

Python for ArcGIS - Working with ArcGIS Notebooks

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Workshop files

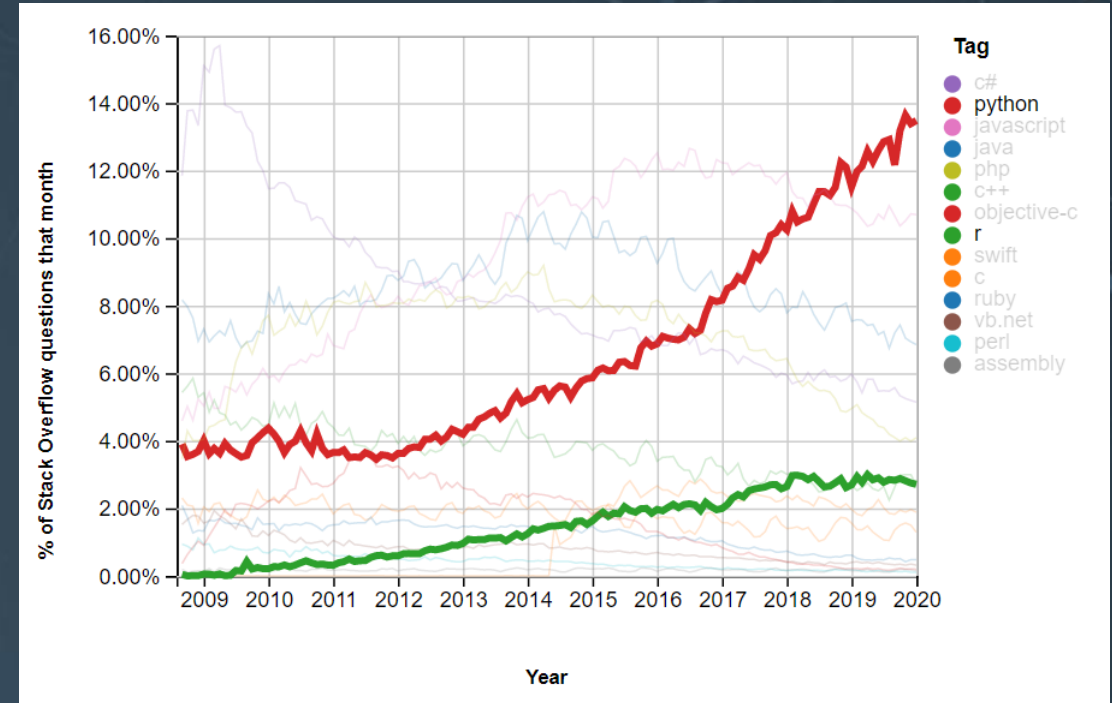
<https://bit.ly/ArcGISNotebooks-2021-01>

Workshop Agenda

- Introduction: Jupyter Notebooks -> ArcGIS Notebooks
- Getting Started:
 - Basics of working with Jupyter Notebooks
 - Notebooks in ArcGIS Pro
 - Hosted Notebooks in ArcGIS Online or ArcGIS Enterprise
- Geospatial Data Science Notebook samples:
 - Data engineering
 - Data exploration
 - Data analysis

Python

- Arguably the most popular programming language today
- Why?
 - Active/supportive community
 - Big Data, ML/DL/AI
 - Many high-quality libraries
 - Reliable and efficient
 - Highly accessible (easy to learn and use)



<https://insights.stackoverflow.com/trends>

Jupyter Notebook

- A popular way to compose documents that include:

- Rich formatted text
- Embedded images
- Multimedia
- Math formulas
- All interlaced with live executable code and visualization of outputs

- Why?

- Everything in one place
- Sharable
- Language independent
- Customizable
- Reproducibility & Transparency
- Teaching
- Iterative exploration

- Python!

