ABSTRACT

Software development cost overruns often induce project managers to cut down manpower cost at the expense of software quality. Accurate effort estimation is beneficial to the prevention of cost overruns. Analogy-based effort estimation predicts the effort of a new project by using the information of its similar historical projects, where the similarity is measured via Euclidean distance. To calculate the Euclidean distance, traditional analogy-based effort estimation methods usually adopt the original project features and assign uniform weights to them. However, it would lead to inappropriate similarity measure and result in inaccurate effort estimate if the original features are interdependent or have unequal impacts on the project effort. In this paper, we propose to use principal components analysis (PCA) to extract independent features, and then use Pearson correlation coefficients between the extracted features and the project effort as the weights for Euclidean distance calculation in similarity measure. Extensive experiments were further conducted on three benchmark datasets: COCOMO, Desharnais, and NASA. The experimental results show that our approach significantly improves prediction accuracy and reliability over the traditional method, either by using correlation weighting alone or by using PCA combined with correlation weighting. The comparison of our approach with other approaches reported in literature also suggests that our approach is competitive.

INDEX TERMS

- IEEE terms
  Costs, Euclidean distance, Feature extraction, NASA, Principal component analysis, Programming, Project management, Quality management, Software development management, Software quality

- INSPEC
  - Controlled Indexing
    principal component analysis, software cost estimation, software quality
  - Non Controlled Indexing
    Euclidean distance, analogy-based effort estimation methods, analogy-based software effort estimation, benchmark datasets, correlation weighting, independent feature extraction, principal components analysis, software development cost estimation, software quality

- Author Keywords
  Analogy, Correlation Weighting, Principal Components Analysis, Software Effort Estimation

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  Abstract | Full Text: PDF (348KB)

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