

Methods for Generating Complex Networks with Selected Structural Properties for Simulations: A Review and Tutorial for Neuroscientists



Many simulations of networks in computational neuroscience assume completely homogenous random networks of the ErdosRenyi type, or regular networks, despite it being recognized for some time that anatomical brain networks are more complex in their connectivity and can, for example, exhibit the scale-free and small-world properties. We review the most well known algorithms for constructing networks with given non-homogeneous statistical properties and provide simple pseudo-code for reproducing such networks in software simulations. We also review some useful mathematical results and approximations associated with the statistics that describe these network models, including degree distribution, average path length, and clustering coefficient. We demonstrate how such results can be used as partial verification and validation of implementations. Finally, we discuss a sometimes overlooked modeling choice that can be crucially important for the properties of simulated networks: that of network directedness. The most well known network algorithms produce undirected networks, and we emphasize this point by highlighting how simple adaptations can instead produce directed networks.

Illustration of the undirected random network generate **Open-i** Methods for generating complex networks with selected structural properties for simulations: A review and tutorial for neuroscientists. *Frontiers in Computational Methods for generating complex networks with selected structural* 49, 2008. Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists. BJ Pettejohn, MJ Mark Damian McDonnell - **Publications - Neurotree** Mar 10, 2011 Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists. *Frontiers* **Matthew Berryman - Google ?????? - Google Scholar** Official Full-Text Publication: Methods for Generating Complex Networks with Selected Structural Properties for Simulations: A Review and Tutorial for Neuroscientists on Many simulations of networks in computational neuroscience assume **Illustration of the undirected scale-free network gener** **Open-i** 44, 2006. Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists. BJ Pettejohn, MJ **self-organized sociopolitical interactions as the best way to** - **arXiv** Apr 17, 2014 This suggests that complex network models whose subnetworks have science methods have begun to be applied

fruitfully in simulations of .. In order to generate large sample-sizes efficiently, simulated LFP data selected structural properties for simulations: a review and tutorial for neuroscientists. **six degrees of separation to improve routing in opportunistic networks** Opportunistic Networks, Routing Algorithm, Data Dissemination, Complex Networks, ranging from naive (i.e. the use of blindly flooding techniques to reach the .. M. J. Berryman, and M. D. McDonnell, Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for. **GeneSPIDER - Generation and Simulation Package for Informative** Methods for Generating Complex Networks with Selected Structural Selected Structural Properties for Simulations: a review and tutorial for neuroscientists. **Mark D. McDonnell - Google Scholar Citations** Mar 10, 2011 Methods for Generating Complex Networks with Selected Structural Properties for Simulations: A Review and Tutorial for Neuroscientists. **Matthew Berryman - Google Scholar Citations** Feb 17, 2017 Methods for Generating Complex Networks with Selected Structural Properties for Simulations: A Review and Tutorial for Neuroscientists. **Methods for Generating Complex Networks with Selected Structural** Methods for Generating Complex Networks with Selected Structural Properties for Simulations: A Review and Tutorial for Neuroscientists. B. Prettejohn, M. **Illustration of the undirected small-world and scale-fr** **Open-i** It also contains methods for design of perturbation experiments, GeneSPIDER offers control of network and data properties in simulations, together with . utilize complex multi-layer models of biochemical kinetics and focus on with selected structural properties for simulations: A review and tutorial for neuroscientists. **Matthew Berryman - Google Scholar Citations** Aug 8, 2011 Methods for Generating Complex Networks with Selected Structural Properties for Simulations: A Review and Tutorial for Neuroscientists **Methods for Generating Complex Networks with Selected Structural Average path length as a** - **Yale Image Finder - Yale University** Apr 14, 2013 The development of modern neuroscience led to the (still ongoing) accumulation of Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists. **Small Modifications to Network Topology Can Induce Stochastic** Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists. Prettejohn BJ, Berryman **Methods for generating complex networks with selected structural** Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists. Front Comput Neurosci. **OpenAIRE - Publication: Methods for Generating Complex** Other Images from Methods for Generating Complex Networks with Selected Structural Properties for Simulations: A Review and Tutorial for Neuroscientists:. **Methods for Generating Complex Networks with Selected Structural** Mar 10, 2011 Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for Many simulations of networks in computational neuroscience assume completely homogenous random **Methods for Generating Complex Networks with Selected Structural** 44, 2006. Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists. BJ Prettejohn, MJ **The Mind-Brain Relationship as a Mathematical Problem - NCBI Call for Contributions to Frontiers in Computational Neuroscience** Methods for Generating Complex Networks with Selected Structural Properties for Simulations: A Review and Tutorial for Neuroscientists. **Methods for generating complex networks with selected structural** Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists. Prettejohn BJ, Berryman **Methods for Generating Complex Networks with Selected Structural** Mar 10, 2011 Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists. Frontiers **Berryman M[au] - PubMed Result - Journal of Neuroscience** Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists **Methods for generating complex networks with selected structural** Pe ?queux AJR, Gilles R (1985) High pressure effects on selected biological systems. MJ et al (2011) Methods for generating complex networks with selected structural properties for simulations: a review and tutorial for neuroscientists.