

The 3rd International Symposium on Software and System Reliability(ISSSR 2017)

会议日程

| 日期 | 时间 | 活动 | |
|-------------|------------------------------------|---|----------------|
| 10月13 | 14:00-18:30 | 报到（信息宾馆一楼大厅） | |
| | 18:30-19:30 | 晚餐 | |
| 10月14 | 08:30-09:00 | 开幕式（郑州轻工业学院图书馆学术报告厅）、照相 主持人:甘勇 | |
| | 09:00-10:30 | 大会特邀报告 (学术报告厅) 主持人: 张素智 | |
| | | <p>Speech 1: W. Eric Wong, University of Texas at Dallas, TX, USA Title: Software Test Generation: Less Cost, Higher Coverage and Better Fault Detection</p> <p>Speech 2: Mark Bentsen, Argo Data, TX, USA Title: Maximizing Business Value with Lifecycle Telemetry Data</p> | |
| | 10:30-10:40 | 茶歇 | |
| | 10:40-12:00 | Track 1 | Track 2 |
| | | 图书馆学术报告厅 | 第三会议室 |
| | 12:00-14:30 | 午餐 | |
| | 14:30-17:30 (15:50-16:10 茶歇) | Track 3 | Track 4 |
| | | 图书馆学术报告厅 | 第三会议室 |
| 18:30-20:00 | 晚宴 | | |
| 10月15 | 08:30-10:00 | 大会特邀报告 | |

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| | | (学术报告厅) | |
| | | 主持人: Eric Wong | |
| | | Speech 3: 毛晓光, 国防科技大学 Title: Exploration on Program Repair Speech 4: 韩林, 数学工程与先进计算国家重点实验室 Title: HPC and Program Optimization | |
| | 10:00-10:10 | 茶歇 | |
| | 10:20-11:40 | Track 5 | Track 6 |
| | | 图书馆学术报告厅 | 第三会议室 |
| | 11:40-12:00 | 闭幕式 主持人: W. Eric Wong | |
| | 12:00-13:30 | 午餐 | |

注: 14 号上午 8:00、中午 12:00、下午 14:00 和 17:30, 15 号上午 8:00 和中午 12:00 有信息宾馆和会场之间的摆渡中巴。

分组报告

10 月 14 日上午 10:40-12:00

Track 1

主持人: 马艳芳

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| 1.1 | Analysis of large fault tree based on simplified BDD algorithm Wei Liu, Yong Zhou, Hongmei Xie, Zhengxian Wei |
| 1.2 | Retrieval of Vehicle Images Based Color Space Fuzzy Quantification in Criminal Investigation Mingdi Hu , Mengbin Zhang |
| 1.3 | A Distribution-level Combinational Model to Improve Reliability Prediction Accuracy Wenjun Xie, Ji Wub, Haiyan Sun, Lu Zhang |
| 1.4 | An Analysis Tool towards the Fault Tolerance System Based on AADL Error Model Wenbing Zhang, Guohua Shen, Zhiqiu Huang, Zhibin Yang, Lei Xue |
| 1.5 | A Fast and Efficient Coding Algorithm for HEVC System Based On Texture Analysis of Entropy Difference Qiuwen Zhang, Kunqiang Huang, Xiao Wang, and Yong Gan |

Track 2

主持人:杨永杰

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| 2.1 | Service selection method based on the Skyline in cloud environment Yan-Pei Liu, Su-Zhi Zhang, Rui Yang |
| 2.2 | An efficient moving optimal radial sampling method for reliability-based design optimization Li Xiaoke, Ming Wuyi, Ma Jun, Qiu Haobo, Chen Zhenzhong |
| 2.3 | Recognition of Opinion leaders in Micro-blog Based on Linked Data Zhi-yun Zheng, Peng-fei Li, Xing-jin Zhang, Dun Li |
| 2.4 | Predicting Accidents in Interlocking Systems: an SHA Model based Approach Yan Wang , Wen Zhong , Xiaohong Chen, Jing Liu |
| 2.5 | Entity Disambiguation with Markov Logic Network Knowledge Graph Jiangtao Ma, Yaqiong Qiao, Yongzhong Huang, Rui Zhanga |

