



# Ciencia de Datos con API de ArcGIS para Python

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Palm Springs, CA



*“Los datos son el nuevo petróleo”*

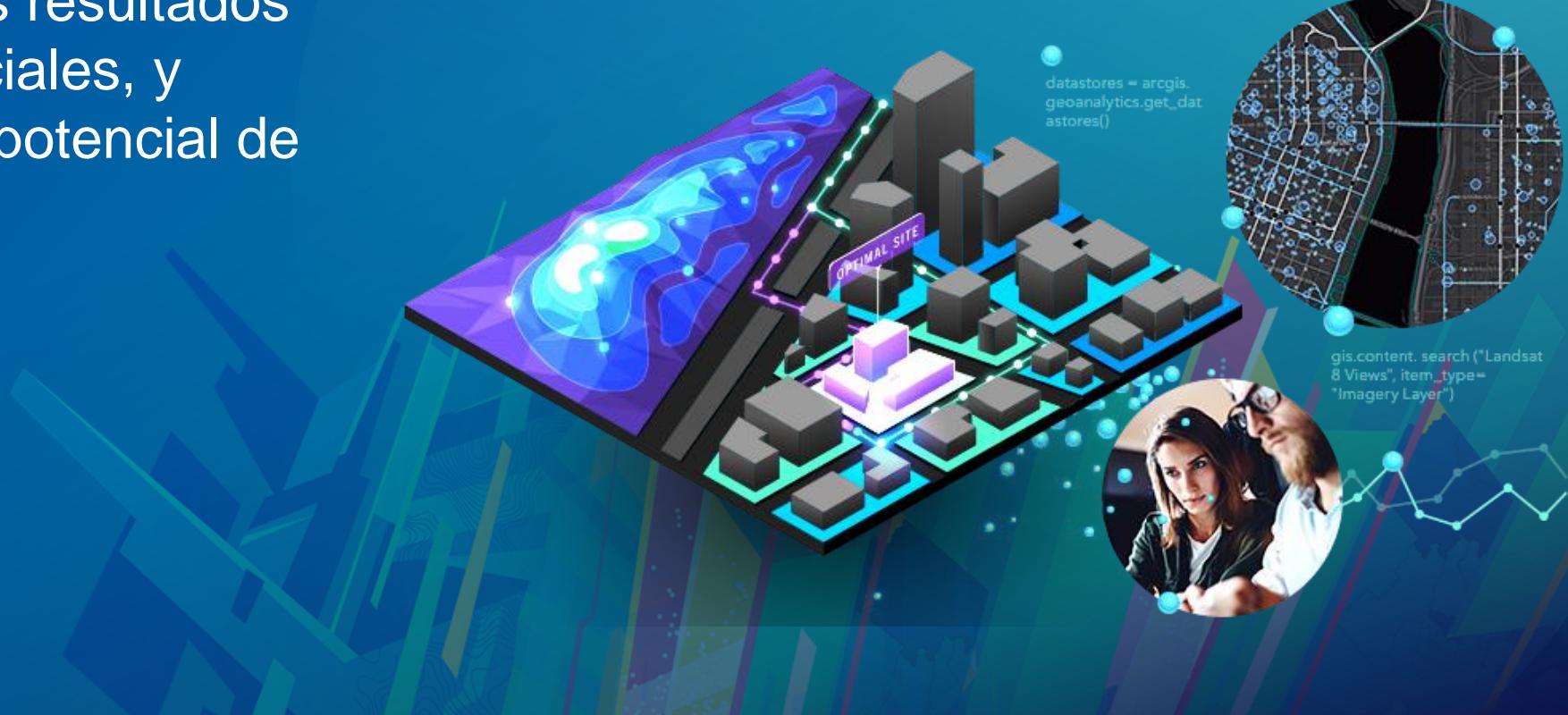
Clive Humby 2016  
British data commercialization entrepreneur

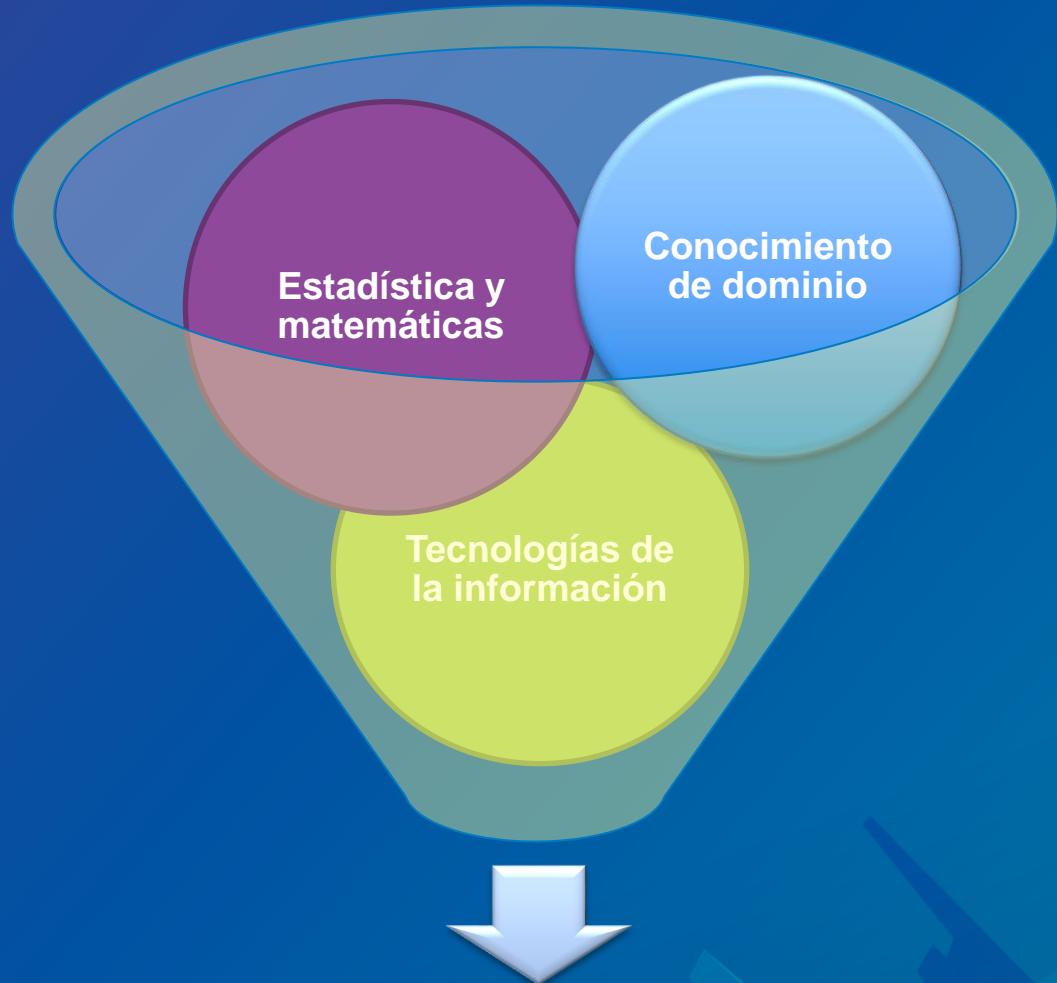
# ArcGIS y la ciencia de datos

- Vea los datos de nuevas maneras, mejore los resultados operativos y comerciales, y desbloquee todo el potencial de sus datos.



