Explainability in Satellite Based Remote Sensing of Nuclear Facilities

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Abstract:

Within this project, the effort is focused on science and technology of predictive and on-demand characterization of localized developments on the Earth surface, subsurface and within the atmosphere. This is done through machine learning algorithms utilizing images taken from a remote sensing satellite built for finding or monitoring nuclear facilities. Focusing on theorizing some possible features that could be used for recognizing a nuclear facility, and then comparing that with the actual features obtained through a machine learning algorithm using explainability programs. These explainability programs clear up the unknown inherent black-box part of machine learning algorithms, and show to a person what features it looks for. and their importance. By comparing these features, it can be understood how the algorithm works, and one can make adjustments accordingly if these machine learned features do not align with what is expected. This will also aid in seeing how well the implementation of the data augmentation works for this project, and if the methods used require any extra complexity or can use more sensing data that is currently not easily available.