UNIVERSITY of GUELPH

COLLEGE of ENGINEERING AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

# MSc Defence

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## Incorporating anomaly detection techniques within SPEA-2

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**Abstract**

Evolutionary Multi-Objective Optimization utilizes evolutionary algorithms to obtain optimal solutions involving multiple objectives, which often are conflicting in nature. This optimal solution set is known as a pareto set and the corresponding fitness for the *pareto set* is the *pareto front*. Multi-Objective evolutionary algorithms can produce solution sets whose evaluations closely approach those of the pareto front. This degree of closeness is called convergence.

Multi-Objective Optimization algorithm often involve a trade-off between convergence of the algorithm and diversity of the solutions formed. Regular MOEA's use a variety of diversity measures to try to control this trade-off. However, an alternative concept to diversity has been introduced in the field of data-mining, that of anomalous points. For our research we found preserving anomalous points, which have two important characteristics, namely sparsity and dissimilarity with respect to the other points in the dataset, improved the overall search direction and selection process of the evolutionary algorithm. In this talk we will investigate the importance of anomalous points within EMOA, which runs counter to how its being used within the field of data-mining, through its incorporation within a Multi-Objective evolutionary algorithm framework known as SPEA-2.