ABSTRACT

Machine learning provides the ability to quickly sift through large data sets to identify observations of known scientific interest and highlight unexpected observations that could lead to new discoveries. In this talk, I will describe two examples of effective application of machine learning to aid science investigations. First, we applied a machine learning classifier to a global collection of Mars orbital observations to detect small, fresh impact craters. Candidate detections were reviewed manually, and to date they have yielded 75 new discoveries of previously unknown impacts. Second, we have developed a system to detect and explain anomalies in galaxy observations from the Dark Energy Survey. The explanations help scientists determine whether the anomalies (1) indicate an upstream data collection or processing issue or (2) are of scientific interest (new discovery). Both systems aim to accelerate the process of scientific discovery by efficiently directing human attention to where it is most needed.

SPEAKER BIO

Kiri L. Wagstaff is an associate research professor at Oregon State University in the School of Electrical Engineering and Computer Science and a principal researcher in machine learning at NASA’s Jet Propulsion Laboratory. Her research focuses on developing new machine learning methods for use onboard spacecraft and in data archives for planetary science, astronomy, cosmology, and more. She earned a Ph.D. in computer science from Cornell University followed by an M.S. in geological sciences and a Master of Library and Information Science (MLIS). She has also served as a tactical uplink lead (operational planning) for the Mars Opportunity rover. She has received two NASA Exceptional Technology Achievement Medals and is a Senior Member of the Association for the Advancement of Artificial Intelligence. She is passionate about keeping machine learning relevant to real-world problems.