W.5.10 Rezazad dissertation and WIREs:CS "review"

Once again, DC discovered a PhD problem, this time in [REZ2009]. Hadi Rezazad earned a PhD from GMU under Wegman Spring 2009: *Enhancement of Network Robustness and Efficiency through Evolutionary Computing, Statistical Computation and Social Network Analysis (2009)* www.galaxy.gmu.edu/stats/colloquia/AbstractsFall2009/CollSept25.html

He was the 2009 Convocation Speaker and like Said and Sharabati, he won the CS/CDS Outstanding PhD Dissertation Award:
volgenau.gmu.edu/events/convocation/past_convocations.php
www.galaxy.gmu.edu/stats/awards.html

However, pp.10-18 include text strikingly similar to that in **W.2.3,** including **"**statues." The text is mostly IDentical to that of the WR, roughly marked with red boxes in **W.2.3.**

DC wrote a full side-by-side and discussed the topic in [DEE2010p], showing additional awkward scholarship beyond the plagiarism.
deepclimate.files.wordpress.com/2010/09/rezazad-wegman-social-network.pdf
This seems yet another irrelevant injection of SNA terminology into computer network analysis, which has a long history of its own. Relabeling computer nodes as "actors" is not a contribution.

[REZ2009, p.5] states:

> "I am sincerely grateful to my Dissertation Director and advisor, Dr. **Edward Wegman**. …
> I am thankful to a superb dissertation committee, which included Dr. Daniel Barbara, Dr. Kristine Bell, and Dr. Jim Chen. Their guidance and support was tremendous help in carrying out and finalizing my research. I am also thankful to Dr. Daniel Menascé for his guidance and feed back. …
> I am also thankful to my many friends and colleagues who supported me and encouraged me throughout this work, most notably Dr. **Yasmin Said**, Mr. Christopher Ambrose and Mr. Donald Benoit."

The committee members are shown here:
http://cs.gmu.edu/~dbarbara/ Computer Science (data mining)
http://gunston.gmu.edu/kbell/ Statistics (statistical signal, sensors)
http://cs.gmu.edu/~jchen/ Computer Science (graphics, OS)
http://eceb.gmu.edu/publications.html

Parts of [REZ2009] were later published as an "Advanced Review" article in *WIREs:CS*, edited by Wegman, Said and Scott (**A.6.5**):

[REZ2011] Hadi Rezazad, "Computer Network Optimization," *Wiley Interdisciplinary Reviews: Computational Statistics*, 3: 34–46. doi: 10.1002/wics.135.
http://onlinelibrary.wiley.com/doi/10.1002/wics.135/abstract

Review articles are usually written by experts to survey well-established work in a field, not brand-new ideas. PhD dissertations are often properly turned into research article(s), but such usually emphasize the new research findings and reference the dissertation, but [REZ2011] :

- does not reference the original dissertation [REZ2009]
- is taken almost entirely from parts of that labeled original work, not review, but reworded slightly as review
- is published in a journal edited by Wegman, Said, and Scott.

This process created a "peer-reviewed" article, but whether the article is a good or bad review, one might question the quality of peer review [83]

As seen elsewhere, the bibliography is weak, shown next.

Citations and References

If a small fraction of references are actually cited, *bibliography-padding might be a possible concern* and it is common here:
50% 40 of 80, WR, **W.8**
39% 26 of 67 [SHA2008] **W.5.7**
32% ~23 of 72 [REZ2009]

The following lists all [REZ2009] references showing the pages on which they were cited. All but one of the references appeared in [REZ2011], although most were listed as Further Reading.

