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Localization of Vascular Anatomies in Digital Subtraction Angiography Using Deep Learning Techniques

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Abstract: Digital subtraction angiography (DSA) is an interventional radiology used for visualization of blood vessels for disease diagnosis and prognosis. DSA has been the gold standard for the identification of vascular abnormalities in patients. The blood vessels are extracted by subtracting the angiographic images (obtained after contrast injection) with the mask (prior to contrast injection). The interpretation of angiography is challenging due to motion artifacts, imaging noise, and vessel overlapping in the DSA images. Anatomic localization is a vital step in interpretation in DSA sequences to minimize misdiagnosis. Deep learning has been used for segmentation, registration, and labelling of blood vessels but limited works have been proposed for localization of vascular anatomies in DSA images.

In this study, we propose a deep learning model for the classification of anatomical localization in both first and second vascular structures in DSA sequences obtained during routine clinical practice. The model's performance on unseen data will be assessed both qualitatively and quantitatively. Hence, by using the proposed methodology, automatic and accurate interpretation of angiography is feasible leading to faster diagnosis, decision-making, and further reduce the amount of time and effort required for report generation in clinical practice.

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