Track 3

主持人:Eric Wong

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| 3.1 | Solar Cell Surface Defects Detection Based on Computer Vision Xiaoliang Qian, Heqing Zhang, Huanlong Zhang, Yuanyuan Wu, Zhihua Diao, Qing-E Wu, Cunxiang Yang |
| 3.2 | A Research for Aerospace Complex Software System Runtime Fault Detection Chenjing Yan, Wei Zhang, Xiaochuan Jing, Hui Ge, Xiaoyin Wang |
| 3.3 | Research on Cloud Computing Task Scheduling Based on Improved Particle Swarm Optimization Shasha Zhao, Xueliang Fu, Honghui Li, Gaifang Dong, Jianrong Li |
| 3.4 | Cloud Task Scheduling Algorithm Based on Improved Genetic Algorithm Hu Yao, Xueliang Fu, Honghui Li, Gaifang Dong, Jianrong Li |
| 3.5 | Micro-blog real time personalized recommendation based on partial indexing Dun Li, Meng Wang, Lun Li, Zhi-yun Zheng |
| 3.6 | A New Improved Algorithm for SLP |

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| | Zhan-Jie Guo, Hui Liu |
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Track 4

主持人:毛晓光

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| 4.1 | A visual cryptography scheme based DNA microarray Xuncaizhang, Zheng Zhou, Yangyang Jiao, Ying Niu*, Feng Han, Yanfeng Wang |
| 4.2 | A Plan Recognizing Algorithm Based On Fuzzy Cognitive Plan Map Yuan Feng, Zengyu Cai, Xuhui Wang, Jianwei Zhang, Yong Gan |
| 4.3 | Software Trustworthiness Static Measurement Model and the Tool Yan Li, Zhiqiang Wu, Yixiang Chen |
| 4.4 | An Effective Rate Distortion Optimization Method for Reliability HEVC System Jinchao Zhao, Kunqiang Huang, and Qiuwen Zhang |
| 4.5 | Automatic Generation of the AADL ALISA Verification Plan with ATL Tianyi Wu, Zhiqiu Huang, Zhibin Yang, Lei Xue |

Track 5

主持人: 韩林

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| 5.1 | An Automated Test Case Generation Approach based on the Activity Diagram of SysML YuFei Yin, YiQun Xun, WeiKai Miao, Yixiang Chen |
| 5.2 | AdaRate: A rate-adaptive traffic measurement method in software defined networks Jixing Tang, Yue Zhang, Yan Li |
| 5.3 | A Novel Ensemble Classification for Data Streams with Class Imbalance and Concept Drift Yange Sun, Zhihai Wang, Hongtao Li, Yao Li |
| 5.4 | The quantitative analysis of approximate correctness for real-time system Yanfang Ma, Liang Chen, Haiyu Pan |
| 5.5 | A Partial Supply Simulation Relation and Its Proof System in PADS Xinghua Yao, Hengyang Wu |

Track 6

主持人: 陈晓红

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| 6.1 | A Subjective Logic Based Approach for Assessing Confidence in Assurance Case Yuan Chunchun, Wu Ji, Liu Chao |
| 6.2 | Schedulability Analysis and Symbolic Verification Method for Heterogeneous Multicore Real-time Systems Wei Wang, Dong Guo, Hui Zhang, Changwu Hu, Jianing Tong |
| 6.3 | Development of Lighting Control System for Smart Hotel Rooms Jiajia Feng, Yongjie Yang |
| 6.4 | Simulation and Analysis of Linear Permanent Magnet Vernier Motors for Direct Drive System Mingjie Wang, Yanyan Li, Hongbo Qiu, Cunxiang Yang, Congshan Li |
| 6.5 | HACO-F: An Accelerating HLS-based Floating-point Ant Colony Optimization Algorithm on FPGA Shuo Zhang, Zhangqin Huang, Weidong Wang, Rui Tian, Jian He |

大会特邀报告

Software Test Generation:

Less Cost, Higher Coverage and Better Fault Detection

W. Eric Wong

Abstract

Studies have shown that combinatorial testing can help programs detect hard-to-find software bugs that may not be revealed by test cases generated using other testing techniques. The first part of this talk focuses on traditional black-box requirements-based combinatorial testing. In particular, I will discuss results and lessons learned from real-life industry applications. The second part extends the concept of combinatorial testing to a white-box structure-based setting. I will present an advanced coverage criterion, Combinatorial Decision Coverage, in conjunction with symbolic execution to achieve high coverage cost-effectively without suffering from potential space exploration.