## ArcGIS





**Ciencia de datos**

# Ciencia de datos

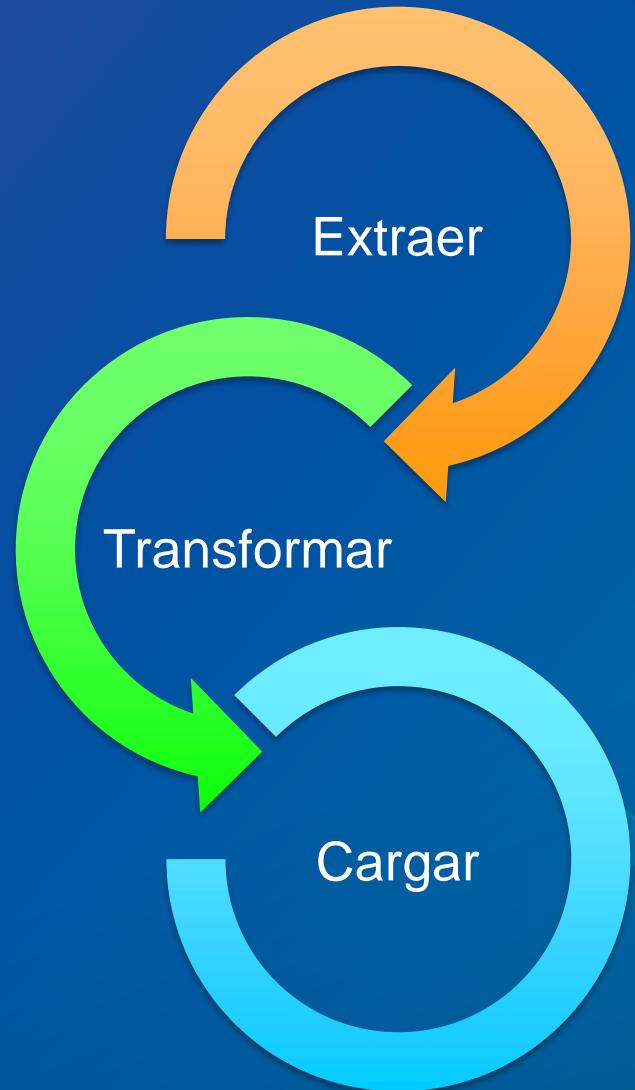
- El término hace referencia al área que de forma cotidiana, aplica técnicas de programación y otras disciplinas como la estadística para analizar datos.

# Ciencia de datos



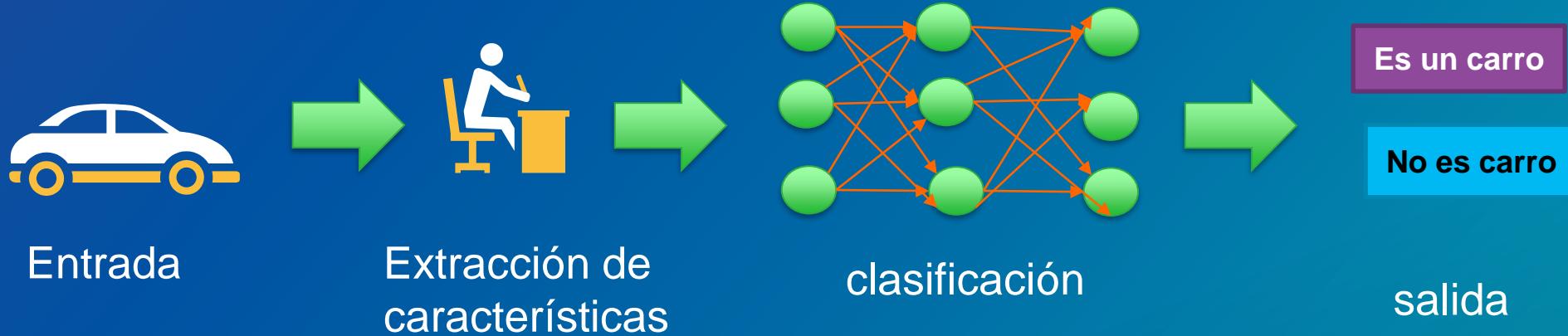
- Existen varias disciplinas que se pueden desarrollar con la ciencia de datos.

# ETL

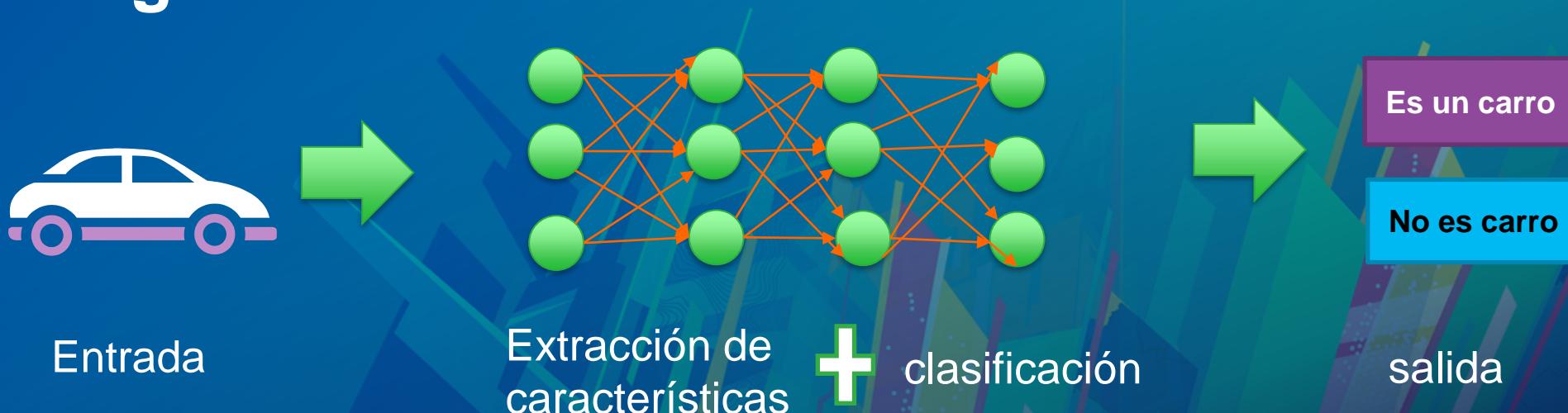


philipmartin.com

# Machine learning



# Deep learning



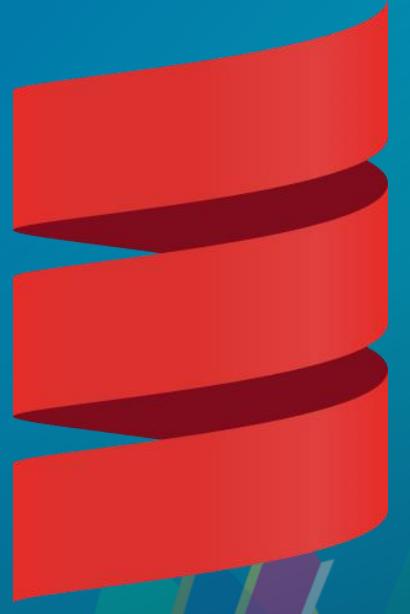
## Herramientas:



```
def add5(x):
    return x+5

def dotwrite(ast):
    nodename = get_name(ast)
    label=sym_label(nodename)
    print '%s : %s' % (label, ast[0])
    if isinstance(ast, list):
        if len(ast) == 1:
            print '%s -> %s' % (label, nodename)
        else:
            print '%s -> %s' % (label, nodename, label),
            for n, child in enumerate(ast[1:]):
                dotwrite(child)
            print ','
    else:
        print '%s : %s' % (label, ast)

dotwrite([5, [1, 2, 3], 4])
```





