



ABBY-NET E³-Systems Research Project Update 2019: # 20: Automated Monitoring of Well Sites Using Satellite Imagery

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Project Summary

There are many well sites in Alberta with oil tanks and buildings. Alberta Energy Regulator (AER) tracks the number of oil processing tanks and buildings within each well site. Development of an annual inventory of tanks and buildings related to oil and gas activities plays an important role in regulatory compliance monitoring/assurance and sustainable land reclamation management. Inspecting the well sites need many employees and significant cost for their visits to the well sites. It is also hard to track new sites, new structures, empty sites, and reduction of tanks or any substantial changes within the well sites. AER would want to utilize satellite imagery and automated analysis of those for this monitoring. AER would like to use SPOT-6 imagery for this purpose. These images, having a resolution of merely 1.5m/pixel, cannot provide a reliable count of tanks/batteries. Super resolution-based methods will be developed to mitigate the challenge.

Progress to Date

We implemented a deep learning-based method to detect and classify tank regions in well site using SPOT-6 imagery. The automated system can classify a detected area as having or not having tanks/battery structures. The counting results of tanks are also generated but accuracy is not satisfactory with the low-resolution images. The next milestone would be to train a neural network to create higher resolution images from SPOT-6 and then count number of tanks. The challenge is to obtain representative high-resolution data for training deep learning.

Contribution to E3-system and Implications

AER has the mandate for industry compliance monitoring and enforcement that essential for Alberta's environment. An automated monitoring method would be able to save cost and man-hour for AER. From the computing science research, this project has ample opportunity to develop novel deep learning techniques for super resolution pertaining to SPOT-6 imagery.

Geographic Location

The study area is Alberta.

Final Outcomes

One MSc thesis in Computing Science is expected. A publication on super-resolution of satellite imagery is also expected.

