

Abstracts of Publications

Contents

Refereed Chinese Journal Papers as First Author.....	2
A Container - Destructor – Explorer Paradigm to Code Smells Detection.....	2
Graphic User Interface Testing Based on Petri Net.....	3
Extraction Approach for Software Bug Report	4
Flame Detection Based on SIFT Algorithm and One Class Classifier with Undetermined Environment..	5
A Novel Direct Small World Network Model.....	6
Conferences Papers as First Author.....	7
A Novel Bug Report Extraction Approach.....	7
Other Refereed Chinese Journal Papers	8
A Novel Image Matching Algorithm Based on Graph Theory.....	8
An improved image segmentation algorithm based on Mean-Shift	9
Submitted Papers.....	10
Using an Improved SIFT Algorithm and Graph Theory for Image Matching.....	10

Refereed Chinese Journal Papers as First Author

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A Container - Destructor – Explorer Paradigm to Code Smells Detection

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Abstract: Software refactoring is increasingly significant in software engineering, besides it is a fundamental task for the detection of code smells being indefinite and non-quantitative for the purpose of refactoring. After essential concepts and signals are migrated to software engineering, the paper presents a detection paradigm, where the algorithm is based on dendritic cell algorithm in danger theory, which regards code smells as antigen. Software metrics values convert to the danger signal and the safe signal for processing, in which mature signal and semi-mature signal is calculated by weight equation. Code smells can be confirmed in comparison of relative values. Variety of code smells' priority is determined by mature context antigen value. There are lower false positive rates in the paradigm. The experiment proves that this approach is competitive effectiveness in F-score(0.784) as well as Kappa analysis (0.756) and outperformance compared to other detection technique.

Keywords: software refactoring; dendritic cell algorithm; software bug; software quality; artificial immune systems; danger theory

Graphic User Interface Testing Based on Petri Net

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Abstract: In environment of undetermined and context-sensitive, graphic user interface testing mainly depend on random testing and testers' professional experience, the effectiveness being low. It is an unresolved puzzle for graphic user interface testing. Therefore, it is brought in the Petri net theory in the discrete and parallel system, defining concepts of event, events sequence, and events decomposition in graphic user interface. It is introduced some significant properties of Petri net, such as reachability, roundedness, liveness and strong connectedness to this field, so as to improve the coverage and efficiency of graphic user interface testing. In addition, an attempt to solve six category bugs in graphic user interface, such as non-reachability, not strong connected, dead-lock, unbounded, not suitable to the original model and error jumping is conducted. The experiment proves that graphic user interface testing based on Petri net is more effective than traditional simple random test in coverage of events, code lines as well as the number of fault detection.

Keywords: Software Bug, Event Sequences, Petri Net, Graphic User Interface, Reachability, Liveness

Computer Science, published by China Computer Federation (CCF)

To appear in 2016/05

Extraction Approach for Software Bug Report

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Abstract: There are increasingly bug reports in software engineering and developers bewildered by the rapid reports accumulation. Therefore, it is necessary to extract bug report for the task of bug fixing and software reuse, etc. The paper proposes a novel extraction approach. Synonyms were merged into one specific word firstly in the approach. Then, it sets up a vector space model, and some text mining methods, such as TF-IDF and information gain, are presented to collect word features for bug reports specifically, but also there is an algorithm for determining sentence complexity, so as to choose the sentence in long length. This work introduced Bayes classifier into bug report extraction. TPR is increased and FPR is decreased in this approach. The experiment proves that bug report extraction by using data mining and Bayes classifier is competitive through the evaluation of AUC(0.71), F-score (0.80) and Kappa value(0.75).

Keywords: Bug report management, Text mining, Bayes classifier, Bug feature, Vector space model, Sentence complexity

Flame Detection Based on SIFT Algorithm and One Class Classifier with Undetermined Environment

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Abstract: Under undetermined and sophisticated environment, it is an unresolved puzzle for early flame detection based on image. Therefore, for the improvement in detection efficiency, it is brought in the SIFT algorithm to image process of identifying flame extreme point as well as feature matching; it is introduced the theory of histogram equalization to this field. Regard fractal dimension as one of flame features. Since flame is the anomalous value mostly, one class classifier is being used to identify the flame. The experiment proves that there is high rate of flame detection and low rate of false alarm in this research.