[83] content.usatoday.com/communities/sciencefair/post/2011/10/more-wikipedia-copying-from-climate-critics/1
deepclimate.org/2011/05/15/wegman-and-said-2011-part-2
deepclimate.org/2011/10/04/said-and-wegman-2009-suboptimal-scholarship

	References in [REZ2009]	Cited	REZ2011
	N: **N**o Citation, else page #s … **R**eference #, **F**urther Reading, **U**nused	N|Page	R|F|U
1	Ahuja, V. (1982)	N	F
2	Albert, R., Jeong, H., & Barabasi, A.L. (July 2000)	38	F
3	Alderson, D., Li, L., Willinger, W., & Doyle, J.C. (2005)	N	F
4	Awerbuch, B. & Shavitt, Y. (2001)	N	F
5	Ballard, D. (1996)	172	F
6	Banzhaf, W., Nordin, P., Keller, R.E & F.D. Francone, (1998)	N	F
7	Bar S., Gonen M., & Wool, A. (2004)	N	F
8	Barabasi, A.L. & Albert, R. (1999)	37	R.9
9	Beygelzimer, A., Grinstein, G., Linsker, R. & Rish, I. (2005)	35	R.8
10	Biggs, N. (1993)	N	F
11	Bollobas, B. & Riordan, O. (2003)	N	F
12	Bollobas, B. (2001)	N	F
13	Bondy , J.A. & Murty , U.S.R. (1976)	N	F
14	Boudaoud, K., Labiod, H., Boutaba, R., & Guessoum, Z. (2000)	N	F
15	Bunke, H., Dickinson, P.J., Kraetzl, M., & Wallis, W.D., (2007)	N	F
16	Callaway, D.S., Newman, M.E.J., Strogatz, S.H. & Watts D.J. (Oct. 2000)	39	F
17	Carlson, J. & Doyle, J. (2002)	39	F
18	Carrington, P.J. & Scott, J. (2005) SIC: & Wasserman	N	F
19	Chaudhri, V. K., Farquhar, A., Fikes, R., Park, P. D., & Rice, J. P. (1998)	172	F
20	Chekuri, C. , Shepherd, F.B., Oriolo, G., Scutellá, M.G. (2007)	N	F
21	Chen, Y. W. (2007)	N	F
22	Cohen, P., Schrag , R., Jones, E., et al., (1998)	172	F
23	Cohen, R., Erez, K., Ben-Avraham, D. & Havlin, S. (2000)	N	F
24	Cohen, R., Erez, K., Ben-Avraham, D. & Havlin, S. (2001)	N	R.10
25	Committee on Network Science for Future Army Applications (2005)	41	F
26	D'Ambrosio, J. & Birmingham, W.P. (1996)	30,172	R.1
27	DeJong, K. (2006)	77	F
28	DeJong, K. (2009)	76	R.5
29	Dekker, A. & Colbert, B. (2004)	36	R.6
30	Demetrescu C., Thorup M., Chowdhury R.A. & Ramachandran V. (2007)	N	F
31	Dietterich, T. G., London, R. L., Clarkson, K., & Dromey, G. (1982)	172	F
32	Dolev D., Jamin S., Mokryn O. & Shavitt Y. (2006)	N	F
33	Doyle J.C. & Carlson, J.M. (2000)	N	F
34	Doyle, J.C. et al, (2005)	N	F
35	Dybala, T., Tecuci, G., & Rezazad, H. (December 1996)	170	F
36	Eiben, A.E. & Schoenauer, M. (2002)	N	F
37	Eiben, A.E., & Smith, J.E. (2003)	77	R.4

