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Concerns: Letter of recommendation for Paul Collette

To whom it may concern,

My name is Murielle Kirkove. I hold a master's degree in Mathematics and a PhD in image processing applied to Astrophysics and Medical Imaging. I have been working in the field of scientific research as a specialist in signal processing since 2003 and I have been employed at the Centre Spatial of Liège (CSL) since 2015. At CSL, I worked in the "Signal Processing lab". My primary areas of expertise include software development in signal processing applied to physical problems across various domains, such as Synthetic Aperture Radar (SAR) imagery, non-destructive testing via laser acquisitions, X-Ray Fluorescence (XRF) spectrometry and optical instrument calibration. In the CSL "Signal Processing" lab, I have also studied the application of Machine Learning (ML) for various purposes over several years.

I am pleased to highly recommend Paul Collette, who recently completed a three-month internship at the CSL "Signal Processing" lab under my supervision, focusing on "Change detection from SAR imagery and Machine Learning techniques".

The project targeted a specific application with an ongoing initiative aimed at detecting spatio-temporal environmental changes induced by mining activities in the Democratic Republic of Congo. Prior his internship, a dataset made of SAR images times series selected from a spatio-temporal Area Of Interest covering numerous mining sites in the Kivu Lake region of DRC has been created. Additionally, a theoretical unsupervised ML methodology was designed. It is based on a joint convolutional Auto-Encoder (AE) that combines two convolutional AEs capable of reconstructing each image from an images-pair. The reconstruction errors serve as indicators for detecting changes inside images-pairs. Paul's task was to understand the project's context, the theoretical concepts of the proposed method, to develop and test the algorithm, to design and implement an assessment technique, and to analyze its performances.

Throughout his internship, Paul exhibited a profound understanding of the challenges involved. He approached each task with rigor and independence, consistently reflecting on optimal solutions and proposing innovative ideas. His collaborative attitude fostered engaging discussions within our team, significantly contributing to the project's progress. Notably, he exhibited a proactive spirit; for example, he did not wait until the SAR dataset was finalized to create his own dataset from publicly available optical data. Testing his development on this alternative dataset enabled him to identify and resolve issues inherent to the method prior to applying it to other data types.

During his internship, Paul developed strong analytical skills, allowing him to comprehend related scientific literature and the proposed methodology. He also enhance his programming skills, to fully implement the method in Python. By incorporating additional labeled data, he succeed in optimizing the approach for optical data, achieving very promising results. He adapted the method to unlabeled SAR data and quickly identified the root causes of poor performance, mainly due to the pre-processing chain rather than the method itself. His insights, combined with those of our team, led to solutions to improve data quality and will benefit future developments. Furthermore, he meticulously reviewed and refined his code, ensuring it adhered to best practices for structure and commenting. He also authored a comprehensive documentation detailing his code and usage instructions, demonstrating his commitment to clear and effective communication.

In summary, Paul has proven to be a diligent, independent, and collaborative individual. I am confident that he is a promising candidate for future internships or employment opportunities, and I wholeheartedly recommend him.

Please feel free to contact me if you require any further information about Paul's skills and achievements.

Sincerely,

Murielle Kirkove