Gratis

Multiplataforma

Código abierto

Amplia comunidad

Fácil de entender

# ArcGIS

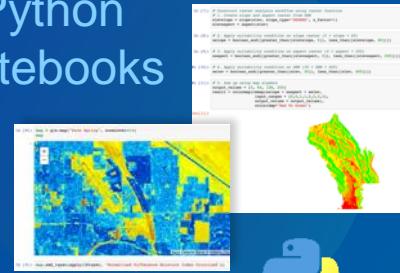
## Es una plataforma abierta



# Integrando Open Science, AI y Machine Learning

## Revolucionando el análisis espacial y la ciencia de datos

Python  
Notebooks



Análisis espacial  
& Geoprocесamiento



## Open Science



# Notebooks de Python alojados para integración, modelado y automatización

Computación  
interactiva

Librerías  
abiertas para  
ciencia

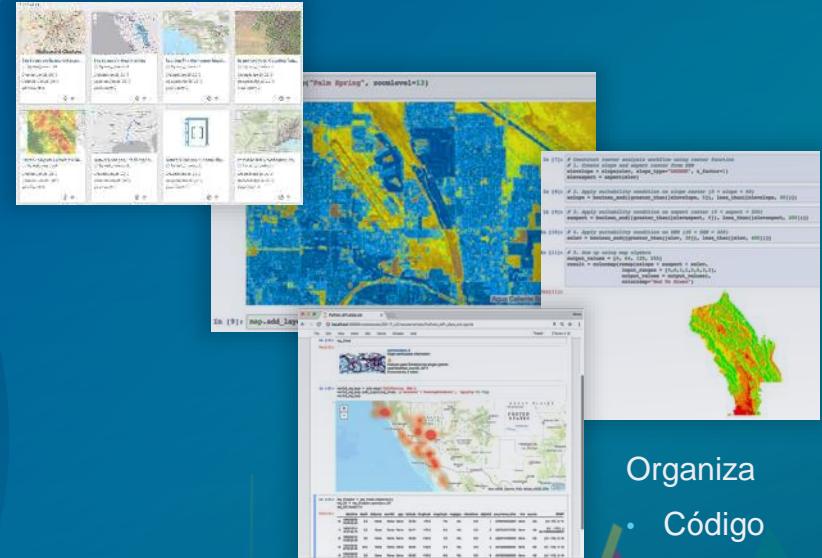


ArcGIS

Notebook Server



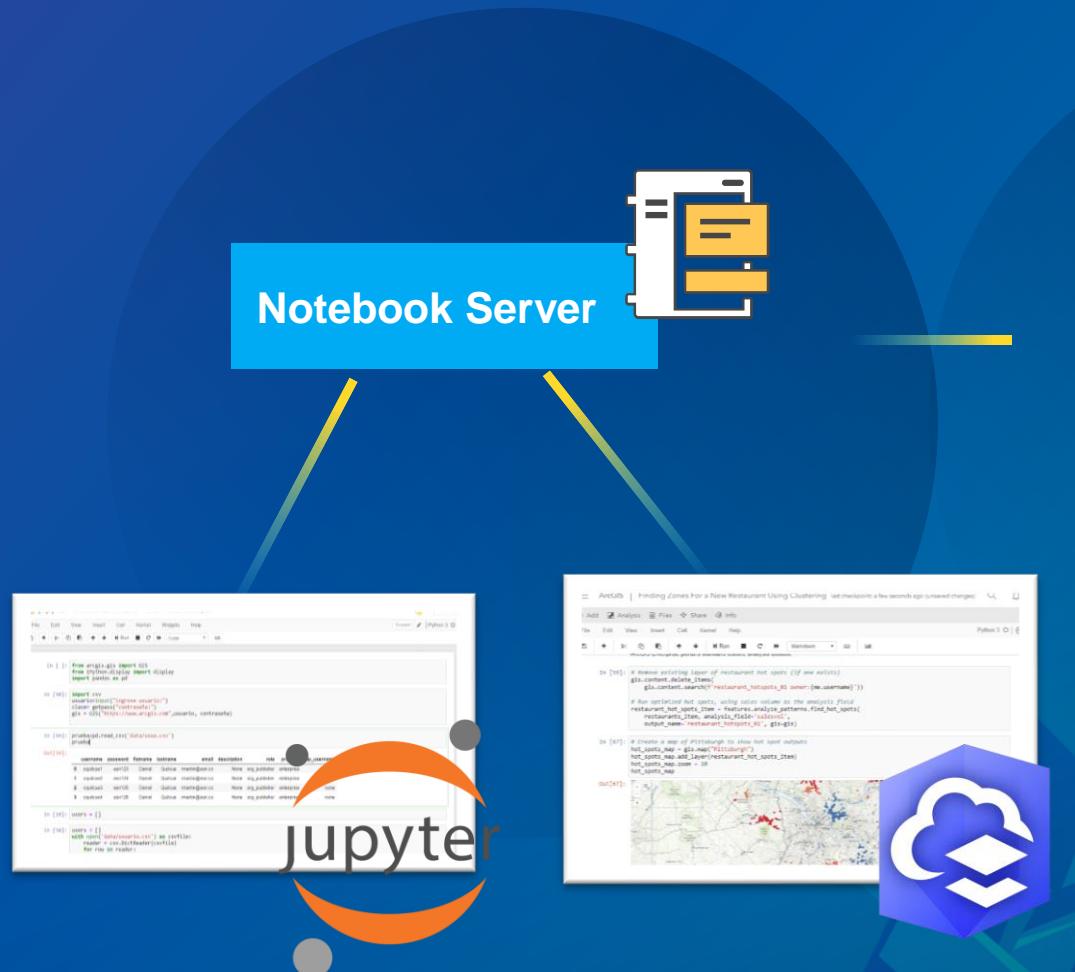
Almacenes de datos



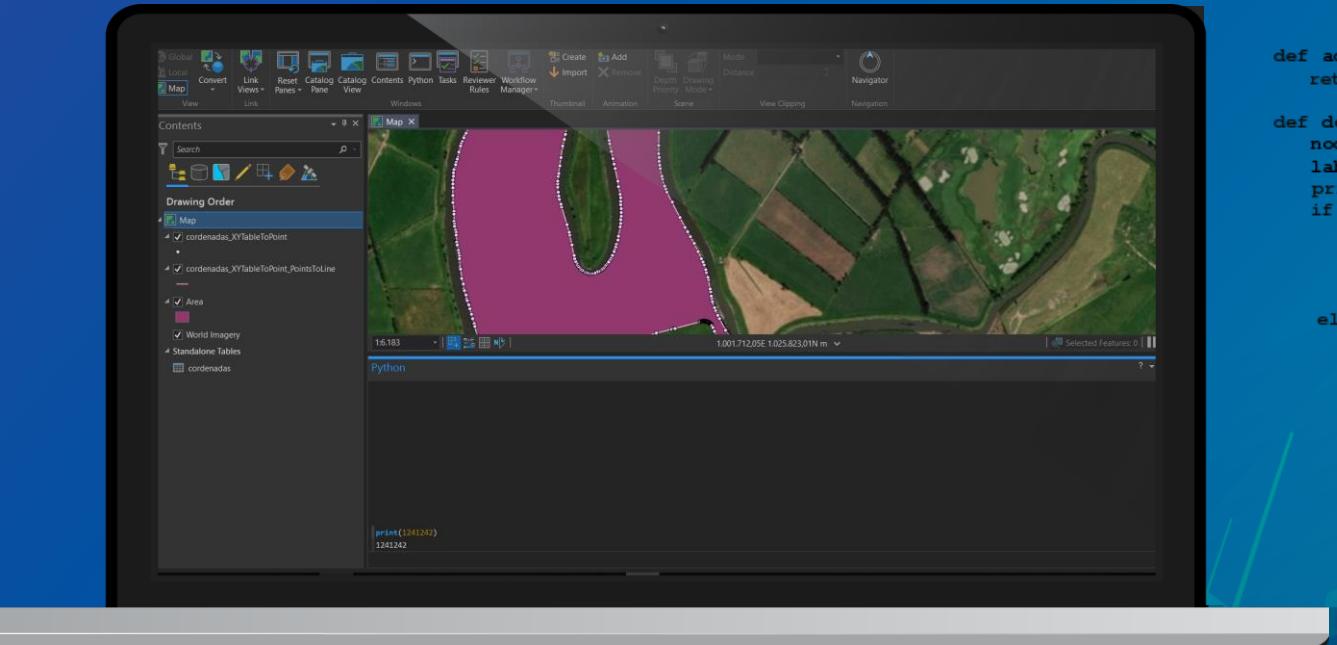
Código listo para usar  
Galería de Notebooks y fragmentos  
de código

- Organiza
- Código
  - Datos
  - Visualización
  - Documentación

# Docker y ArcGIS Notebook Server.



# ArcGIS ArcPy



def add5(x):  
 return x+5  
  
def dotwrite(nodename, label):  
 print '%s %s' % (int(ast[0]), ast[0])  
 if isin(nodename, label):  
 if ast[1] == '':  
 for child in ast[2]:  
 dotwrite(child)  
 print '---' % nodename  
 for in :namechildren  
 print '%s' % name,