Bio



W. Eric Wong received his M.S. and Ph.D. in Computer Science from Purdue University, West Lafayette, Indiana, USA. He is a Full Professor, the Director of International Outreach, and the Founding Director of Advanced Research Center for Software Testing and Quality Assurance (<http://paris.utdallas.edu/stqa>) in Computer Science at the University of Texas at Dallas (UTD). He also has an appointment as a guest researcher at the National Institute of Standards and Technology, an agency of the U.S. Department of Commerce. Prior to joining UTD, he was with Telcordia Technologies (formerly Bellcore) as a senior research scientist and the project manager in charge of

Dependable Telecom Software Development. Professor Wong is the recipient of the 2014 IEEE Reliability Society Engineer of the Year. He is also the Edit-in-Chief of the IEEE Transactions on Reliability. His research focuses on helping practitioners improve software quality while reducing production cost. In particular, he is working on software testing, program debugging, risk analysis, safety, and reliability. Professor Wong has published more than 180 papers and edited 2 books.

Professor Wong is the Founding Steering Committee Chair of the IEEE International Conference on Software Security and Reliability (SERE) and the IEEE International Workshop on Program Debugging. In 2015, the SERE conference and the QSIC conference (International Conference on Quality Software) merged into one large conference, QRS, with Q representing *Quality*, R for *Reliability*, and S for *Security*. Professor Wong continues to be the Steering Committee Chair of this new conference (<http://paris.utdallas.edu/qrs>).

Maximizing Business Value with Lifecycle Telemetry Data

Mark Bentsen

Abstract

“Sufficiently Advanced Monitoring is Indistinguishable from Testing” posited Ed Keyes in a 2007 Google test automation conference. A new business model and software monitoring product emerged illustrating this reality at ARGO. A software development company, they now also provide business value via system and software reliability with the Early Detection Monitoring Service (EDMS). This embedded monitoring software inspired a way forward; advancing the depth of software testing. By monitoring over 250 operational metrics, ARGO works to predict and eliminate issues leading to production outages. These same operational metrics provide telemetry into testing processes that detect issues earlier in the application lifecycle.

Bio



Mark Bentsen leads cross-enterprise collaboration in the Dallas area among Software Quality practitioners. Gathering corporately on a quarterly basis, the QA Trailblazers are pushing each other to expand the capabilities of the modern software testing organization. He is the QA Manager of ARGO Data, a software development company providing mission-critical and analytical solutions for financial services and healthcare.

Mark is a certified CTAL-Full, CSTE, PMP, and ASQ CMQ/OE. He frequently presents at industry conferences, university, and webinars with other industry colleagues of software quality and test automation.

About ARGO

Founded in 1980, ARGO is a leader in mission-critical and analytical software. Financial services solutions include payment transaction processing, sales, service, and relationship management, and retail and commercial lending. Fraud solutions detect and prevent fraud across multiple channels at the point of presentment with proactive positive pay functionality, BSA/AML monitoring, and transaction/image analysis. Healthcare solutions address patient matching with biometric verification; duplicate record detection and prevention; care coordination, referrals, and risk mitigation; and patient financing/provider cash flow.

