length of 8
HR is a type of String with a length of 3
DOW is a type of String with a length of 3
SHIFT is a type of String with a length of 1
OFFCODE is a type of String with a length of 10
OFFDESC is a type of String with a length of 50
ARCCODE is a type of String with a length of 10
ARCCODE2 is a type of String with a length of 10
ARCTYPE is a type of String with a length of 10
XNAD83 is a type of Double with a length of 8
YNAD83 is a type of Double with a length of 8
>>>
```

12.2 获取要素或表中的字段列表

ListFields (dataset, {wild_card}, {field_type})

Parameter	Explanation	Data Type
dataset	The specified feature class or table whose fields will be returned.	String
wild_card	The wild card limits the results returned. If no wild card is specified, all values are returned. (The default value is None)	String
field_type	The specified field type to be returned. Valid field types are: • All — All field types are returned. This is the default. • BLOB —Only field types of BLOB are returned. • Date —Only field types of Date are returned. • Double —Only field types of Double are returned. • Geometry —Only field types of Geometry are returned. • GlobalID —Only field types of GlobalID are returned. • GUID —Only field types of GUID are returned. • Integer —Only field types of Integer are returned. • OID —Only field types of OID are returned. • Raster —Only field types of Raster are returned. • Single —Only field types of Single are returned. • SmallInteger —Only field types of SmallInteger are returned. • String —Only field types of String are returned. (The default value is All)	String

12.3 使用Describe() 返回要素类的描述性信息

所有的数据集都含有描述性信息。例如，一个要素类有名称、形状类型和空间参考等。当使用脚本来查找特定的信息用于进一步处理时，这些描述性信息就显得非常有用。使用Describe()函数所获取的数据集的基本描述信息，可以理解为数据集的元数据。

无标题 - ArcMap

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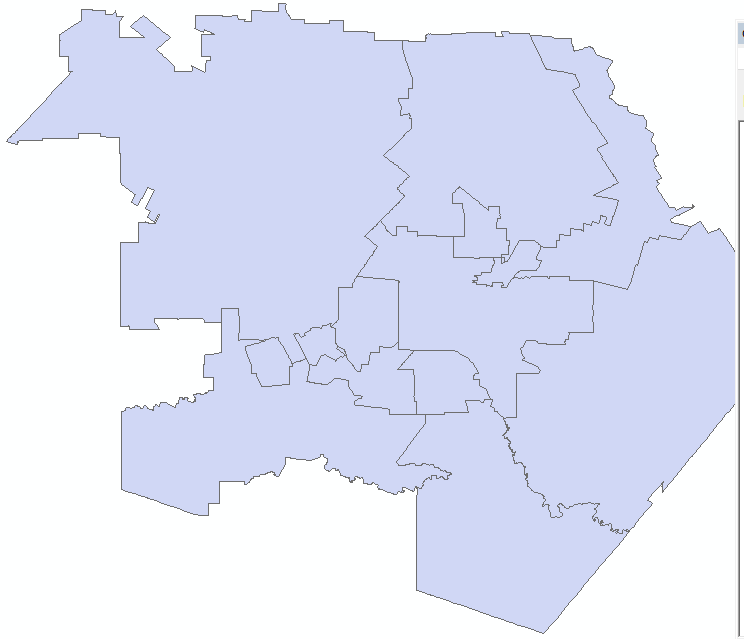
Layers

C:\ArcpyBook\New_Data\CityOfSanAntonio_Pe

SchoolDistricts



Catalog

Location: CityOfSanAntonio_Personal.mdb

- Ch9
- code
- data
- GenerateRandomPoints
- New_Data
  - CityOfSanAntonio_Personal.mdb
    - BexarCountyBoundaries
    - CityBoundaries
    - Crime2009Table
    - Crimes2009
    - CrimesBySchoolDistrict
    - SchoolDistricts
    - Texas_Counties_LowRes
  - PythonAddInTest
  - Unique.mdb
  - ch4Crime.sddraft
- Intel
- LenovoDrivers
- LenovoQMDownload
- OneDriveTemp
- PerfLogs

Python

```
>>> import arcpy
... arcpy.env.workspace = r'C:\ArcpyBook\New_Data
```

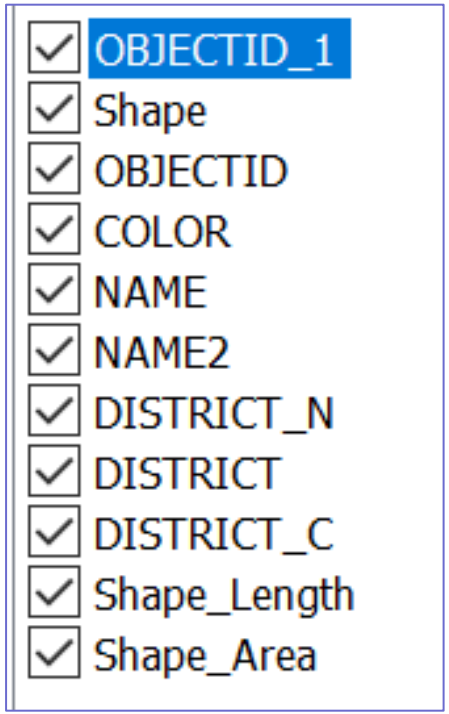
-98.707 29.487 Decimal Degrees

12.3 使用Describe() 返回要素类的描述性信息

Python