# ARCPY



# PYTHON



# ArcGIS

# ArcGIS API for Python

The image shows two side-by-side Jupyter Notebook interfaces. Both notebooks are titled "analyze\_new\_york\_city\_taxi\_data".

**Top Notebook (Session 1):**

- In [1]:

```
import arcgis
from arcgis.gis import GIS
```
- In [2]:

```
ago_gis = GIS() # Connect to ArcGIS Online as an organization
search_subset = ago_gis.content.search("NYC_taxi_5s")
subset_item = search_subset[0]
subset_item
```
- Out[1]:

NYC\_taxi\_subset  
A subset of NYC taxi data

Feature Layer Collection by alma mani  
Last Modified: September 14, 2016  
0 comments, 827 views
- In [3]:

```
map2.add_layer(agg_result, {
    "renderer": "ClassedColorRenderer",
    "field": "MAX_TAXI_TRIP_DISTANCE",
    "visualization": "MAX_trip_distance",
    "classificationMethod": "natural-breaks",
    "opacity": 0.75
})
```
- Out[3]:

**Bottom Notebook (Session 2):**

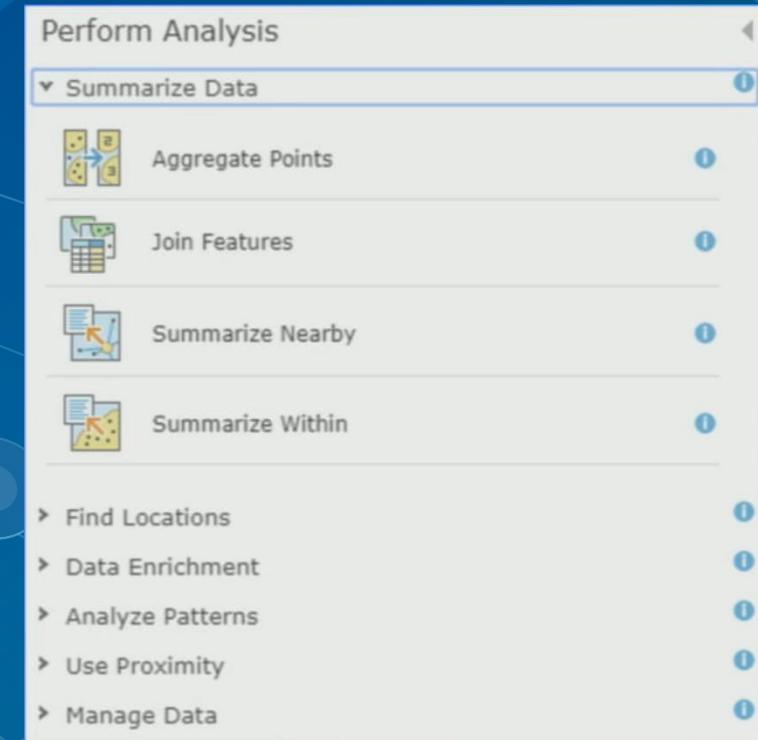
- In [1]:

```
subset_map = ago_gis.map("New York, NY", zoomlevel=11)
```
- Out[1]:



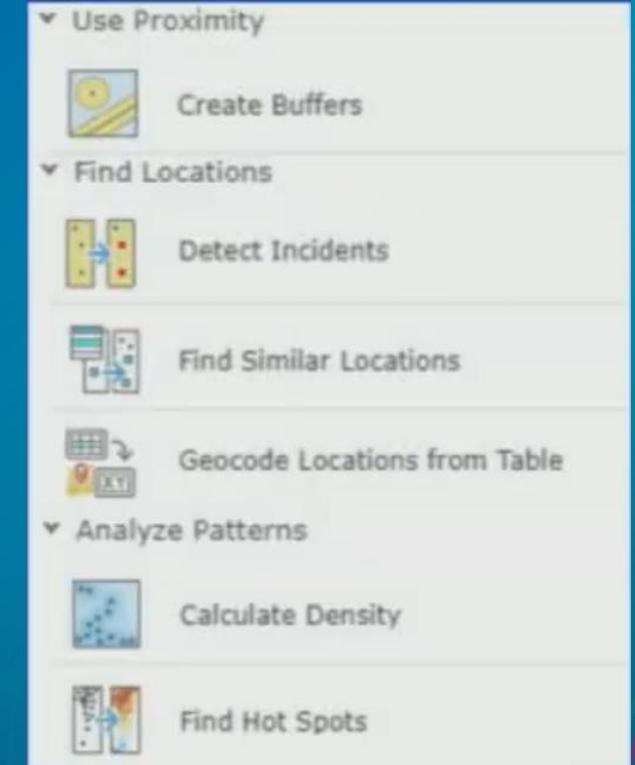
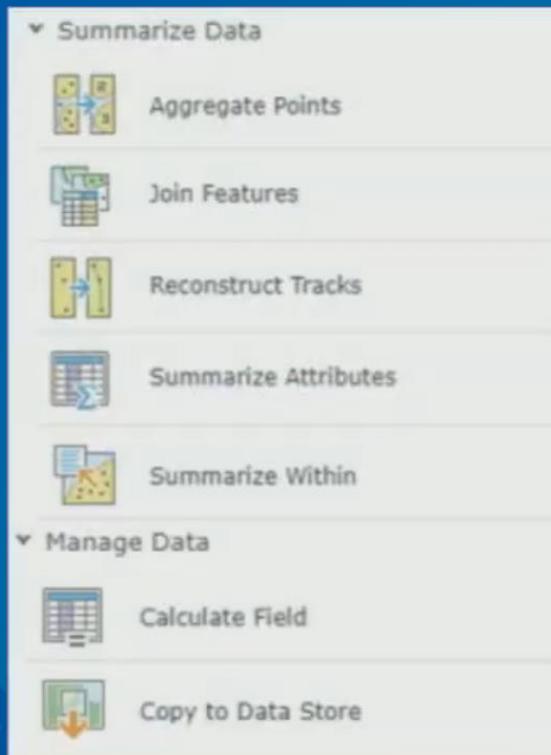
# Spatial Analysis

