# Exploring high reliable substructures in auto-reconstructions of a neuron

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**Research**

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# Abstract

The digital reconstruction of a neuron is the most direct and effective way to investigate its morphology. Many automatic neuron tracing methods have been proposed, but without manual check it is difficult to know whether a reconstruction or which substructure in a reconstruction is accurate. For a neuron's reconstructions generated by multiple automatic tracing methods with different principles or models, their common substructures are highly reliable and named individual motifs. In this work, we propose a Vaa3D based method called Lamotif to explore individual motifs in automatic reconstructions of a neuron. Lamotif utilizes the local alignment algorithm in BlastNeuron to extract local alignment pairs between a specified objective reconstruction and multiple reference reconstructions, and combines these pairs to generate individual motifs on the objective reconstruction. The proposed Lamotif is evaluated on reconstructions of 163 multiple species neurons, which are generated by four state-of-the-art tracing methods. Experimental results show that individual motifs are almost on corresponding gold standard reconstructions and have much higher precision rate than objective reconstructions themselves. Furthermore, an objective reconstruction is mostly quite accurate if its individual motifs have high recall rate. Individual motifs contain common geometry substructures in multiple reconstructions, and can be used to select some accurate substructures from a reconstruction or some accurate reconstructions from automatic reconstruction dataset of different neurons.


# Full Text