

Introduction to Approximation Algorithms - 2014/2

Practical Project Proposal

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Abstract

The main objective of this Practical Project is extend and validate the propositions of the Seminar chosen paper. The extension proposed is solve other problem with the approximation algorithm studied. And the validation are obtained through simulations on best(worst)-case scenarios.

I. INTRODUCTION

The chosen paper [2] solves the Maximum-Weighted Independent Set of Links Problem [**MWIS**] using algorithms designed under the protocol interference model. We are interested in the greedy one, called **gWIS**.

There is a related work on Wireless Communications [1] in which the authors made a proof (Theorem 4.5) that any algorithm to solve **MWIS** is a constant approximation for the Multi-Rate Scheduling Problem [**MRS**].

So, our proposed contributions are:

- 1) obtaining a constant approximation to the **MRS** through the fast and simple algorithm (**gWIS**).
- 2) implementing the **stripWIS** algorithm (which make use of **gWIS**) to simulate best and worst case scenarios

II. PRACTICAL PROJECT TASKS

This project is divided in two parts: one analytical and other experimental.

A. Analytical

Into this part, the main task is the mapping of the **MRS** [1] into a kind of input to the **gWIS** described at [2]. This map must preserve the approximation guaratees.

B. Experimental

Simulations will validate **gWIS** in best and worst case scenarios. The implementation code is avaiable at github [3].

REFERENCES

- [1] Olga Goussevskaia et al, *Wireless Multi-Rate Scheduling: From Physical Interference to Disk Graphs*, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [2] Peng-Jun Wan et al, *Fast and Simple Approximation Algorithms for Maximum Weighted Independet Set of Links*, IEEE INFOCOM 2014 - IEEE Conference on Computer Communications.
- [3] MRS, *Multi-Rate Scheduling*, GitHub Repository, <https://github.com/mfer/mrs.git>