Full Name (English):	Thangarajah Akilan	Recent Photo 
Affiliated Institution and Title (English):	Associate professor, Department of Software Engineering, Lakehead University	

Biography
(Please provide in paragraph form within 500 words.)

Dr. Akilan, T. (Ph.D., P.Eng., SMIEEE) received his Ph.D. in Electrical and Computer Engineering from the University of Windsor, Canada. He is an Associate Professor in the Department of Software Engineering at Lakehead University, Thunder Bay, ON, Canada. His research interests include image/video processing, information fusion, large-data analysis, object/action recognition, and semantic segmentation using artificial intelligence, machine learning, deep learning, and statistical techniques.
Currently, he serves as the director of the Engineering Co-op at Lakehead University, a reviewer for several journals, including IEEE Transactions on Multimedia, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Intelligent Transportation Systems, and IEEE Transactions on Industrial Informatics, and an associate editor for IEEE Transactions on Circuits and Systems for Video Technology.

Speech Title (English):
The Emergence of Self-supervised Learning in Medical Image Semantic Segmentation

Speech Abstract
(Please provide in paragraph form within 500 words.)

Advancements in artificial intelligence, particularly deep learning, have led to significant breakthroughs in medical image analysis, including tasks such as MRI-based brain tumor segmentation and lung cancer detection using CT scans.
Image segmentation plays a critical role in high-level medical imaging applications, including tumor diagnosis (detection and classification), surgical and radiotherapy treatment planning (RTP), longitudinal monitoring, treatment response evaluation, and clinical decision-making. By enabling precise delineation of anatomical structures, segmentation enhances patient care and facilitates tailored treatment strategies, resulting in improved clinical outcomes and saving lives.

However, achieving state-of-the-art performance with traditional supervised learning approaches (end-to-end training) requires large-scale, precisely annotated datasets. The curation of such datasets is labor-intensive, time-consuming, and costly, as it necessitates expert's involvement. This challenge is particularly pronounced in the medical domain, where data availability is often limited, and diverse pathological scenarios may not be adequately represented.

Self-supervised learning (SSL) offers a promising alternative by exploiting vast amounts of unlabeled data and designing surrogate (pretext or proxy) tasks to learn useful feature representations without requiring manual annotations. As a result, the machine learning paradigm is shifting from traditional supervised learning toward SSL, marking a fundamental evolution in visual data analysis. SSL has demonstrated strong potential in various downstream computer vision tasks, including classification, detection, segmentation, ad so forth by learning transferable representations from unlabeled data.

This talk will provide an overview of the foundations of SSL and explore different pretext tasks that can be applied to medical image segmentation. The discussion will conclude with key observations and future research directions in this rapidly evolving field.