ArcGIS Notebooks

- Notebooks – around since '80s
 - > IPython (2001)
 - > Jupyter (2014, multi-language)
- ArcGIS:
 - Geoprocessing with Python since ArcGIS 9.0 (2004)
- 2016: ArcGIS Notebooks =
 - Jupyter Notebook server
 - + Python
 - + ArcGIS API for Python
 - + ArcPy
- 2019: Hosted Notebooks =
 - ArcGIS Notebook
 - + ArcGIS Enterprise 10.7.1+
 - + Notebook Server for ArcGIS
- 2020:
 - ArcGIS Pro Notebooks** =
 - ArcGIS Pro 2.5+
 - + ArcGIS Notebooks
 - Hosted Notebooks** =
 - ArcGIS Notebook
 - + ArcGIS Online



What can ArcGIS Notebooks do?



Data
Engineering
(Wrangling)



(Spatial)
Data Analysis



ML / DL / AI



Automation



Collaboration

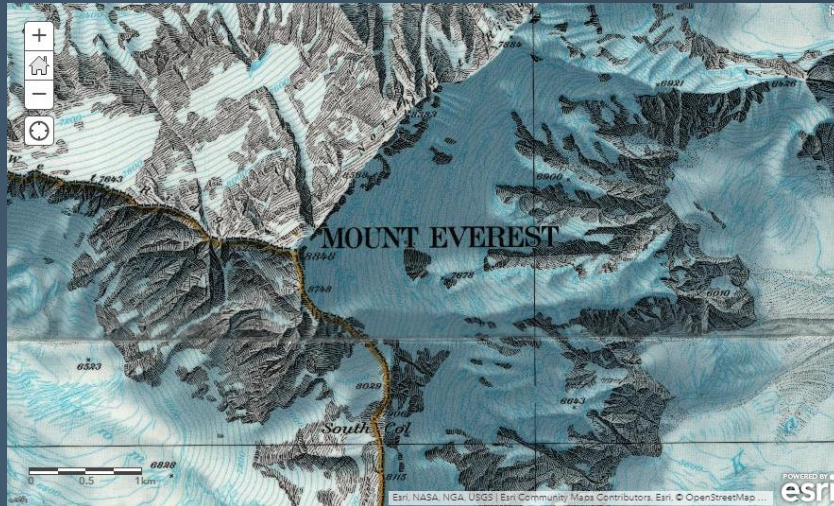


Storytelling



Iteration &
Experimentation
(Learning)

ArcGIS StoryMaps...



help you turn this...
(simple web maps)

