Threshold Extraction Framework for Software Metrics

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Research Background

➡ Software metrics are used to measure different attributes of software. To practically measure software attributes using these metrics, metric thresholds are needed. Many researchers attempted to identify these thresholds based on personal experiences. However, the resulting experience-based thresholds cannot be generalized due to the variability in personal experiences and subjectivity in opinions.

Research Objective

- Propose an automated clustering framework based on the expectation maximization (EM) algorithm where clusters are generated using a simplified 3-metric set (LOC, LCOM, and CBO).
  - Given these clusters, different threshold levels, for software metrics, are systematically to be determined such that each threshold reflects a specific level of software quality.

The proposed Framework

- The proposed framework is composed of two major steps: the clustering step where the software quality historical dataset is decomposed into a fixed set of clusters using the EM algorithm; and the threshold extraction step where thresholds, specific to each software metric in the resulting clusters, are estimated using statistical measures such as the mean (μ) and standard deviation (σ) of each software metric in each cluster.

The proposed Framework
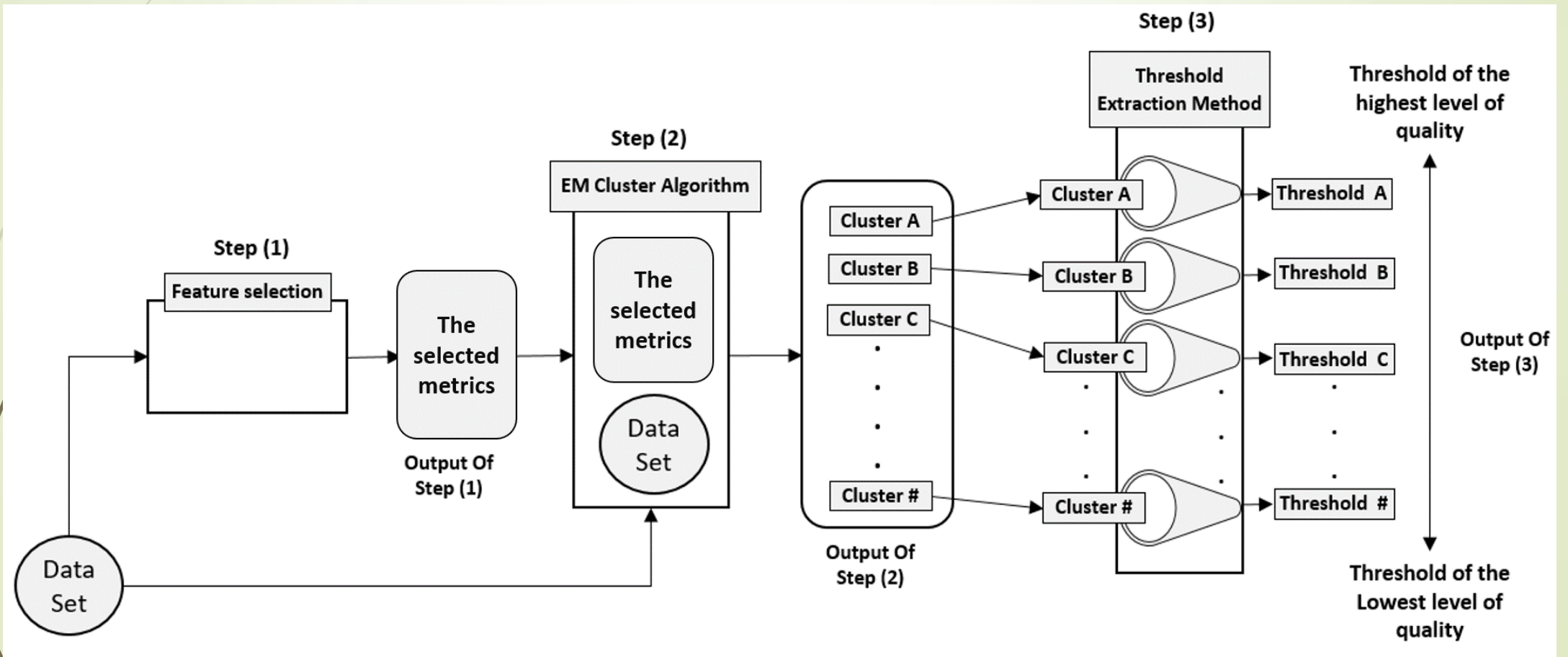
Research Contribution and Results

1. Proposed a machine learning-based framework to extract any number of thresholds associated with varying quality levels.

2. The resulting clusters are characterized with different threshold levels for the metrics in a systematic fashion. Each extracted threshold reflects a specific software quality level.

3. The paper findings highlight the capability of the EM-based clustering, using a minimum metric set, in grouping software quality datasets according to different quality levels

Framework Automation

- The proposed framework has been fully automated as is made available at: http://www.qumasi.com/TEFSW/

The result after upload the file