OIL SPILL AUTOMATIC DETECTION BASED ON MULTI-OBJECTIVE EVOLUTIONARY ALGORITHM

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Abstract: This study has demonstrated work to optimize the oil spill footprint detection in synthetic aperture radar (SAR) data. Therefore, Entropy-based Multi-objective Evolutionary Algorithm (E-MMGA) and non-dominated sorting genetic algorithm-II (NSGA-II) have implemented with COSMO-SkyMed data during the oil spill event along the coastal water of along the Koh Samet Island, Thailand. Besides, Pareto optimal solution is implemented with both E-MMGA and NSGA-II to minimize the difficulties of oil spill footprint boundary detection because of the existence of look-alike in SAR data. The study shows that the implementation of Pareto optimal solution and weight sum in E-MMGA and NSGA-II generated accurate pattern of an oil slick. Furthermore, thick oil spill has highest value of 2.3 NSGA-II than thin and medium spills. The NSGA-II has the highest performance as compared to E-MMGA, which is able to preserve the morphology of oil spill footprint boundaries i.e. thick, medium, and light. In conclusion, NSGA-II is considered as an excellent algorithm to discriminate oil spill from look-alikes and also to identify thick oil spill from thin one within the shortest computing time.

Keywords: Multi-Objective Evolutionary Algorithm, Entropy based Multi-Objective Evolutionary Algorithm, Non-dominated Sorting Genetic algorithm-II, oil spill spreading, Cosmo-skymed satellite.