	References in [REZ2009]	Cited	REZ2011
	N: **N**o Citation, else page #s … **R**eference #, **F**urther Reading, **U**nused	N|Page	R|F|U
38	Erdős, Rényi, A. (1959)	57	R.12
39	Erdos, P. & Renyi, A. (1961)	N	F
40	Estrada, E. & Hatano, N. (2008)	N	F
41	Estrada, E. (2006)	N	R.11
42	Estrada, E. (2007)	N	F
43	Faloutsos M., Faloutsos P. & Faloutsos C, (1999)	N	F
44	Fogel, D.B. (1995)	N	F
45	Freeman, L. C. (1978/1979)	46	F
46	Freeman, L.C. (2004)	N	F
47	Gibbons, A. (1985)	N	F
48	Godsil, C. & Royle, G. (2001)	N	F
49	Goldberg, D.E. (1989)	N	F
50	Harary, F. (1969)	N	F
51	Haupt, R.L. & Haupt, S.E. (2004)	N	F
52	Hedberg, S. (1994)	N	F
53	Holland, J.H. (1992)	N	F
54	Humphreys, J. F. (1996)	N	F
55	Karónski, M. (1982)	N	F
56	Knoke, D. & Kuklinski, J.H. (1982)	N	F
57	Koza, J.R., Keane, M.A. & Streeter, M.J. (2003)	N	F
58	Krebs, V. (2000)	31	F
59	Kuo, F. F. (1976)	N	F
60	Li, L., Alderson, D., Doyle, J.C., & Willinger, W. (2005).	N	F
61	Mitchell, M. (1998)	N	F
62	Ng, A.K.S. & Efstathiou, J. (2006)	N	F
63	Papachristodoulou, A., Li, L., & Doyle, J.C., (2004)	N	F
64	Rezazad, H. & Tecuci, G. (2000)	17,169	F
65	Rezazad, H. (2003)	16,17,169	R.2
66	Rezazad, H. (2007)	75	R.7
67	Scott, J. (2000).	N	F
68	Seymour, P. & Thomassen, C. (2009) SIC: editors	N	U
69	Wasserman, S. & Faust, K. (1999) SIC:1994	23	R.3
70	Willinger, W. & Doyle, J. (2002)	N	F
71	Winzer, P.J., Shepherd, F.B., Oswald, P., Zimgibl, M, (2005)	N	F
72	Wu, F.Y.J. (1982)	N	F
	Cited	**23**	
	Cited %	**32%**	

Following shows samples of the [REZ2009]➔[REZ2010] comparison. *Some might consider this self-plagiarism, but I am not claiming that. Given a proper citation, re-use of dissertation work in research articles seems fine to me. Of course, no proper citation is included.*

[REZ2011, p.34]

Computer networks are vital in our everyday lives. It is important to design network configurations with special consideration for their various aspects, such as security, integrity, scalability, and cost. It is especially important for a network to be built as robustly as possible to protect against failures, attacks, and intrusions. In this article, I review methods to assess and improve the robustness and efficiency of computer networks. These methods use computer network analysis, social network analysis, evolutionary computing, statistical methods, and graph theory. Specifically, the aim has been to achieve enhanced network robustness and efficiency with a primary focus on architecture and topology of networks. Metrics have been developed for measuring the robustness and efficiency elements of networks and to construct an evolutionary algorithm for the enhancement of these elements. These methods have been applied to various networks, including random networks, biased networks, and real-life networks. These networks have been analyzed and enhanced using the evolutionary algorithm. Using the metrics, it is shown how the robustness and efficiency of the networks improve In addition, through this evolutionary process, certain network parameters, as well as the network topological configuration converge.

[REZ2011, p.34

Network configuration design and enhancements include complex tasks that are traditionally performed by network domain experts. These efforts are time-consuming, costly, and are typically not documented. In addition to traditional configuration methods, various new and innovative methods have been introduced by researchers from diverse disciplines in developing new network designs and in improving existing ones.[1] There are many aspects to building a successful computer network. This includes taking into consideration important factors such as cost, security, integrity, and scalability.[2] It is especially important for a network to be built as fault tolerant (robust) as possible. This, in turn, requires that the network have the minimal possible points of failure. Robustness of computer networks is, therefore, of great importance. As computer networks are being used more widely and for more critical purposes, the need for their robustness is becoming even more crucial. Network robustness is especially important in the face of various possible malicious attacks and intrusions.

Robustness, however, may come at the price of reduced network efficiency. Here, efficiency refers to the speed in which one can get from one node on the network to another (quickest path), as well as a suitable and appropriate number of connections for each node (not too many and not too few). A network that is designed with special attention to these efficiency factors will generally provide better throughput, is less costly, and is easier to manage.

If an issue exists here, it is not with Rezazad, but Said and Wegman. This is not a review article, but part of a dissertation edited slightly to convert "novel" methods into "reviews."

Cyan here means identical text in the two sources, not plagiarism.

