Something about NP-complete problems

Chris S. Student
Division of Science and Mathematics
University of Minnesota, Morris
Morris, Minnesota, USA 56267
cssxxxx00000@morris.umn.edu

ABSTRACT

This paper discusses new results in NP-complete problems and the use of distributed networks to solve certain partial cases of NP-complete problems.

1. DISCUSSION OF SOURCES

I will focus on using the *super-new-nifty-method* for solving partial cases of NP-complete problems on distributed networks.

1.1 Sources I expect to use (and how)

I plan to use the following sources:

- I expect [8, 9] to be two of my main sources, and I'm still looking for one more "core" paper to build on. [8] covers *this* and *that*, which is important for *the other*. [9] takes a very different approach which appears to take better advantage of some new developments in cloud infrastructure. One area where a new paper would be helpful would be in better connecting and comparing these two techniques.

- I think I'll use [2] for background on cloud infrastructure.

- I'll use [1, 10] and possibly selected chapters of [7] as background on NP-completeness and what it means to solve partial cases of NP-complete problems. The Wikipedia entry on NP-Completeness ([11]) looks like it may be useful as a background reference, especially their little "inheritance" chart showing the reductions for some of the "standard" problems.

As mentioned above I still one more "core" papers, and I'm still looking for good examples that I can use to explain why solving partial cases of NP-complete problems matters.

1.2 Sources I doubt I'll use

I was initially considering algorithms on compete graphs as a possible topic, and looked over [12, 5, 6] before I settled on my current topic. [12] was quite readable and provided a nice background on complete graphs, and might still become a background citation.

I also looked at [3] which I thought would be very helpful, but turned out to be *very* poorly written to the point of being almost incomprehsible. I also thought [4] looked promising, but it was just a two page poster paper and had almost no useful detail. I tried searching for follow-up work and couldn't find any. Some searching with my advisor suggests that this poster was part of someone's Master's thesis, and it looks like they took an industry job right after this and haven't published anything since.

2. REFERENCES

[1] S. Aaronson. Guest column: NP-complete problems and physical reality. *SIGACT News*, 36:30–52, March 2005. *This is a great background resource. It covers the approach Blah that I plan to focus on.*

[2] Y. Brun. Solving NP-complete problems in the tile assembly model. *Theor. Comput. Sci.*, 395:31–46, April 2008. *This is an alternative approach that I am likely to use for comparison of approaches and results. The approach seems slightly less efficient than Blah, expect for cases with a small number of nodes (< 100).*

[3] T. Dee and T. Dum. A quite awful paper (with a very appealing title). In *Poorly reviewed nonsense*, 2011. *The writing in this was terrible, and it was almost incomprehensible.*

[4] T. Dee and T. Dum. A nice little poster, with very little content. In *A very big poster session so people can get their trips paid for*, 2013. *Looks interesting, but really thin, and I couldn't find any follow-up work.*

[5] D. P. Dobkin, S. J. Friedman, and K. J. Supowit. Delaunay graphs are almost as good as complete graphs. In *Foundations of Computer Science, 1987., 28th Annual Symposium on*, pages 20–26. IEEE, 1987. *Won't be using this since my topic isn't complete graphs anymore.*

[6] J. Folkman. Graphs with monochromatic complete subgraphs in every edge coloring. *SIAM Journal on Applied Mathematics*, 18(1):19–24, 1970. *Won't be using this since my topic isn't complete graphs anymore.*

[7] M. R. Garey and D. S. Johnson. *Computers and Intractability: A Guide to the Theory of NP-Completeness*. W. H. Freeman & Co., New York, NY, USA, 1979. *This is an old book, but it is referenced in most papers I have looked at as the*

primary background source on NP-complete problems. I am very likely to use it.

[8] M. Oltean and O. Muntean. Solving NP-complete problems with delayed signals: An overview of current research directions. In *Proceedings of the 1st international workshop on Optical SuperComputing*, OSC '08, pages 115–127, Berlin, Heidelberg, 2008. Springer-Verlag. *This paper has the key result that I am interested in presenting.*

[9] B. A. Prakash, L. Adamic, T. Iwashyna, H. Tong, and C. Faloutsos. Fractional immunization in networks. *Austin, Texas, USA*, 2013.

[10] Wikipedia. NP-complete — Wikipedia, The Free Encyclopedia, 2013. [Online; accessed 20-September-2013]. *Provides some useful background on NP completeness and an example that I think I may use in my introduction.*

[11] Wikipedia. Np-complete — wikipedia, the free encyclopedia, 2015. [Online; accessed 17-September-2015].

[12] P. M. Winkler. Isometric embedding in products of complete graphs. *Discrete Applied Mathematics*, 7(2):221–225, 1984. *Won't be using this since my topic isn't complete graphs anymore.*