

## 基于广义模糊数的软件成本加权CBR估算研究

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### Case-based Reasoning with Optimized Weight for Software Cost Estimation Based on Generalized Fuzzy Number

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**摘要** 在软件项目开发过程中,准确估算出软件成本在提高软件质量和保障软件成功开发方面起到重要支撑作用。针对软件项目历史数据库中部分属性在项目开发初期难以给予精确数值(仅仅能给出模糊数),而已有软件成本估算模型不能很好地处理模糊信息的问题,本文在基于案例推理模型(CBR)基础上集成广义模糊数,提出了基于广义模糊数的CBR模型。使用基于广义模糊数的相似度度量方法代替传统CBR模型中采用的欧式距离等相似度度量方法,采用模糊C均值聚类(FCM)方法将已有软件项目历史数据库中的精确数值进行模糊化处理,以匹配新项目中的模糊数。进一步采用粒子群算法(PSO)来优化属性的权重,构建基于广义模糊数的加权CBR模型。最终在实验中采用Desharnais数据来检验构建模型的有效性。实证结果表明,在与常用的欧式距离CBR模型相比,构建的基于广义模糊数的加权CBR模型能有效提高估算精度,采用PSO优化属性权重能提高模型的估算精度。

**关键词:** [软件成本估算](#) [基于案例推理](#) [广义模糊数](#) [权重优化](#)

**Abstract:** In the software development process, accurate estimation of software effort is of great significance for software project and the enterprise. In order to overcome the difficulties that there isn't an accurate number for new software project at early stages according to the attributes of history project dataset and the existing software effort estimation models can't deal with the fuzzy number effectively, case-based reasoning and generalized fuzzy number are integrated, and a case-based reasoning (CBR) model based on generalized fuzzy number is proposed for software effort estimation in this paper. The traditional similarity measure such as Euclidean distance is replaced by a new similarity measure based on generalized fuzzy number in CBR model. Furthermore, the fuzzy c-means clustering is applied to fuzz the accurate number in history project dataset. Moreover, particle swarm optimization (PSO) is employed to further optimize attribute weights of the model. Finally Desharnais data is adopted to examine the validity of the model. It is shown that the proposed generalized fuzzy numbers CBR model can improve the estimation accuracy in comparison with the commonly used Euclidean distance CBR. In addition, it is also shown that the model with optimized weight from PSO can improve the estimation accuracy.

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