

## **SETTINGS OF GENETIC PROGRAMMING TOWARD THE IMPROVEMENT OF ACOUSTIC CLASSIFICATION PERFORMANCE FOR DIFFERENT SEAFLOOR CONDITIONS**

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**Abstract:** *This is the second examination of the Genetic Programming (GP) for classification of different seafloor habitats using acoustic backscatter. The main purpose of this work is to study how GP settings affect the classification capability. The result of this study showed that the acoustic classification capability with respect to recognition of different seafloor habitats can be further enhanced by adoption and fine-tuning of the GP system. With different settings of the fitness criterion, GP showed improved behaviours than the first test result. This confirms that the fitness function plays a critical role in the GP system's classification performance. Several initial candidate features with different combinations of operators were investigated to examine their effects on the GP. With a suitable adjustment of the GP system, the classification capability can be noticeably improved relative to that obtained in the first case. The performance of GP is illustrated using the data collected from different seafloor habitats in the Australian coastal waters. A comparison of the classification performance of the present algorithm and the techniques used before with and without GP is provided. The conclusion is that the employment of GP with its proper settings for acoustic backscatter processing can improve the capability of sonars with respect to the characterization of different seafloor conditions.*

**Keywords:** *Genetic Programming, fitness, acoustic backscatter, classification, seafloor, habitat*