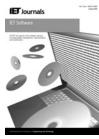
www.ietdl.org

Published in IET Software Received on 15th June 2010 Revised on 9th December 2010 doi: 10.1049/iet-sen.2010.0070



ISSN 1751-8806

Software refactoring at the package level using clustering techniques

A. Alkhalid¹ M. Alshayeb² S.A. Mahmoud²

¹Mathematical and Computer Sciences and Engineering Division, King Abdullah University of Science and Technology, Thuwal 23955-6900, Saudi Arabia

²Information and Computer Science Department, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia

E-mail: abdulaziz.alkhalid@kaust.edu.sa

Abstract: Enhancing, modifying or adapting the software to new requirements increases the internal software complexity. Software with high level of internal complexity is difficult to maintain. Software refactoring reduces software complexity and hence decreases the maintenance effort. However, software refactoring becomes quite challenging task as the software evolves. The authors use clustering as a pattern recognition technique to assist in software refactoring activities at the package level. The approach presents a computer aided support for identifying ill-structured packages and provides suggestions for software designer to balance between intra-package cohesion and inter-package coupling. A comparative study is conducted applying three different clustering techniques on different software systems. In addition, the application of refactoring at the package level using an adaptive *k*-nearest neighbour (A-KNN) algorithm is introduced. The authors compared A-KNN technique with the other clustering techniques (viz. single linkage algorithm, complete linkage algorithm and weighted pair-group method using arithmetic averages). The new technique shows competitive performance with lower computational complexity.