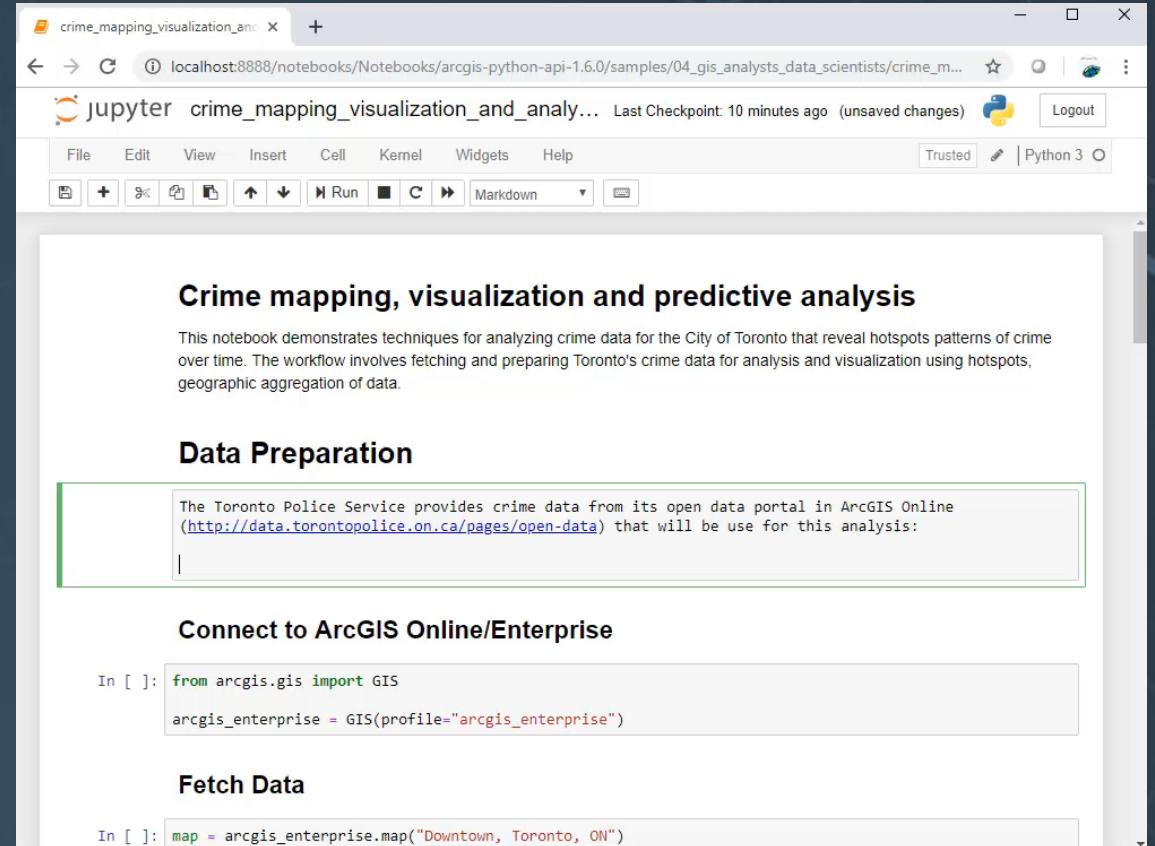


...into this.

ArcGIS Notebooks...

```
1 # crime_mapping_visualization_and_analysis_toronto.py
2 # Load the layer as a spatial data frame, and save to disk for use with arcpy analysis:
3 from arcgis.features import SpatialDataFrame
4 mci_sdf = SpatialDataFrame.from_layer(mci_layer.layers[0])
5
6 # Load the arcpy module, and create a Space Time Cube from the crime data
7 import arcpy
8 arcpy.env.overwriteOutput = True
9
10 # Using downloaded copy of data: D:\ScratchFiles\MCI_2014_to_2017.shp
11 arcpy.stpm.CreateSpaceTimeCube(r"D:\ScratchFiles\MCI_2014_to_2017.shp",
12 r"D:\ScratchFiles\MCI_2014_to_2017.nc", "Date", None, "1 Months", "END_TIME", None, "500
13 Meters", None, "HEXAGON_GRID", None, None)
14
15 # Execute Emerging Hotspot Analysis
16 arcpy.stpm.EmergingHotSpotAnalysis(r"D:\ScratchFiles\MCI_2014_to_2017.nc", "COUNT",
17 r"D:\ScratchFiles\MCI_2014_to_2017_hotspots.shp", None, 1, None, "FIXED_DISTANCE", None,
18 "ENTIRE_CUBE")
19
20 from arcgis.features import FeatureLayerCollection
21
22 # Upload shapfile as zip archive, and publish new layer:
23 hotspots_shp = arcgis.enterprise.content.add([{"type": "Shapefile"}],
24 r"D:\ScratchFiles\MCI_2014_to_2017_hotspots.zip")
25 hotspots_layer = hotspots_shp.publish()
26
27 # Update symbology of layer from an existing item used as a template:
28 template_layer = arcgis.enterprise.content.get("a86e128a1a5b472ca326be0ead7e0b10").layers[0]
29 flc = FeatureLayerCollection.fromitem(hotspots_layer)
30 flc.layers[0].manager.update_definition({"drawingInfo": template_layer.properties["drawingInfo"]})
31
```

help you turn this...
(python scripts)



...into this.