```
>>> import arcpy
... arcpy.env.workspace = r'C:\ArcpyBook\New_Data
 \CityOfSanAntonio_Personal.mdb'
... try:
...     descFC = arcpy.Describe("SchoolDistricts")
...     print("The shape type is: " + descFC.ShapeType)
...     flds = descFC.fields
...     for fld in flds:
...         print("Field: " + fld.name)
...         print("Type: " + fld.type)
...         print("Length: " + str(fld.length))
...     ext = descFC.extent
...     print("XMin: %f" % (ext.XMin))
...     print("YMin: %f" % (ext.YMin))
...     print("XMax: %f" % (ext.XMax))
...     print("YMax: %f" % (ext.YMax))
... except:
...     print(arcpy.GetMessages())
```

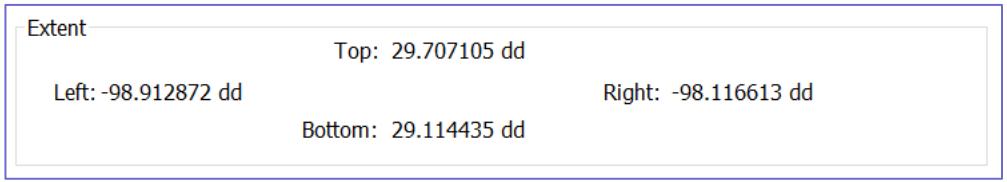
12.3 使用Describe() 返回要素类的描述性信息




```
The shape type is: Polygon
Field: OBJECTID_1
Type: OID
Length: 4
Field: Shape
Type: Geometry
Length: 0
Field: OBJECTID
Type: Double
Length: 8
Field: COLOR
Type: SmallInteger
Length: 2
Field: NAME
Type: String
Length: 254
Field: NAME2
Type: String
Length: 254
Field: DISTRICT_N
Type: Double
Length: 8
Field: DISTRICT
Type: String
Length: 7
Field: DISTRICT_C
```

12.3 使用Describe() 返回要素类的描述性信息

```
XMin: -98.912872
YMin: 29.114435
XMax: -98.116613
YMax: 29.707105
```



无标题 - ArcMap

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

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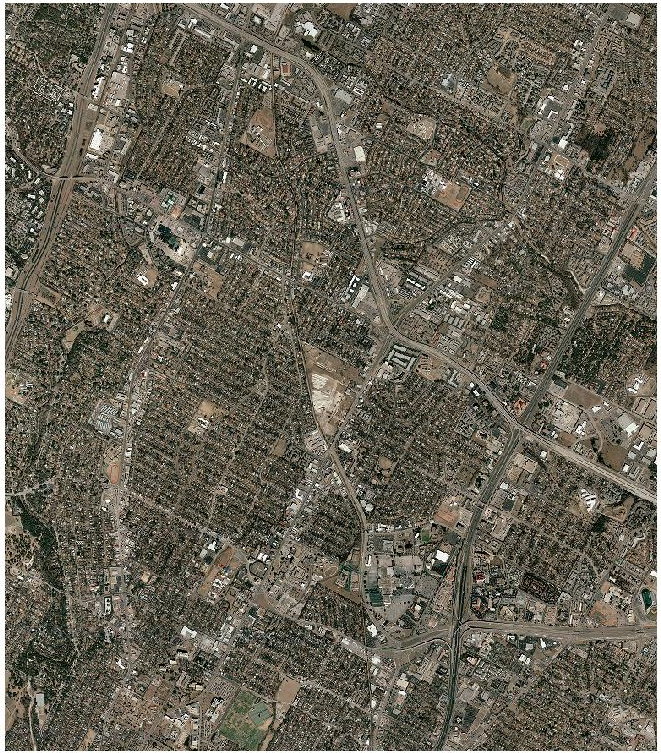
Layers
C:\ArcpyBook\data\
AUSTIN_EAST_NW.sid
RGB
Red: Band_1
Green: Band_2
Blue: Band_3



Catalog

Location: AUSTIN_EAST_NW.sid

Ch2
Ch3
Ch4
Ch5
Ch6
Ch7
Ch8
Ch9
code
data
TravisCounty
Wildfires
CityOfSanAntonio.gdb
AUSTIN_EAST_NW.sid
bc_pop1996.csv
Building_Permits.shp
Burglaries_2009.shp
BurglariesNoForcedEntry.lyr
County1_Tracts.shp
County2_Tracts.shp

Python

12.4 使用Describe() 返回栅格图像的描述性信息

Python

```
>>> import arcpy
... arcpy.env.workspace = "c:/ArcpyBook/data"
... try:
...     descRaster = arcpy.Describe("AUSTIN_EAST_NW.sid")
...     ext = descRaster.extent
...     print("XMin: %f" % (ext.XMin))
...     print("YMin: %f" % (ext.YMin))
...     print("XMax: %f" % (ext.XMax))
...     print("YMax: %f" % (ext.YMax))
...
...     sr = descRaster.SpatialReference
...     print(sr.name)
...     print(sr.type)
... except Exception as e:
...     print e.message
...
```

12.4 使用Describe() 返回栅格图像的描述性信息

```
XMin: 3111134.862457
YMin: 10086853.262238
XMax: 3131385.723907
YMax: 10110047.019228
NAD83_Texas_Central
Projected
```

Property	Value
⊟ **Extent**	
Top	10110047.0192
Left	3111134.86246
Right	3131385.72391
Bottom	10086853.2622
⊟ **Spatial Reference**	NAD83_Texas_Central
Linear Unit	Foot_US (0.304801)
Angular Unit	Degree (0.0174532925199433)
false_easting	2296583.333333333
false_northing	9842499.999999998

The End