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COMPARISON OF PARTICLE SWARM OPTIMIZATION AND GENETIC ALGORITHM IN RATIONAL FUNCTION MODEL OPTIMIZATION

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Abstract. Rational Function Models (RFM) are one of the most considerable approaches for spatial information extraction from satellite images especially where there is no access to the sensor parameters. As there is no physical meaning for the terms of RFM, in the conventional solution all the terms are involved in the computational process which causes over-parameterization errors. Thus in this paper, advanced optimization algorithms such as Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) are investigated to determine the optimal terms of RFM. As the optimization would reduce the number of required RFM terms, the possibility of using fewer numbers of Ground Control Points (GCPs) in the solution comparing to the conventional method is inspected. The results proved that both GA and PSO are able to determine the optimal terms of RFM to achieve rather the same accuracy. However, PSO shows to be more effective from computational time part of view. The other important achievement is that the algorithms are able to solve the RFM using less GCPs with higher accuracy in comparison to conventional RFM.

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