- Descubrir relaciones, patrones y tendencias en los datos



# Geoanalytics

- Resumir datos
- Administrar datos
- Análisis de proximidad
- Encuentra ubicaciones
- Analizar patrones



## Geocodificación

- Permite geocodificación, encontrar coordenadas o direcciones también de manera masiva

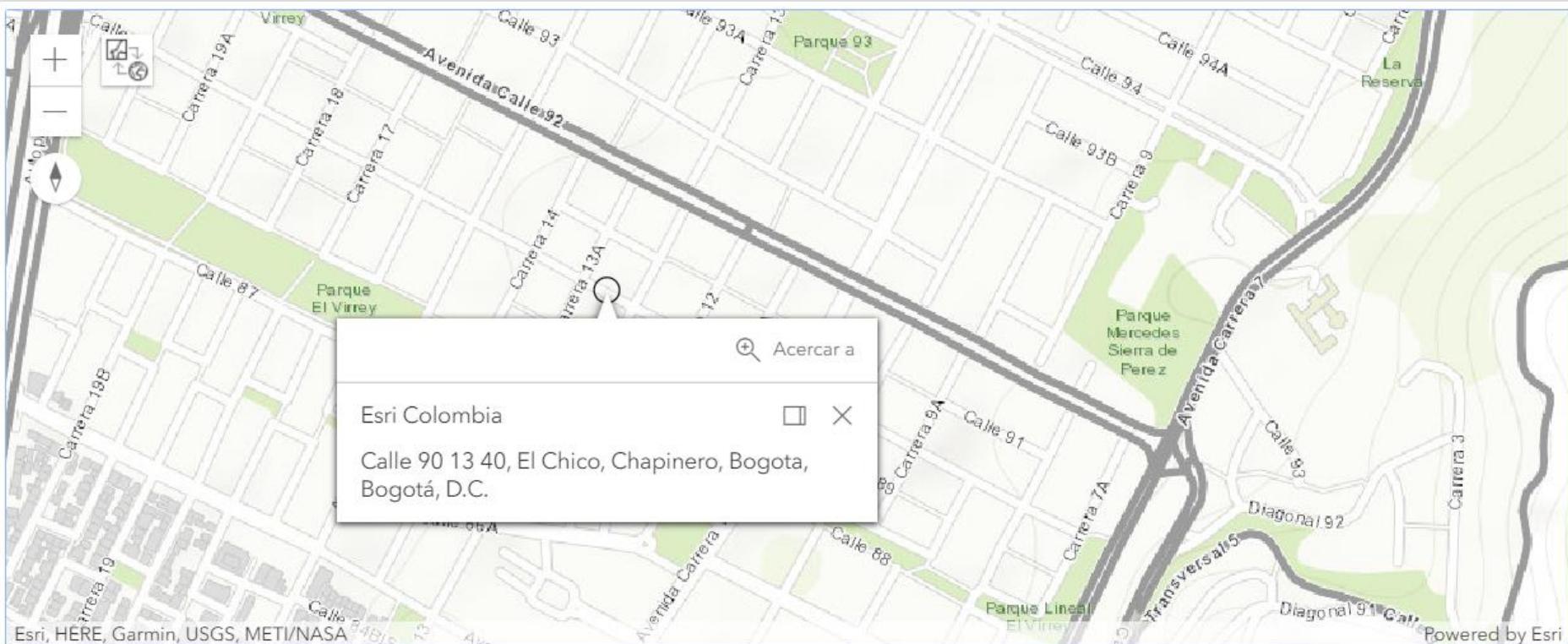




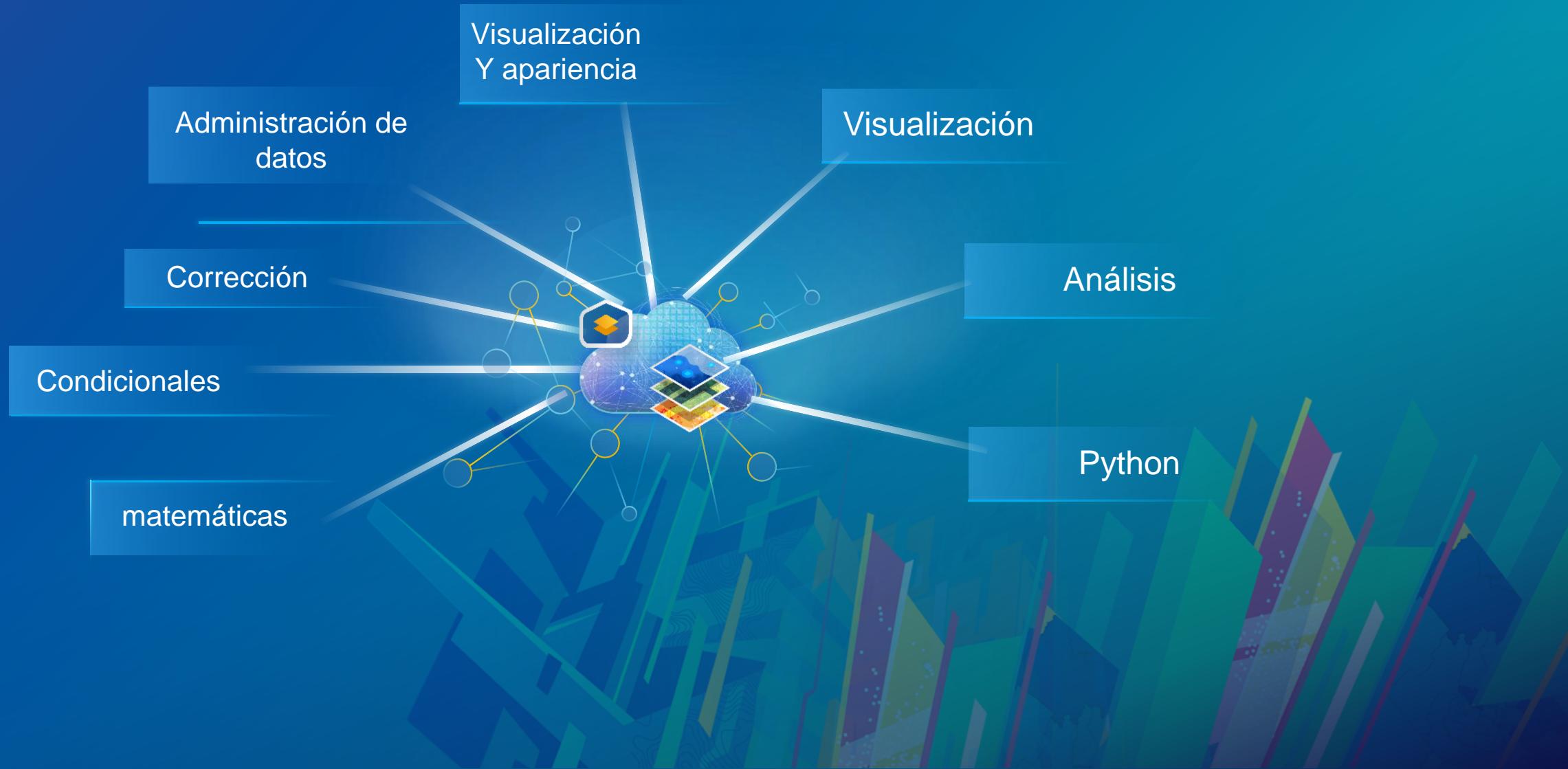
```
In [4]: multi_field_address = 'Calle 90 13 40, El Chico, Chapinero, Bogotá, COL'
```

```
In [7]: map = gis.map("Bogotá, COL",11)
```

```
esrihq = geocode(multi_field_address,geocoder)[0]
popup = {
    "title" : "Esri Colombia",
    "content" : esrihq['address']
}
map.draw(esrihq['location'], popup)
map
```



