July 5, 2025

Dear Editors,

Subject: Submission of research article titled "CoATLAS: A generalisable Self-Supervised framework using Triple Attention Mechanism for Robust Vessel Segmentation Across Domains"

We are pleased to submit our manuscript entitled **"CoATLAS: A generalisable Self-Supervised framework using Triple Attention Mechanism for Robust Vessel Segmentation Across Domains"** for editorial consideration in the journal Expert Systems with Applications. This work contributes to the development of advanced AI-driven healthcare by introducing a self-supervised framework tailored for vessel segmentation in medical imaging. The proposed architecture integrates a novel triple attention-based encoder and multi-scale feature weighting mechanism, enhancing structural delineation and robustness across domains. Our approach addresses key challenges in annotation-free learning and cross-domain generalization, aligning well with the journal's focus on intelligent measurement systems, computational instrumentation, and biomedical diagnostics.

The manuscript focuses on the development of a vessel segmentation architecture in a self-supervised paradigm. This paper offers insights into delineating the vessels in coronary angiograms. We hope the audience of the journal will gain new ideas on using depth information to improve various fields of vessel segmentation.

Our manuscript makes the following new contributions:

- We propose a new approach for vessel segmentation using a channel selective mechanism based on triple attention and leverages channel-wise weighting and rotational convolutional attention to adaptively emphasize the most informative features leading to enhanced segmentation accuracy.
- Our architecture utilizes a cycle-based generative approach to translate grey-scale angiogram images into binary segmentation masks, achieving robust and transferable feature learning.
- Our architecture also makes use of combined losses that integrate L_1, $clDICE$ and BCE loss into a compound cycle loss function, which effectively enhances vessel segmentation accuracy. This design effectively bridges the gaps in generalization faced by prior methods.
- We evaluate the performance proposed network architecture on intra-domain (134XCA and 30XCA) out-of-domain (XCAD), cross-domain (DRIVE, and STARE), and locally collected heart angiogram datasets, showcasing its ability to adapt and perform well in diverse settings. We further utilize performance metrics such as accuracy, precision, recall, Jaccard and DICE index.

All the authors have contributed significantly to this research. We had full access to all the data and approval from the institutions to publish this article. We declare no conflict of interest and all the authors have read the attached manuscript and agreed with the contents. The manuscript has not been published before, nor is it under consideration for publication elsewhere. We have checked the accuracy of the references and their citation in the text.

Note:- The institutional email of our contributor Atul Abraham is unavailable from the institution, please allow us to submit the manuscript.

Thank you for your consideration of this manuscript.

Sincerely,

Bhupender Kaushal
Sudhish N. George
Ravi Varma M K
Atul Abraham
Kiran Raja

Enclosed:
1. Original Manuscript
2. Supplementary material