Notes from Geospatial/GIS Meetup

October 20, 2020

via Zoom

Attendees: Janet Reyes, facilitator;

Via Zoom: Adrian Monges Rodriguez, Ahmed Eldawy, Ariana Firebaugh Ornelas, Candice Mays, Canserina Kurnia, David Yu, Elizabeth Perez, Fedah Alanazi, Gideon Kinzie Hawver, Hana Kang, Hoori Ajami, Jonathan Young, Juan Sebastian Acero Triana, Luciane Musa, Lynn Sweet, Maxine Wu, Mike Cohen, Orchida Fayez, Pengchi Xiao, Rey Castillo, Robert Johnson, Sara Bruene, Shanon Langlie, Steve Ries, Wijdan Alsurayya, Yolanda Ou

<u>Announcements</u>

This meeting was recorded; video is available <u>here</u>. The access password to view is   63X^$SMu

Given that one individual used an inappropriate screen name at last month's meetup, all attendees are reminded that **our meetups are a safe space** where we respect each other and follow the <u>UC Riverside Principles of Community</u>.

The **2020 ArcGIS StoryMaps Competition** is open now through November 25. The theme is sustainable development goals (SDGs). Anyone with a story map that touches on any of the 17 SDGs (which include subjects such as hunger, poverty and equality) are encouraged to enter.

Two map librarian organizations, MAGIRT and WAML, are sponsoring a <u>webinar</u> at 11:00 am on October 23 regarding the **Mapping Prejudice** project.

Janet is giving **two workshops** this quarter: <u>Introduction to QGIS</u> at 2:00 pm on October 29 and <u>Introduction to ArcGIS Online</u> at 2:00 pm on November 12.

The **ACM SIGSPATIAL 2020** conference will be virtual November 3-6. It includes presentations and numerous workshops.

The next Esri **Lunchtime Chats on GIS Education**, on November 3 at 9:00 am, will focus on <u>ArcGIS Hub</u>. Recordings and resources are made available after each monthly chat.

Stanford has made a digital exhibit on **Cartographic Symbologies**, with a collection of how elements such as mountains, ships and compass roses have been depicted on maps over time.

This year, most UC campuses (including UCR) are collaborating on **UC-wide GIS Week** to be held November 17-19. The programming will include posters, lightning talks, presentations, and panel discussions. Time slots will be 11:00-12:00, 1:00-2:00, and 3:00-4:00 each day.

Gideon shared that last week the **R'Geospatial Club** held its first meeting of the academic year, at which plans for Fall quarter were outlined. Any undergrads or grad students who are interested or have

questions about the club are welcome to contact him gkinz001@ucr.edu or Jonathan Young jyoun049@ucr.edu.

Canserina said Esri is preparing new videos for GIS Day, including one on what skills are required in the GIS job market. A few UC graduates who now work at Esri will participate in UC GIS Week.

First-time Attendees

First-time attendees were asked to put their information in the chat.

Adrian Monges Rodriguez is a master's student in Computer Science and is a UCR alum. Adrian is interested in data analysis and security.

Juan Acero is a postdoc working on hydro-ecological modeling.

Ariana Firebaugh Ornelas is a third year PhD student in EEOB (Evolution, Ecology, and Organismal Biology).

For the other first-time attendees: welcome, and we hope you'll return in the future!

Presentation

David Yu, a UCR alumni who is a Data Scientist on Esri's GeoAI team, spoke on "GeoAI: Machine Learning meets GIS." He explores the intersection of machine learning with GIS and how the results can be applied to solving real-world problems. Approaches include object tracking, anomaly detection, and pattern analysis.

David started by explaining how the terms artificial intelligence, machine learning, and deep learning relate to each other in the context of GeoAI.

Imagery analysis uses deep learning. Four tasks involving deep learning are pixel (semantic) classification, object detection, instance segmentation, and image classification. Applications of these techniques include detecting objects from videos, creating high resolution land cover, and identifying damaged houses in an aerial image.

The deep learning workflow in ArcGIS consists of four basic steps: collect samples, export training samples, train, and perform inference. Training can occur through a GUI interface or through Esri's Python API, which provides canned, configurable models for creating a neural net. All of the steps can happen in an environment called the Learn module, which greatly simplifies the process. In addition to training, ArcGIS API for Python includes functionality to implement other deep learning procedures.

David shared a demo in ArcGIS Pro, where using image classification to assess fire damage to houses could enable more timely disaster response. In this demo, David showed how to use the ArcGIS Pro geoprocessing tool "Export Training Data for Deep Learning." Another tool, "Train Deep Learning

Model," uses the output of the previous tool. Finally, the tool "Classify Objects Using Deep Learning" classified the condition of houses in a new area.

David also demonstrated land cover mapping at 1-meter resolution from NAIP imagery. They used a manually-created land cover map to train the model, and achieved 91% accuracy in a process that was 16 times faster than the manual project. In applying this method, land cover for the entire country of Kuwait was mapped in ten minutes.

Vehicle accidents prediction is an application of machine learning using vector data. One would start by determining all the factors (weather, time, road alignment, etc.) that might cause an accident. David showed the results of an accident probability prediction model built in ArcGIS Pro. The locations of actual accidents corresponded with the model's results. David also showed how all the factors interact over the course of the day (rush hour, sun glare) and that the factors can be assigned different weights.

The question-and-answer period following the presentation included: discussion of GPU/RAM needs for running these models, whether the training takes place on Esri's machines or elsewhere, using ArcGIS Pro tools vs Python API, preprocessing data, and use of VMs (virtual machines). David recommended visiting https://medium.com/geoai to see more about the projects he mentioned, as well as other projects. He recommended visiting https://developers.arcgis.com/python/ for resources and sample notebooks.

The links that were shared in the chat are included below.

Link to free lessons: https://learn.arcgis.com/en/gallery/#?q=deep%20learning

To contact Canserina for assistance: ckurnia@esri.com

David's email address: dyu@esri.com

Links shared by David:
http://pro.arcgis.com/en/pro-app/help/analysis/geostatistical-analyst/get-started-with-geostatistical-analyst-in-arcgis-pro.htm

http://pro.arcgis.com/en/pro-app/tool-reference/image-analyst/an-overview-of-the-segmentation-and-classification-tools-in-image-analyst.htm

http://pro.arcgis.com/en/pro-app/tool-reference/spatial-statistics/an-overview-of-the-spatial-statistics-toolbox.htm

http://esriurl.com/analysis

https://developers.arcgis.com/python/sample-notebooks/

https://learn.arcgis.com/en/projects/use-deep-learning-to-assess-palm-tree-health/

https://www.esri.com/training/mooc/

Info on VM:
https://www.esri.com/arcgis-blog/products/arcgis-pro/announcements/virtualization-of-arcgis-from-the-cloud-and-on-premise-platforms-to-support-higher-education/