Paper abstract

Authors: **Melanie Corcoran & Dr. Shawana P. Johnson, GISP**

Platforms designed for Big Data Provisioning with Small Satellite Constellations

Descartes Labs will present the analysis, monitoring and forecasting cloud platform implementing a Living Atlas of the World and providing a basis for the rapid development of high-level global-scale business intelligence products powered by machine learning and remote sensing science **designed to support Small Satellite constellations**. This paper delivery will demonstrate:

1. Analysis-ready time sequences of global, persistent multi-sensor public and commercial satellite imagery,
2. Machine learning algorithms for rapid development of end-to-end solutions to remote sensing analysis, monitoring and forecasting problems, and
3. Dissemination of output of these solutions as continually updated high-level business intelligence geospatial products, via open standard web APIs.

The paper will address analysis, monitoring and forecasting of economically significant non-human food crops (com, soybeans), supporting commercial applications in agriculture, finance, and insurance in the US. The paper will demonstrate small satellite data usage with top-tier US agricultural and financial companies as well as the US Government. The paper presentation will demonstrate the world as a system and show advances in:

- Commercial and public space imaging systems (smallsats and cubesats) including public SAR, and Multispectral
- Commercial cloud computing/networking/storage that rivals traditional super-computing, and
- Machine learning algorithms for computer vision and predictive modeling.

Descartes Labs provides global capacity at a spatial and temporal granularity, monitoring changes in near real-time, conducting global-scale historical analyses, and building predictive models that capture the patterns of life and the early warning signs of threats and anomalies.

DL calls this combination of very-large scale scientific data and high-performance predictive models a *Living Atlas of the World.* The global-scale situational awareness and high-level business intelligence generated by this atlas has the potential to enable breakthroughs in a range of commercial sectors, from agriculture and other natural resources, to construction, transportation and energy.

The presentation will demonstrate small sat applications on platform analytics for defense, intelligence and civilian government. DoD has acknowledged a need for improved large-scale situational awareness leveraging the growing availability of global, persistent, multi-modal public and commercial small satellite imagery and sensor data to support a variety of global needs such as, international drug interdiction, maritime security, treaty compliance, infrastructure protection, logistical planning, target detection and monitoring, and near- and long-term forecasting of regions of political instability.

The presentation will highlight satellite data in a Geo Visual Search (GVS™) tool allowing users to search on any object globally to produce automated feedback. Based on the neural network learning capabilities, users can then have alerts sent them regarding changes in this object. Small Sat imagery and its use as Big Data in a machine learning, platform analytics base will be the focus during this presentation.