

Data-driven learning of network-generating models

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Abstract

Network-generation is a very interesting phenomena seen in many biological and physical applications such as in leaf-venation networks, vascular network formation, etc. We model the phenomena using a (i) Darcy's type equation and (ii) a dynamical equation to describe the conductance network under pressure forces. We systematically develop a deep learning approach to solve the network-generating PDEs which also respect an energy dissipation law. We then present the results of our model implementations using various neural network structures and parameters, and how accurately they comply with the existing research.

Keywords: network-formation, venation, data-driven learning, deep-learning