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Ground Sensing and In-situ Processing of Geophysical Data

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Seismic monitoring systems are typically emplaced along with a complementary infrastructure for power and data exfiltration. In some instances, it may be desirable to deploy a system in a location where it is not feasible or reasonable to provide such infrastructure. In this case there are numerous commercial options that can provide continuous recording and indefinite operation using solar power. However, these locations must still be visited on occasion to retrieve data. We have developed a system that allows for both continuous monitoring and deployment of semi-complex algorithms. Satellite and cellular communications provide a both the ability to retrieve data and command/control of the sensor platform. This platform provides for the ability to deploy complex detection and/or classification algorithms to reduce the need to send back continuous data. A system has been deployed at the Redmond Salt Mine in southwestern Utah, USA since October of 2018. A 1-D convolutional neural network (CNN) inference model has been implemented on the unit as an exemplar to demonstrate the ability to classify seismic signals from explosive blasting at the salt mine. The CNN was trained on a dataset labeled by mine level and achieved a F1 Score of 0.802 with the testing set.

Promotional text

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