# Análisis de imágenes



jupyter Imagenes satelitales Last Checkpoint: el viernes pasado a las 14:55 (unsaved changes) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [4]:

```
landsat=landsat_item.layers[0]
raster1 = landsat.filter_by("GroupName='LC80090572019246LGN00_MTL'") # 2017-12-09
raster2 = landsat.filter_by("GroupName='LC80090572019086LGN00_MTL'")
landsat_item
```

Out[4]:

Multispectral Landsat  
Landsat multispectral and multitemporal imagery with on-the-fly renderings and indices for visualization and analysis. The Landsat 8 imagery in this layer is updated daily and is directly sourced from the Landsat on AWS collection.

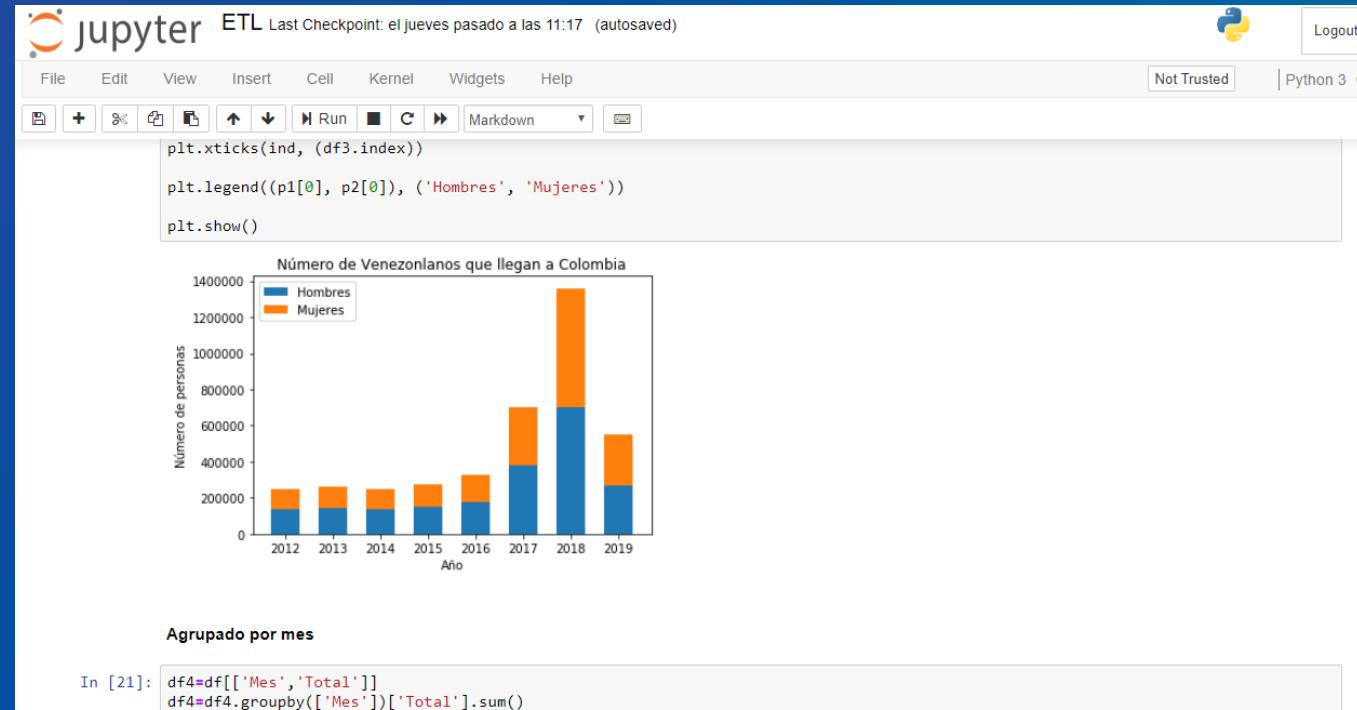
Imagery Layer by esri  
Last Modified: septiembre 04, 2019  
0 comments, 186.974 views

In [11]:

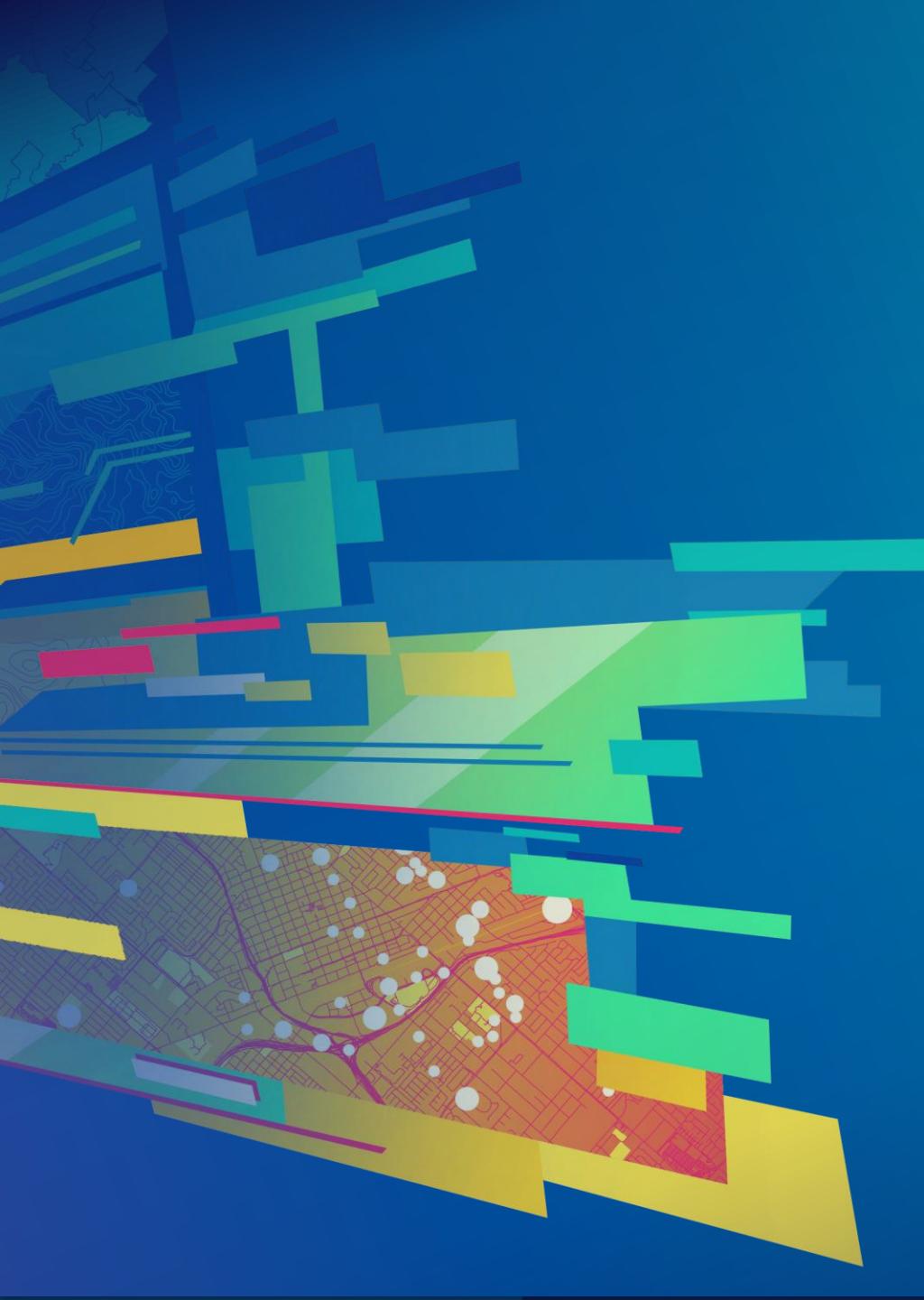
```
from arcgis.raster.functions import *
extract_band(raster1, [6,5,4])
```



