Public can explore time-lapse videos of Earth with new tool from Carnegie Mellon and Google

Eurekalert!

PITTSBURGH—Researchers at Carnegie Mellon University's Robotics Institute, working with colleagues at Google and the U.S. Geological Survey (USGS), have adapted their technology for interactively exploring time-lapse imagery to create a tool that enables anyone to easily access 13 years of NASA Landsat images of the Earth's surface.

This new capability within Google Earth Engine enhances the public's ability to view the massive amount of imagery collected by the Landsat program between 1999 and 2011. Users can zoom in or out on any spot on the globe and move back and forth in time. This enables anyone to see deforestation unfold in the Amazon, see water levels rise and fall in the Aral Sea and watch the urbanization of desert as Las Vegas expands.

For the past 40 years, the Landsat program has continuously collected imagery of the Earth's surface and, since 2008, the USGS has made that imagery available free to the public. But accessing that data — measured in petabytes, or quadrillions of bytes — has long been cumbersome, said Randy Sargent, a system scientist in the Robotics Institute's CREATE Lab in Pittsburgh and a visiting researcher at Google.

Google has improved access by building the largest library of Landsat imagery on hard-drive storage, Sargent said. Google Earth Engine has already amassed more than 1.5 million Landsat images of Earth and this is growing by thousands of images per day as new satellite data is collected.

The new tool for Earth Engine, based on Carnegie Mellon's GigaPan Time Machine technology, takes this access to another level. When combined with Google Earth Engine's massively parallel computation power, the Landsat image archive is transformed into a set of seamless, zoomable videos easily accessible from a modern Web browser.

"The sheer volume of visual data is daunting to explore by conventional means," said Rebecca Moore, engineering manager of Google Earth Engine. "Together we can now offer an intuitive, effortless method to explore the planet in space and time."

Google, NASA and Carnegie Mellon previously collaborated to create GigaPan, a technology for capturing a mosaic of hundreds or thousands of digital pictures and stitching those frames into panoramas that be interactively explored via computer. GigaPan Time Machine, developed with Google's support, took advantage of the HTML5 language incorporated into such browsers as Google Chrome to extend GigaPan into the realm of video. Sargent, along with CMU colleagues Paul Dille and

Chris Bartley, developed algorithms and software architecture that made it possible to shift seamlessly from one video portion to another as viewers zoom in and out of the imagery.

One of the first applications of the Time Machine technology was to 12 months of imagery from NASA's Moderate Resolution Imaging Spectroradiometer, or MODIS, satellites. Sargent said the success of that project led directly to the effort to create a tool for accessing Landsat and other satellite imagery available through Google Earth Engine.

Sargent predicted that the enhanced access to satellite imagery will help ground public discussions about land use, climate change and environmental policy. "You can continue to argue about why deforestation has happened," he explained, "but you no longer will be able to argue whether it happened.

"Exploring the data is now much faster — hundreds of times faster than it used to be," he added. "That leads to discoveries. That leads to making connections."

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Videos demonstrating how the time-lapse tool can be used to explore phenomena such as deforestation, urban growth and drying seas can be viewed at http://earthengine.google.org/#intro [1].

In addition to Sargent, Dille and Bartley, computer science student Richard Hofer, Robotics Institute intern Saman Amirpour and Illah Nourbakhsh, professor of robotics and director of the CREATE Lab, have contributed to this project. They are continuing to work with Google scientists to increase access to additional imagery from Landsat and other satellite programs. The Robotics Institute is part of Carnegie Mellon's School of Computer Science. Follow the school on Twitter @SCSatCMU.

About Carnegie Mellon University:

Carnegie Mellon (www.cmu.edu [2]) is a private, internationally ranked research university with programs in areas ranging from science, technology and business, to public policy, the humanities and the arts. More than 11,000 students in the university's seven schools and colleges benefit from a small student-to-faculty ratio and an education characterized by its focus on creating and implementing solutions for real problems, interdisciplinary collaboration and innovation. A global university, Carnegie Mellon's main campus in the United States is in Pittsburgh, Pa. It has campuses in California's Silicon Valley and Qatar, and programs in Asia, Australia, Europe and Mexico. The university is in the midst of "Inspire Innovation: The Campaign for Carnegie Mellon University," which aims to build its endowment, support faculty, students and innovative research, and enhance the physical campus with equipment and facility improvements.

Source:http://www.eurekalert.org/pub_releases/2012-07/cmu-pce073012.php [3]

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