

COMS E6232 - Project Proposal: Asymmetric TSP

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Proposal:

In the second lecture of this class when we were discussing TSP heuristics, I was fascinated by the idea of utilizing a disjoint cycle cover in order to derive an approximation ratio for Asymmetric TSP (ATSP). During the lecture, we only covered a $\log n$ approximation algorithm for ATSP while only briefly mentioning that there was a better approximation algorithm than $\log n$ approximation. I was curious on what this better algorithm entailed. Now, since I have the opportunity to research a topic of my choice, I want to specifically research more in depth of the Asymmetric TSP. The TSP and all its variants have been thought provoking for me but unfortunately, I would not be able to cover all those variants within this research paper due to the length constraints for this paper. My goal of this research paper is to provide a summary of the current state of the art P-time algorithms and their accompanying approximation ratios for ATSP and to provide an educated opinion on what I perceive will be the future direction of the research towards better ATSP approximation algorithms. I will also summarize on why we can not approximate within $75/74$ in polynomial time for ATSP unless $P = NP$. The main papers that I will focus on will include “An $O(\log n / \log \log n)$ -approximation algorithm for the asymmetric traveling salesman problem” by Asadpoor et al, SODA 2010, and “The elusive inapproximability of the TSP” by Lampis, SIGACT 2014. Also, I will supplement research on additional papers that I feel would complement my analysis and summarization of the main focus papers.