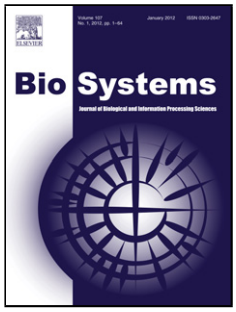

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PII: S0303-2647(15)00130-6
DOI: http://dx.doi.org/doi:10.1016/j.biosystems.2015.09.002
Reference: BIO 3599

To appear in: *BioSystems*

Received date: 3-3-2015
Revised date: 3-9-2015
Accepted date: 4-9-2015

Please cite this article as: Fioralba Ajazi, George M. Napolitano, Tatyana Turova, Izbassar Zaurbek, Structure of a Randomly Grown 2-d Network, *BioSystems* (2015), http://dx.doi.org/10.1016/j.biosystems.2015.09.002

Structure of a Randomly Grown 2-d Network

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Abstract

We introduce a growing random network on a plane as a model of a growing neuronal network. The properties of the structure of the induced graph are derived. We compare our results with available data. In particular, it is shown that depending on the parameters of the model the system undergoes in time different phases of the structure. We conclude with a possible explanation of some empirical data on the connections between neurons.

Keywords: Randomly grown network, random graphs

1. Introduction

Random graphs are commonly used in this century as an important tool to model and to analyse the structure and dynamics of real networks, in particular, neural networks (e.g. [2, 3]). The relations between the structure of a network and its functional properties are intensively studied. It is clear that the structure should affect the performance, especially when it concerns dynamical processes on networks, which in turn may change the network itself (consult [9] on a recent development in this area). These questions generate a lot of mathematical problems, answers to which might contribute to better understanding of the physiology of the brain. Although the models cannot reproduce a living brain, they may close approximate at least some experiments *in-vitro* (see the discussion on the related two-dimensional models in [6]).

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