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Invited talk: Multispectral Satellite Data Analysis Using Support Vector Machines With Quantum Kernels

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Support vector machines (SVMs) are a well-established classifier effectively deployed in an array of pattern recognition and classification tasks. In this work, we consider extending classic SVMs with quantum kernels and applying them to satellite data analysis.

The design and implementation of SVMs with quantum kernels (hybrid SVMs) is presented. It consists of the Quantum Kernel Estimation (QKE) procedure combined with a classic SVM training routine. The pixel data are mapped to the Hilbert space using ZZ-feature maps acting on the parameterized ansatz state. The parameters are optimized to maximize the kernel target alignment.

We approach the problem of cloud detection in satellite image data, which is one of the pivotal steps in both on-the-ground and on-board satellite image analysis processing chains. The experiments performed over the benchmark Landsat-8 multispectral dataset revealed that the simulated hybrid SVM successfully classifies satellite images with accuracy on par with classical SVMs.

Primary author(s) :   Prof. MIELCZAREK, Jakub (Jagiellonian University); MIROSZEWSKI, Artur (Jagiellonian University); SZCZEPANEK, Filip (Jagiellonian University); CZELUSTA, Grzegorz (Jagiellonian University); GRABOWSKI, Bartosz (KPLabs); Prof. LE SAUX, Bertrand (European Space Agency); Prof. NALEPA, Jakub (KPLabs, Silesian University of Technology)

Presenter(s) : MIROSZEWSKI, Artur (Jagiellonian University)

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