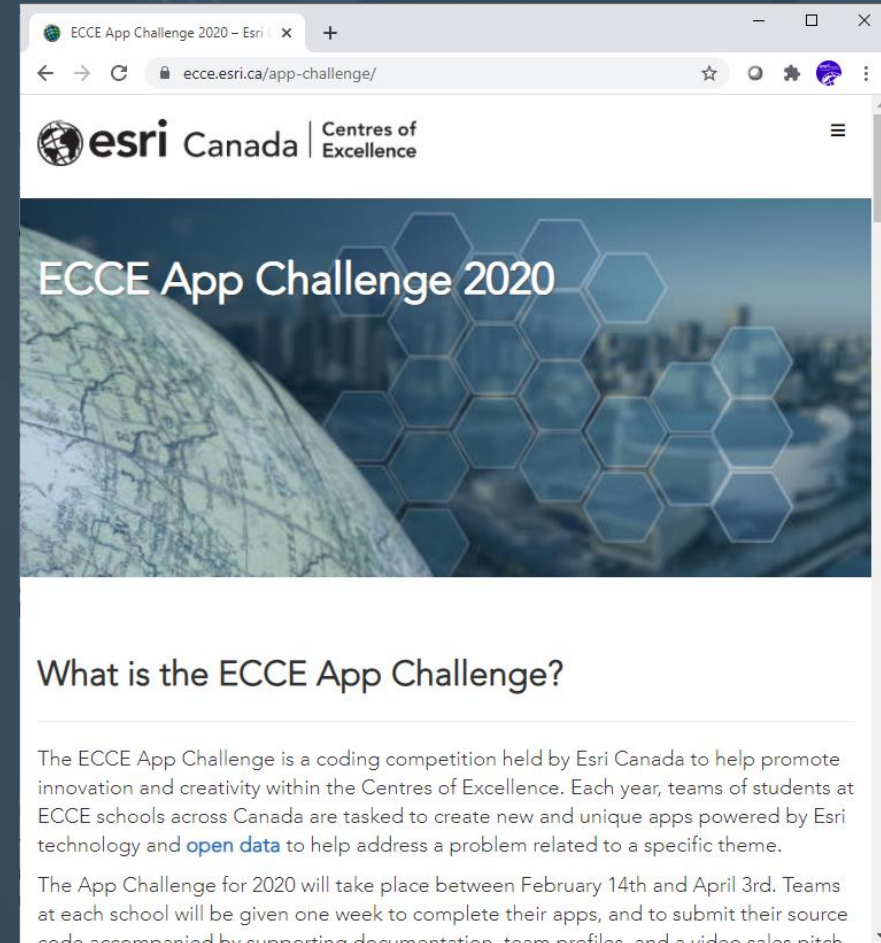
Learn Python

- Python Docs: <https://www.python.org/about/gettingstarted/>
- Free tutorials: <https://learnpython.org> (example)
- (many more) ...
- ArcGIS Reference (arcpy): <https://pro.arcgis.com/en/pro-app/arcpy/main/arcgis-pro-arcpy-reference.htm>
- ArcGIS API for Python (arcgis): <https://developers.arcgis.com/python/>
 - Samples: <https://developers.arcgis.com/python/sample-notebooks/>
- Esri Canada Education & Research Resources: <https://hed.esri.ca/resourcefinder/>

Getting Started...