Keywords: SIFT algorithm, one class classifier, fractal, histogram equalization, flame detection

A Novel Direct Small World Network Model

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Abstract: There is too much redundancy and low efficiency on modern computer networks. This paper presents a novel Direct Small World network model in order to optimize networks. In this model, several nodes construct to regular networks. Then, replot some nodes randomly and iteratively to generate Direct Small World network. There are no change in average distance and clustering coefficient, however, the network performance improved, such as hops. The experiments prove that compared to traditional small world network, the degree, average of degree centrality and average of closeness centrality are lower in Direct Small World network. This illustrates that the nodes in Direct Small World networks are closer than Watts–Strogatz small world network model. The Direct Small World can be used not only in the communication of the community information, but also in the research of epidemics.

Keywords: Small World network; complex networks; node centrality; network reliability; network optimization

Conferences Papers as First Author

The First International Symposium on Dependability in Sensor, Cloud, and Big Data Systems and Applications (DependSys2015), Springer, EI indexed

A Novel Bug Report Extraction Approach

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Abstract: There are more and more bug reports in software. Software companies and developers invest a large amount of resources into the dramatic accumulation of reports. We introduce Bayes classifier into bug report compression, which is the first effort in the literature. For this purpose, the vector space model as well as some conventional text mining values, such as tf-idf and chi-squared test, are designed to collect features for bug reports. The experiment proves that bug reports extraction by using Bayes classifier is outperformance to the method based on SVM through the evaluation of ROC and F-score.

Keywords: Bug report; Naïve Bayes classifier; Bug extraction; Tf-idf; Text mining

Other Refereed Chinese Journal Papers

Computer Applications and Software, published by Shanghai Computer Society

To appear in 2016/08

A Novel Image Matching Algorithm Based on Graph Theory

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Abstract: SIFT algorithm plays an important role in the field of image matching. However, the feature points extracted by SIFT algorithm distributing among the whole image. This situation result in the feature points are not concentrated. This paper developed a new G-SIFT algorithm based on the SIFT algorithm. The G-SIFT algorithm combines the graph theory with the SIFT algorithm, removing the SIFT feature points, which are not concentrated. In the graph theory, every feature point is treated as a vertex. The unary terms of these vertices is taken as edges of graph. The feature points are processed according to those edges. The experiments show that the feature points matching results are more concentrated and concentration rate is improved by 12%.

Keywords: SIFT; G-SIFT; Graph theory; Feature point matching

An improved image segmentation algorithm based on Mean-Shift

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Abstract: Traditional segmentation based on Mean-Shift is time consuming and low segmentation accuracy limited by the number of iterations. The paper proposed a new image segmentation algorithm based on Mean-Shift. It combine texton histogram with Mean-Shift. Comparing with traditional image segmentation algorithm, this algorithm takes into account the edge information of the image. Furthermore, It decrease the complexity for training and classification. Experimental shows that the algorithm proposed in this paper has better result during image segmentation. Comparing with the traditional image segmentation algorithm, The segmentation accuracy for this algorithm increased 4.3%-18.25%.

Keywords: Mean-Shift algorithm; Maximum response Filter; Texton histogram; K-means clustering; Mean-Shift patches

Submitted Papers

PLOS ONE

Using an Improved SIFT Algorithm and Graph Theory for Image Matching

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Abstract: SIFT (scale invariant feature transform) algorithm plays an important role in the field of image matching. However, the keypoints extracted via SIFT algorithm distribute in the whole image, which can result in the lack of focus for the keypoints. This paper proposes a new G-SIFT algorithm which combines SIFT algorithm with graph theory to remove the sparsely distributed SIFT keypoints. In the graph theory, each keypoint is treated as a vertex. The Euclidean distance relationships between vertices is summarized as edge of the graph. The degree of a vertex determines whether the corresponding keypoint is removed or not. The experimental results show that the keypoints distribute in more centralized region via G-SIFT algorithm, and the matching rate and the accuracy of matching rate improve at most 0.87% and 9.1%, respectively.