[REZ2009, pp.11-12 (uses PDF page #s)]

Computer networks are vital in our everyday lives. It is important to design network configurations with special consideration for their various aspects, such as security, integrity, scalability, and cost. It is especially important for a network to be built as robustly as possible to protect against failures, attacks, and intrusions. Through this work, I develop a novel method to assess and improve the robustness and efficiency of computer networks. This method uses computer network analysis, social network analysis, evolutionary computing, statistical methods, and graph theory. Specifically, my aim is to achieve enhanced network robustness and efficiency with a primary focus on architecture and topology of networks. I develop metrics for measuring the robustness and efficiency elements of networks and construct an evolutionary algorithm for the enhancement of these elements. I then apply the method to various networks, including random networks, biased networks, and real-life networks. I analyze these networks and enhance them using the evolutionary algorithm. Then, through using the metrics, I show how the robustness and efficiency of the networks improved. I further show how certain network parameters, as well as the network topological configuration, converge through this evolutionary process.

[REZ2009, pp.13-14]

Network configuration design and enhancements include complex tasks that are traditionally performed by network domain experts. These efforts are time-consuming, costly and are typically not documented. In addition to traditional configuration methods, various new and innovative methods have been introduced by researchers from different disciplines in developing new network designs and in improving existing ones. There are many aspects to building a successful computer network. This includes taking into consideration important factors such as cost, security, integrity, and scalability. It is especially important for a network to be built as fault tolerant (robust) as possible. This, in turn, requires that the network have the minimal possible points of failure. Robustness of computer networks is, therefore, of great importance. As computer networks are being used more widely and for more critical purposes, the need for their robustness is becoming even more crucial. Network robustness is especially important in the face of various possible malicious attacks and intrusions.

⇨ Through this work, I develop an innovative method to assess and improve the robustness of computer networks.

Robustness, however, may come at the price of reduced network efficiency. Here, efficiency refers to the speed in which one can get from one node on the network to another (quickest path), as well as a suitable and appropriate number of connections for each node (not too many and not too few). A network that is designed with special attention to these efficiency factors will generally provide better throughput, is less costly, and is easier to

⇨ manager.

[REZ2011, pp.34-35]
The approaches described in this article are

based on concepts and techniques from computer network analysis, social network analysis,[3] evolutionary computing,[4,5] statistical methods, and graph theory.[6] Focusing on both the robustness and the efficiency elements of a network, the aim is to achieve enhanced network fault tolerance. Although there are various aspects in assessing the robustness and efficiency of a computer network, in this article, the focus is on network architecture, connectivity, and topology.

Throughout the following sections,
the background information and the essential concepts are presented.
This includes the introduction of
several metrics for measuring the robustness and efficiency of computer networks and evaluating and comparing these metrics using statistical analysis. Next, detailed explanations and arguments are provided for adopting the method and an evolutionally algorithm is presented. In addition, the evolutionary computer algorithm that was developed in carrying out the necessary tasks is described. The results are then provided that were obtained from applying the algorithm to a number of computer networks. The method and its application to a specific example are described in detail and the results are presented.

Finally, a summary of the methods and results is provided.

Network fault tolerance is a critical aspect of any network configuration design. A network configuration must be designed in such a way that its robustness is ensured. Therefore, comprehending, assessing, and improving the robustness of a network is of great importance. The robustness of a network, however, is linked (directly or otherwise) to the efficiency of the network, often being antithetic and competing qualities. Throughout this article, several robustness and efficiency parameters are defined, evaluating their relevance and setting the stage to assess and improve network robustness and efficiency. Here, the term

efficiency' is used to refer to the speed in which one can get from one node on the network to another (quickest path), as well as a suitable and appropriate number of connections for each node (not too many and not too few).

[REZ2009, pp.14-15]
Thus, I take into account the robustness factors, as well as the efficiency factors, in developing my method. My approach is
based on concepts and techniques from computer network analysis, social network analysis, evolutionary computing, statistical methods, and graph theory. Focusing on both the robustness and the efficiency elements of a network, my aim is to achieve enhanced network fault tolerance. Although there are various aspects in assessing the robustness and efficiency of a computer network, in this dissertation, I focus on network architecture, connectivity and topology. …

I begin by presenting
the background information and the essential concepts.
I introduce
several metrics for measuring the robustness and efficiency of computer networks and evaluate and compare these metrics using statistical analysis. I follow by providing detailed explanations and arguments for adopting my method and present an evolutionally algorithm. I also describe a computer code that I have developed to carry out the necessary tasks, as prescribed in the evolutionary algorithm. Next, I provide results obtained from applying the algorithm to a number of computer networks. I describe in detail the examples, the method, application of the method to the examples, and the results. I then conduct a thorough analysis in studying the behavior of such networks as a result of applying the algorithm and draw several conclusions. I also use an actual computer network that is in use today to demonstrate the concepts, analyze the data and show important results. I conclude by providing a summary of the methods and results, and introduce several ideas for future work.

