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Machine Learning (ML) is a significant advancement in the field of Artificial Intelligence (AI). Therefore, it is essential to develop a model for Software Defect Prediction (SDP) that employs ML techniques to ensure quality while reducing testing costs. The literature reveals various challenges in predicting software defects using ML methodologies. Researchers have applied a range of ML algorithms to different datasets, resulting in varying levels of performance, accuracy, and precision. The objective of this study is to create a prototype for SDP that minimizes testing costs while enhancing the accuracy of the proposed system. To achieve this, we will analyze different ML techniques alongside selected features and clustering methods to attain high accuracy. Our goal is to achieve better accuracy through our analyzed approaches, particularly employing ML algorithms on the CM1 dataset, which has shown lower accuracy with many techniques.
The figure below shows the architecture of our proposed model. We explored several popular machine learning (ML) techniques and optimized methods using a freely available dataset to boost its accuracy compared to earlier studies. To start, we used K-means clustering to categorize the class labels. From there, we applied different classification models to selected features and utilized Particle Swarm Optimization to fine-tune these models. To assess how well our models performed, we looked at various metrics such as precision, accuracy, recall, F-measure, performance error metrics, and confusion matrices. In the sections that follow, we'll dive deeper into these details. Our goal in choosing these ML techniques is to improve their accuracy, as past findings in the literature have shown that there's still room for enhancement. So, we aim to enhance the performance of these methods and analyze the results together.

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