IAF EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observations to address Earth's Environment and Climate Challenges (7)

Author: Dr. Hector Simon Vargas Martinez
Universidad Popular Autónoma del Estado de Puebla, Mexico

Mr. Charles Galindo Jr
Universidad Popular Autónoma del Estado de Puebla, Mexico
Mr. Eugenio Urrutia
Universidad Popular Autónoma del Estado de Puebla, Mexico
Mr. André González
Universidad Popular Autónoma del Estado de Puebla, Mexico
Mr. Hero Sebastian Becerra Acosta Rodríguez
Universidad Popular Autónoma del Estado de Puebla, Mexico

CNN HYBRID ALGORITHM FOR SEGMENTING ASH DISPERSION AS A PAYLOAD OF THE "GXIBA-1" CUBESAT

Abstract

In this paper we present the mission of the Gxiba-1 satellite: earth observation satellite to segmentation of volcanic ash plumes using convolutional neural networks, with the end of alert complications in the respiratory tract and other alterations in the population's health. Two well-established architectures, the segNet and the U-Net, have been used for the processing of in situ images to validate their usability in the field of volcanology. The methods presented in this paper offer a generalized toolkit for volcano monitoring that allows detecting, segmenting, and tracking ash plume emissions. Automatic plume detection helps to significantly reduce the storage of useless data by starting to record and save eruptive events at the time of agitation when a volcano leaves quiescence, and semantic segmentation allows automatic tracking of volcanic plumes and calculation of geometric parameters. UPAEP is committed to supporting the project, as well as seeking more academic, government and business partners to support the project in order to ensure the well-being and quality of life of populations vulnerable to a volcanic event. The Gxiba-1 Project will generate important data for the early warning of major volcanic events, this contributes to the SDG 3 "Good health and well-being", SDG 13 "Climate Action". It will also contribute to the generation of high tech human resources SDG 4 "Quality Education; SDG 8 "Decent Work and Economic Growth" and SDG 9 "Industry, Innovation and Infrastructure". Gxiba-1 satellite will demonstrate the technological capabilities of the work team, as well as the creation of the technological and scientific infrastructure of the Gxiba project to generate more accurate early warning models for the prevention of a major disaster, in order to ensure the quality of life of the most vulnerable population in close the volcanoes. UPAEP's MEVA (Monitoring and Exploration of Active Volcanoes) program contains several projects to monitor and explore Mexico's active volcanoes, in particular it has the "Gxiba-1" project, a 1U CubeSat category satellite, which won the 6th round of the KiboCUBE 2021 competition. This program is an initiative of UNOOSA and JAXA.