[REZ2009, pp.43-44]
Network fault tolerance is a critical aspect of any network configuration design. A network configuration must be designed in such a way that its robustness is ensured. Therefore, comprehending, assessing, and improving the robustness of a network is of great importance. The robustness of a network, however, is often linked (directly or otherwise) to the efficiency of the network, often being antithetic qualities. In this chapter, I focus on defining parameters, evaluating their
relevance and setting the stage to begin the assessment and improvement process. Furthermore, I demonstrate statistical computation, evaluation and analysis in support of assessment and improvements of network robustness and efficiency. Here, I use the term "efficiency" to refer to the speed in which one can get from one node on the network to another (quickest path), as well as a suitable and appropriate number of connections for each node (not too many and not too few).

[REZ2011, p. 35]

To verify and validate that a network design is one that will make the network more reliable and more efficient, appropriate criteria must be taken into consideration. An important such criterion is that a node on the network must be connected to at least one other node on the network.

Another way to state this is that a node *A* that has direct or indirect connectivity to another node *B*, must always maintain some type of connectivity (accessibility) to that node. As configuration changes are proposed or implemented, two nodes that have had some sort of connectivitymay not become completely disconnected. ⇦

If a node has no link to any other node, it will no longer be a part of the network and will become a disconnected node.

In general, when a network node or a network link is removed from the network and the removal causes one or more of the network nodes to become disconnected from the rest of the network, a *network disconnection* occurs. When a network becomes disconnected, it is divided into two smaller networks, namely subnets.

For a disconnected network, the larger subnet is referred to as the *base network* and the smaller subnet is referred to as the *disconnected segment*.

Network Robustness and Efficiency

To verify and validate that a network design is indeed one that will make the network more reliable and more efficient, appropriate criteria must be taken into consideration and suitable metrics must be adopted and evaluated.[7] In addition, certain constraints must be met and maintained in the design of each network.

I describe a method for making configuration design changes to a given network to obtain enhanced robustness and efficiency. Given an initial configuration for a network, a set of robustness and efficiency metrics are measured. Then, a network configuration change is made to the original network, and the same metrics are computed again for the new network *instance*.[8] The process then continues with another reconfiguration of the new instance. At the end of each such iteration of network configuration change, the values of the metrics are recorded and compared to those of the previous instance. The results are then compared and analyzed to investigate any improvements and enhancements. The following metrics are used in assessing and improving network robustness and efficiency:

[REZ2009, pp.31-32]

To verify and validate that a network design is one that will make the network more reliable and more efficient, appropriate criteria must be taken into consideration. An important such criterion is that a node on the network must be connected to at least one other node on the network. If a node has no link to any other node, it will no longer be a part of the network and will become a disconnected node.

In general, when a network node or a network link is removed from the network and the removal causes one or more of the network nodes to become disconnected from the rest of the network, a *network disconnection* occurs. When a network becomes disconnected, I refer to the subnet with the larger number of nodes as the

base network and the subnet with the smaller number of nodes as the *disconnected segment*.

Another way to state this is that a node *A* that has direct or indirect connectivity to another node *B*, must always maintain some type of connectivity (accessibility) to that node. As configuration changes are proposed or implemented, two nodes that have had some sort of connectivity may not become completely disconnected. ⇦ ??

