Notes on Approximation Algorithms

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Abstract

A collection of some notes on the design and analysis of approximation algorithms and approximation techniques. Based mainly off of [2, 1].

1 Introduction

Problem 1 (Vertex Cover)
Given an undirected graph $G = (V, E)$ and a cost function $c : V \to \mathbb{Q}^+$, find a minimum cost set of vertices $V' \subseteq V$ such that every edge has at least one endpoint in V'.

Definition 1 (Submodularity)**.** A function f is submodular if it satisfies

$$f(S \cup \{v\}) - f(S) \geq f(T \cup \{v\}) - f(T)$$

for every pair of sets S, T such that $S \subseteq T$ and element $v \notin T$.

Theorem 1. *Under the IC model, σ is a submodular function.*

References

[1] Vijay V Vazirani. *Approximation Algorithms*. Springer, 2001.

[2] David P Williamson and David B Shmoys. *The Design of Approximation Algorithms*. Cambridge University Press, 2011.