INSTITUT DES SCIENCES,
DES TECHNOLOGIES
ET DES ÉTUDES AVANCÉES D'HAÏTI

L'Université de la nouvelle Haïti

Félicitations aux étudiants **Wougens Vincent** (mathématiques) et **Amos Noël** (génie informatique), ainsi qu'au professeur **Jean-Eugène Piou**!

Dirigé par le professeur associé à l'ISTEAH, **Jean-Eugène Piou, ing., Ph.D.**, du Massachusets Institute of Technology (MIT), le travail de recherche de deux étudiants de maîtrise de l'ISTEAH a fait l'objet de deux articles scientifiques dans une prestigieuse conférence de l'Institute of Electrical and Electronics Engineers (IEEE) à New York, du 26 au 29 novembre 2022. Toutes nos félicitations aux étudiants **Wougens Vincent** (mathématiques) et **Amos Noël** (génie informatique), ainsi qu'au professeur **Jean-Eugène Piou**!

Voici un résumé du premier article en question :

A Deep Learning Application to the 2004 Flooding of the City of Gonaïves in Haiti

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1: Graduate Student at **Institut des Sciences, des Technologies et des Etudes Avancées d'Haïti (ISTEAH**), Saint-Marc, Haiti
2: Research Scientist in Cambridge, MA, USA

Abstract:

In this paper, a deep learning network is considered to study the impact of the flooding on the city of Gonaives that occurred on 18 September 2004. Satellite images collected before and after the disaster are segmented then partitioned into 2 and 3 classes and later used to train and test the deep learning network, to estimate the damage that was inflicted upon the land topography and infrastructures of the city. Experiments conducted on the data revealed high performance of the network to identify areas buried in muddy water and regions of the city that did not suffer any damages. Data augmentation scenarios carried out on the training set translated into higher performance of the network on the test data than the result achieved when it was trained solely on the original images. The practicality of the deep learning to locate areas that were severely affected by the flood and estimate its impact on the residents of the city of Gonaïves is revealed.

Published in: 2022 IEEE 13th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON)
Date of Conference: 26-29 October 2022
Date Added to IEEE *Xplore*: 01 December 2022
ISBN Information:
DOI: 10.1109/UEMCON54665.2022.9965684
Publisher: IEEE
Conference Location: New York, NY, NY, USA

Voici un résumé du deuxième article en question :

Analyses of 2010 and 2021 Earthquakes that Struck Haiti Using a Deep Learning Network

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1: Graduate Student at **Institut des Sciences, des Technologies et des Etudes Avancées d'Haïti (ISTEAH**), Saint-Marc, Haiti
2: Research Scientist in Cambridge, MA, USA

Abstract:

Presented in this paper are results from analyses conducted on satellite imagery collected on the 12 January 2010 earthquake with a moment magnitude (Mw) of 7.0 that devastated Port-au-Prince, the capital of Haiti, and the 14 August 2021 earthquake with moment magnitude (Mw) of 7.2 that struck the southwestern peninsula of Haiti. A deep learning network architecture that constitutes the main engine of this research investigation to carry out analyses from images collected before and after the earthquakes is considered. The images are segmented, labelled then randomly chosen to form training and testing datasets that are partitioned into 3 classes. Localization of regions deeply affected by the impacts of the earthquakes and identification of land areas, road infrastructures and buildings severely damaged are useful information that the DL network provides to demonstrate its effectiveness. Data augmentation on the training side is considered to enhance the performance of the DL network on testing and shows its usefulness to reduce performance accuracy error and make the DL network a suited component in damage assessment. So, in the future, the DL network can integrate recovery and relief efforts as a tool that one can leverage on to limit the impacts of natural disasters on human lives.

Published in: 2022 IEEE 13th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON)
Date of Conference: 26-29 October 2022
Date Added to IEEE *Xplore*: 01 December 2022
ISBN Information:
DOI: 10.1109/UEMCON54665.2022.9965694
Publisher: IEEE
Conference Location: New York, NY, NY, USA