To verify and validate that a network design is indeed one that will make the network more reliable and more efficient, appropriate criteria must be taken into consideration and appropriate metrics must be adopted and evaluated (Rezazad, 2007). In addition, certain constraints must be met and maintained in the design of each network. In this chapter, I introduce a new method for making configuration design changes to a given network to obtain enhanced robustness and efficiency. Throughout this approach, given an initial configuration for a network, a set of robustness and efficiency metrics are measured. Then, a network configuration change is made to the original network, and the same metrics are computed again for the new network *instance*. The process then continues with another reconfiguration of the new instance. At the end of each such iteration of network configuration change, the values of the metrics are recorded and compared to those of the previous instance. The results are then compared and analyzed to investigate any improvements and enhancements. As described earlier, the following metrics are used throughout this approach in assessing and improving network robustness and efficiency:

The article basically presents Rezazad's ideas and method, but with a few phrases changed to convert "novel" research results into a review. Perhaps the article might have been sent to a relevant journal and undergone normal peer review as a research contribution, evaluated by networking researchers, but that did not happen. The dissertation may apply ideas from social network analysis and statistics, *but those were not very visible in the article, although many references persisted.*
The rest of the article is directly extracted from the dissertation to give definitions and an example of the method.

[REZ2011, pp.35-36]
"Average Shortest Path Length … ALBDR is the average of all of the disconnection ratios caused by removing a link on the network."

[REZ2011, pp.36-38]
"Evolutionary Algorithm
NetEnhancer is an evolutionary algorithm that has been developed to carry out the aforementioned tasks. This algorithm is based on intelligently …
then adding new nodes and new links require only re-optimization."

[REZ2011, pp. 38-39]
"**NETWORK ENHANCEMENT THROUGH EVOLUTIONARY ALGORITHM—NetEnhancer …** a modified network configuration is saved in matrix format."

[REZ2011, pp. 39-42]
"From Table 1, it can be observed that: …These results are indicative that the network metrics measuring the robustness and the efficiency of the network have improved from one configuration to next, using NetEnhancer."

[REZ2011, pp. 42-43]
"After three more iterations; at the end of the fifth iteration, Instance-5 of the network is obtained. NetEnhancer is referred to as 'Instance-5'. … ⇐ error created.
and then NetEnhancer can be re-employed to optimize the expanded network and provide for better robustness and more efficiency on the network."

[REZ2011, pp. 44]
"Computer networks are continuing to play more vital roles in our everyday lives. …
In this article, methodology was described for reconfiguring and expanding computer networks in a manner that will improve the robustness and efficiency of such networks. Specifically, the method used concepts from evolutionary algorithms, social network analysis techniques, and statistical computing and analysis. By using this method, the networks show better robustness at the end of the evolutionary process while the efficiency factors either improved or remained generally unchanged.

It would be interesting to hear opinions from real networking researchers regarding the quality and relevance of the work. *This article mostly seems to describe theoretical analyses of graphs, not algorithms of much use in the real world, where physical constraints prevent arbitrary reconfigurations. Its presence in a computational statistics review journal seems very strange, as strange as social networking articles in CSDA,* ***W.5.6****. It is clearly no review article, as would have been obvious had it been accurately presented as an algorithm from a dissertation.*

[REZ2009, pp.47-50]
"Average Shortest Path Length… ALBDR is the average of all of the disconnection ratios caused by removing a link on the network."

[REZ2009, pp.77-83]
"4.3 Evolutionary Algorithm
To conduct this research and to arrive at the results, I have developed an algorithm, which I have called *NetEnhancer*. This algorithm is based on intelligently …
then adding new nodes and new links require only re-optimization."

[REZ2009, pp.94-99]
"**4.4.1. Network Enhancement through Evolutionary Algorithm – NetEnhancer …**
a modified network configuration is saved in matrix format."

[REZ2009, pp.102-106]
"From Table 4.9, it can be observed that: …These results are indicative that the network metrics measuring the robustness and the efficiency of the network have improved from one configuration to next, using NetEnhancer."

[REZ2009, pp.111-117]
"Next, another link transfer is performed.
The newly configured network using NetEnhancer is referred to as "Instance-5". …
and then NetEnhancer can be re-employed to optimize the expanded network and provide for better robustness and more efficiency on the network."

[REZ2009, pp.111-117]
"Computer networks are continuing to play more vital roles in our everyday lives. …
I have developed a new methodology to re-configure and expand computer networks in a manner that will improve the robustness and efficiency of such networks. Specifically, I have developed a method using evolutionary algorithms, social network analysis techniques and statistical computing and analysis that enhances the robustness and efficiency of computer networks."