

CP1: Setup and Paper Selection

Team 70 Members: Ali Ahsan Rajani, Hamza Raza

Spring 2025 CS/CE 412/471 Project

Paper Details

- **Title:** *Deterministic Online Bipartite Edge Coloring*
- **Authors:** Joakim Blikstad, Ola Svensson, Radu Vintan, David Wajc
- **Conference/Year:** Symposium on Discrete Algorithms (SODA) 2025
- **Link:** <http://arxiv.org/abs/2408.03661v2>

Summary

This paper investigates the online bipartite edge coloring problem with one-sided arrivals. It introduces a deterministic algorithm that achieves a competitive ratio of $\frac{e}{e-1} + o(1)$, outperforming the greedy algorithm for graphs with high maximum degree. It combines contention resolution schemes and martingale concentration to break the long-standing belief that randomization is essential to improve on greedy in this setting.

Justification

The paper is a significant theoretical contribution and fits well with our course goals. It overcomes limitations of deterministic online algorithms and introduces a novel way to derandomize an online coloring algorithm. The techniques are insightful and practical for studying online decision-making.

1 Implementation Feasibility

The algorithm is constructive and includes pseudocode. The key steps are:

- Simulate online arrivals of nodes.
- Implement contention resolution.
- Analyze performance compared to the greedy algorithm.

All parts are feasible in Python or C++ without requiring external datasets.

Team Responsibilities

- **Hamza:** Literature review, theory, Greedy and baseline implementation
- **Ali:** Contention resolution, recursion, Experiments, documentation, and final report