

Postgraduate Seminar Series

Venue: Graduate Seminar Room

Date & Time: September 26, 2026 at 3:00 PM

Speaker Information

Samidhya Sarker (Std No. 1018052049) is a part time M.Sc. student in the department of CSE, BUET. He completed his undergraduate studies from Bangladesh University of Engineering and Technology (BUET) in 2018. He is currently working as an Assistant Programmer, CA Operation and Security at Bangladesh Computer Council (BCC). His research interest lies in the field(s) of PKI Security, Applied Cryptography and Combinatorial Optimization. He is currently doing his postgraduate thesis under the supervision of Abu Wasif. He will be speaking about his ongoing research in this talk.



Development of Novel Greedy Heuristics for Double Roman Domination Problem

The Double Roman Domination Problem (DRDP) is an NP-hard combinatorial optimization problem that is a variant of the classical graph domination problem. This thesis develops four greedy heuristics for solving the DRDP: Vertex Cover Based Construction (built on star graph decomposition), Sum of Nth-Degree Based Heuristics (a weighted and a concentration variant), Maximal Biclique Decomposition, and Gain-Factor Based Construction. Each uses a different vertex-scoring strategy to construct low-weight double Roman dominating functions. The thesis also adapts several metaheuristic and hyper-heuristic frameworks to the DRDP for the first time: Simulated Annealing, GRASP-Lite, and Entropy-Guided Ruin-and-Recreate as metaheuristics, and a Contextual Bandit Hyper-heuristic. The evaluation compares these methods against existing baselines from earlier work for solving the DRDP: naive Degree-Greedy construction, Ant Colony Optimization, and a Genetic Algorithm. The benchmark contains path and cycle graphs with known optimal values, synthetic Erdős–Rényi random graphs of varying density, and real-world sparse matrices from the Harwell-Boeing collection. Across the full 143-graph benchmark, Simulated Annealing metaheuristic achieves the lowest mean rank (2.02) and the most best-or-tied scores (113). The Contextual Bandit Hyper-heuristic ranks second (3.15), and Ant Colony Optimization ranks third (3.86). In the subset of real-world Harwell-Boeing graphs, after Simulated Annealing, Ant Colony Optimization comes second and Contextual Bandit Hyper-heuristic comes third. Genetic Algorithm comes fourth in both cases. Gain-Factor Based Construction scores below these methods, but it runs much faster. This makes Gain-Factor Based Construction a fast baseline for heavier metaheuristic and Hyper-heuristic constructions. These findings will improve the understanding of solving DRDP, with applications in domains such as network monitoring, facility and resource placement, and wireless sensor network deployment.