# Demostración 1



## Demostración 2

The background features a complex, abstract geometric pattern composed of numerous overlapping rectangles in various colors, including shades of blue, green, yellow, and red. These rectangles are arranged in a way that suggests depth and movement, creating a dynamic visual effect against a dark blue gradient background.

En resumen.

# Datos

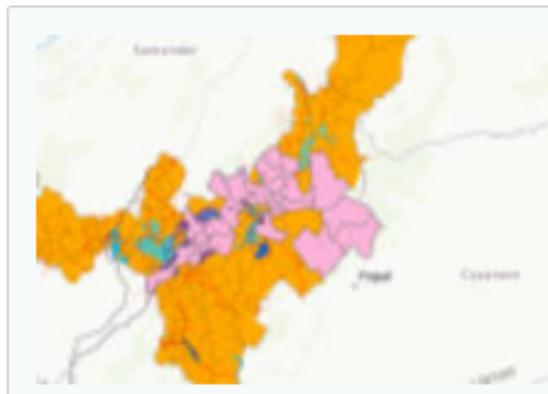
- Contenido de Esri – Living Atlas
- Tus datos, datos de la organización y datos compartidos contigo.
- Datos públicos.

```
items = gis.content.search('Boyacá',  
                           outside_org=False)  
  
for item in items:  
    display.display(item)
```



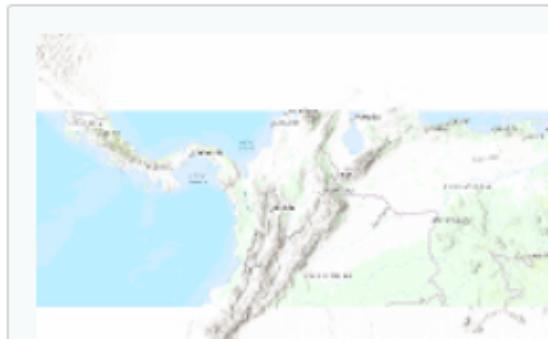
[Mapapruебapresidentesboyacá](#)  
Boyacá

■ Service Definition by mtoro\_geek  
Last Modified: junio 20, 2019  
0 comments, 1 views



[Centro Poblado Boyacá compleja](#)  
Centro Poblado Boyacá compleja

■ Service Definition by rmartin\_geek  
Last Modified: junio 21, 2019  
0 comments, 1 views

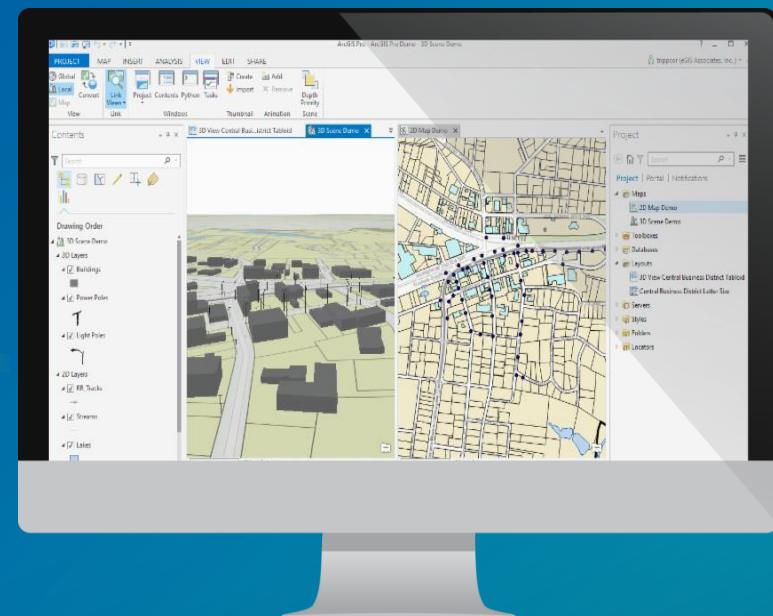


[Datos Boyacá compleja](#)  
resultados encuesta Boyacá compleja

■ Web Mapping Application by  
rmartin\_geek

# Ciencia de datos con ArcGIS: Visualización

- Visualizar con ArcGIS
  - Widget de mapa
  - Web maps y web Scene
  - Layers
  - Representaciones personalizadas
- Visualizar con Python
  - Matplotlib, Seaborn, Bokeh, Plotly...
  - Datashader, Holoviews, Mayavi ...