ECCE App Challenge 2021

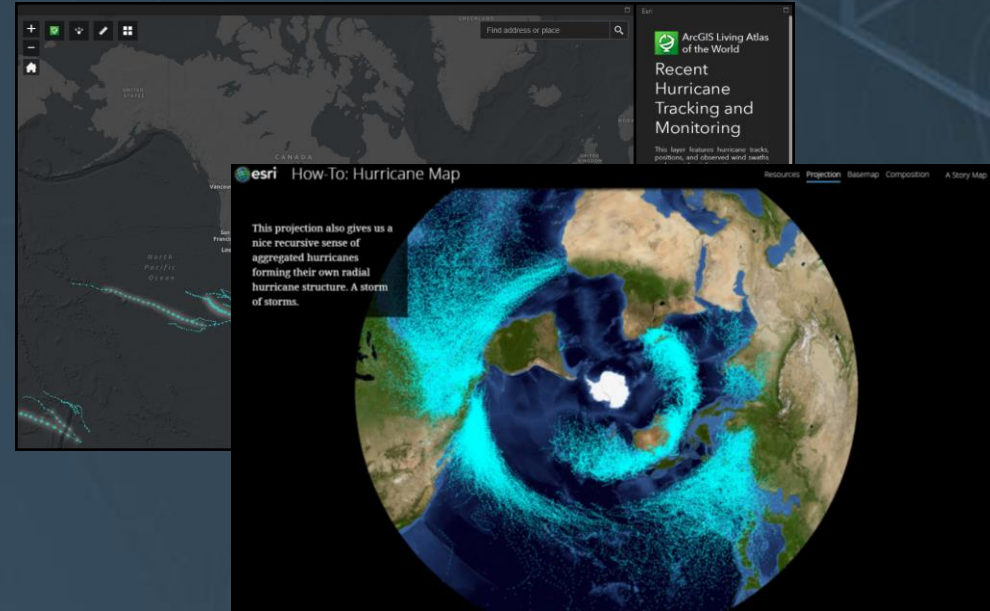
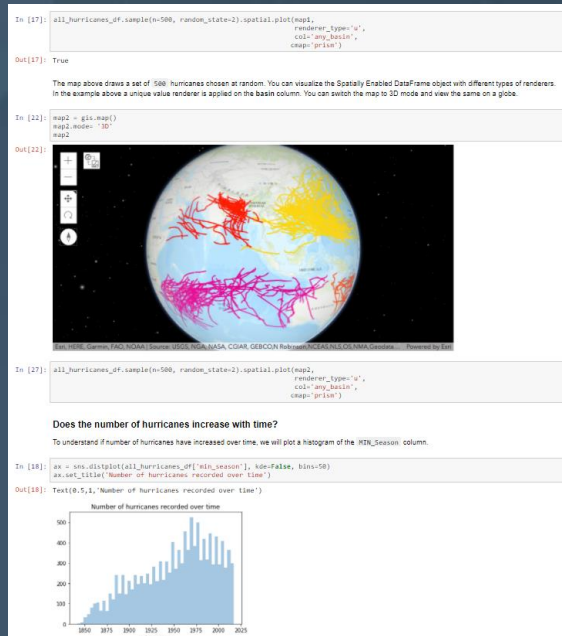
- An annual one-week team-based competition held at ECCE schools across Canada
- Teams of 2-3 students must:
 - Develop apps that address a specific topic/theme using Open Data and Esri Technology *
 - Develop a team mission statement and associated documentation
 - Produce a video to demonstrate/promote the team's creation
- Open to all students at ECCE schools
- Dates to be announced (between late-February and early-April)
- Contact ECCE directors at your school to join a team: <https://ecce.esri.ca/schools/>
- **Prize:** Expenses paid trip to Esri User Conference in San Diego **
- **No coding necessary** (but it is welcome)



<https://ecce.esri.ca/app-challenge/>

ArcGIS Notebooks in the App Challenge:

Example...



Use ArcGIS Notebooks to:

- Showcase data preparation, and analysis steps.
- Automate workflows that create and/or update output datasets.

Use apps/story maps to:

- Enable users to view, interact with, and analyze your output data.
- Share insights, tell the story that data and analyses support.

QUESTIONS?

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ListServ: <https://hed.esri.ca/studentlistserv>

Twitter: [@GIS4HEd](https://twitter.com/GIS4HEd)