# Análisis

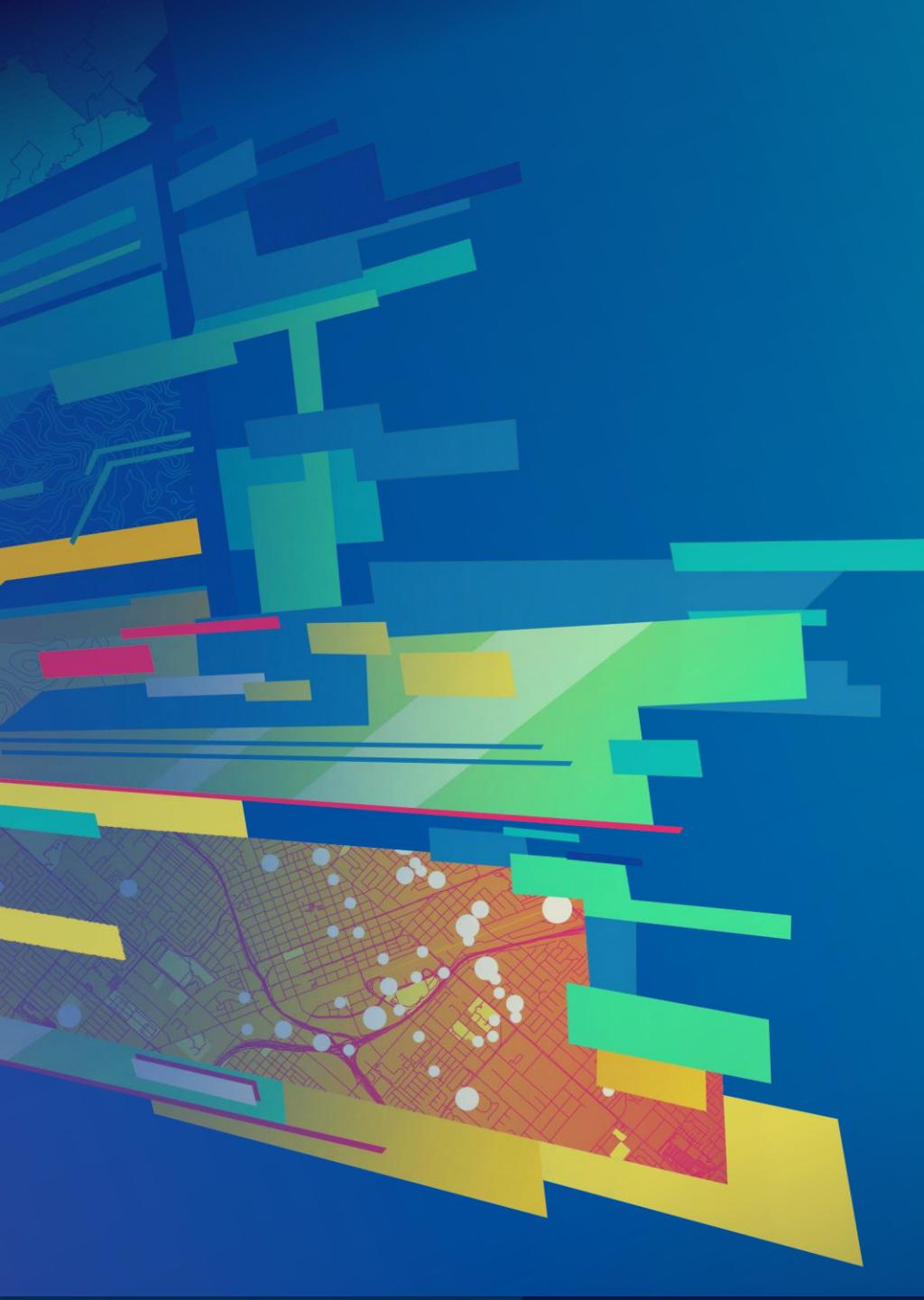
- Análisis con librerías de python
  - Data wrangling
  - Machine learning
  - Geospatial análisis
  - Procesamiento de imagen



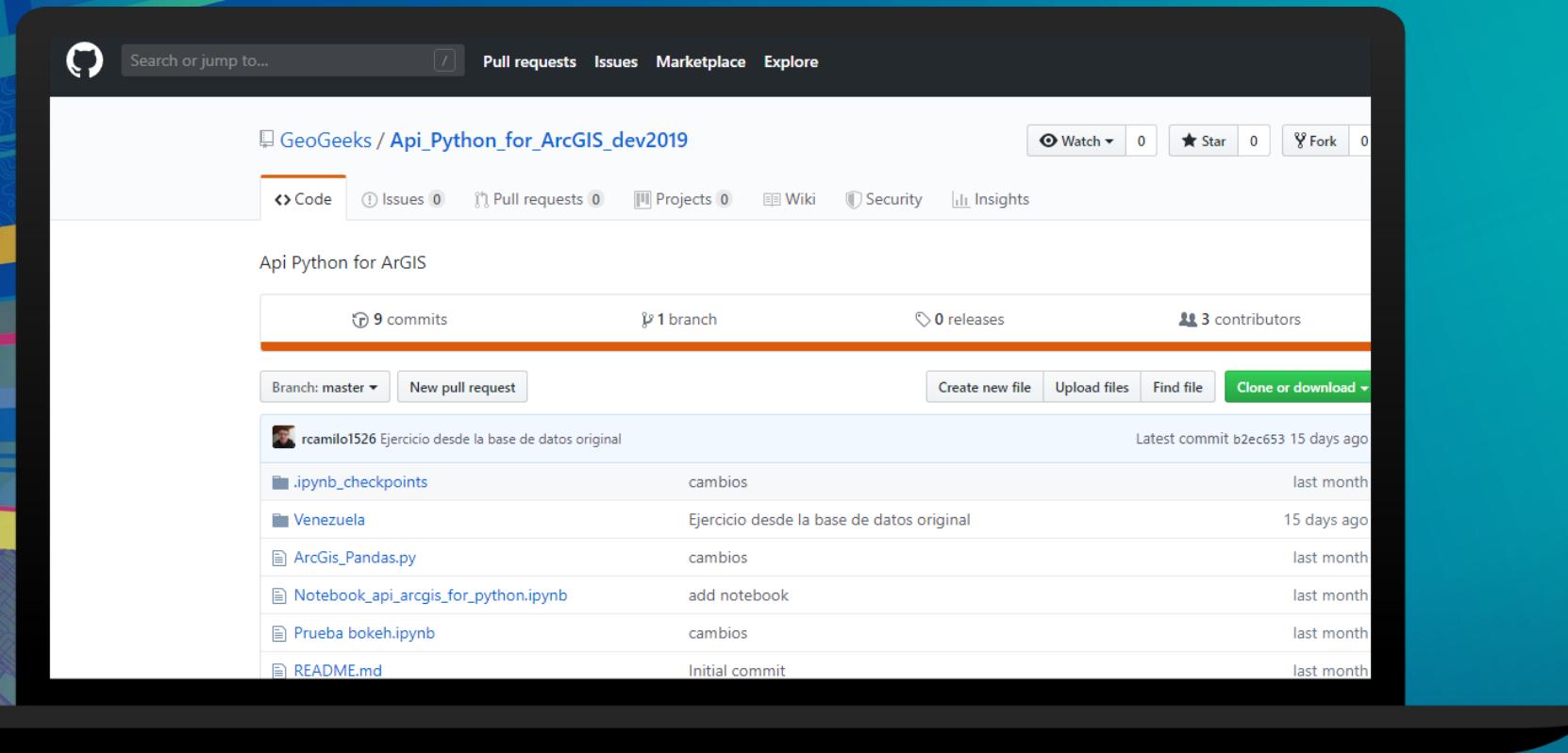
# Despliegue

- Como productos de información
- Como herramientas web
- Dashboards de python o Jupyter



The background features a dynamic, abstract graphic on the left side. It consists of numerous overlapping, semi-transparent geometric shapes in shades of blue, green, yellow, and red. These shapes are oriented at various angles, creating a sense of depth and motion. Below this abstract layer is a faint, light-colored map of a city or region, showing a grid-like street pattern and some circular markers. The overall composition is modern and visually engaging.

# ¿PREGUNTAS?



[https://github.com/GeoGeeks/Api\\_Python\\_for\\_ArcGIS\\_dev2019](https://github.com/GeoGeeks/Api_Python_for_ArcGIS_dev2019)

## Referencias.

- [https://bitsandbricks.github.io/ciencia\\_de\\_datos\\_gente\\_sociable/que-es-la-ciencia-de-datos.html](https://bitsandbricks.github.io/ciencia_de_datos_gente_sociable/que-es-la-ciencia-de-datos.html)
- <http://desarrolladores.esri.co/>
- <https://developers.arcgis.com/>



esri

THE  
SCIENCE  
OF  
WHERE