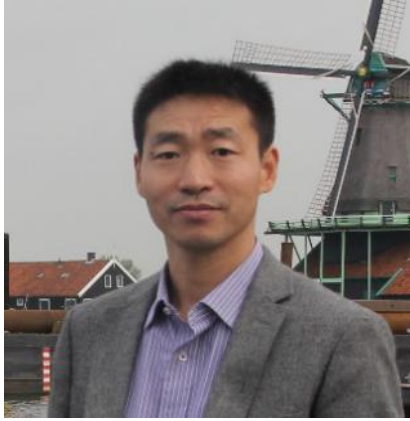
Exploration on Program Repair

Xiaoguang Mao

Abstract

Automated program repair recently received considerable attentions, and many techniques on this research area have been proposed. This speech will reveal our exploration on program repair from the right beginning: thinking, decision making, experiments and findings. Our research work will be introduced under the topic: Weak Compilation and Testing Prioritization for the effectiveness of patch verification, Fault Localization for the success-rate of patch generation, Random Search for the demonstration of our findings and etc.

Bio



Xiaoguang Mao received his Ph.D. in Computer Software from National University of Defense Technology, Changsha, China. He is a Full Professor, the Vice Director of the Department of Computer Science at the National University of Defense Technology.

From Oct. 2003 to Nov. 2004, as a visiting scholar, he worked in the Safety Systems Research Center (SSRC) of Bristol University, U.K. He was a fellow in UNU/IIST, in Macau, from Mar. 1999 to Jun. 1999. His research interests are in Software Engineering, with a focus on software dependability, fault localization and program repair.

He is a Distinguished Member of CCF, IEEE member and a member of CCF Software Engineering Society. He serves the Journal of Software as an editorial board member. He has served on program committees of various conferences, including QSIC, COMPSAC, SERE, TASE, SETTA, ATC, Internetware, ISSSR and etc.

HPC and Program Optimization

Lin Han

Abstract

The demand for high performance parallel software has been increasing rapidly with the fast development and extensive use of high performance computer systems. This speech will focus on how to take advantage of the computing resources and speed up programs. Our research work will be introduced under the topic: Library optimization and automatic vectorization compiler design for Sunway TaihuLight, Some works for program optimization and etc.

Bio



Dr. Han Lin is an associate professor of the State Key Laboratory of Mathematical Engineering and Advanced Computing. He received his Ph.D. in Computer Software and Theory from The PLA Information Engineering University, Zhengzhou, China.

Dr. Han's research interests are in the field of High Performance Computer, Compiler design and Program Optimization. His current projects include National Science and Technology Major Project, NSFC, 863 Program and etc., and he has published more than 30 articles on magazines and conference.

1.1 Analysis of large fault tree based on simplified BDD algorithm

Wei Liu, Yong Zhou, Hongmei Xie, Zhengxian Wei

Abstract:

A simplified BDD analysis method (SimBDD) is proposed to solve the problem of temporal and spatial explosion and low computational efficiency of getting the fault tree's minimum cut sets in BDD method. On the basis of using SimBDD to get the minimum cutting sets, the failure paths of the fault tree is obtained by the hierarchical processing method. Tests are taken on large fault trees with this method. The results demonstrate that the method is efficient.

1.2 Retrieval of Vehicle Images Based Color Space Fuzzy Quantification in Criminal Investigation

Mingdi Hu , Mengbin Zhang

Abstract:

The color and shape features provide more contributions for vehicle images in criminal investigation generally. A criminal investigation library that was used in studying criminal tools was set up , in which the number of the car images is more than one thousand . In this paper, the color of the car pictures was quantized by the nonuniform quantization,the triangular and the trapezoidal fuzzy membership degree functions respectively, and then the Euclidean distance and the weighted distance similarity measures methods are proposed, the last step is that the car images were retrieved by the above six algorithms in the criminal investigation library. The results show that the weighted distance similarity measure algorithm based trapezoidal membership degree is better than others, meanwhile the precision and recall are significantly higher than other

else. The triangular fuzzy quantization algorithm is not very different from the non-uniform quantization algorithm, and even the precision and recall ratio is smaller than the latter. Under the same quantization condition, the weighted distance algorithm is slightly better than the Euclidean distance, but the difference is not great.

1.3 A Distribution-level Combinational Model to Improve Reliability Prediction Accuracy

Wenjun Xie, Ji Wu, Haiyan Sun, Lu Zhang

Abstract:

Single reliability growth model usually only captures partial knowledge of a failure process. A combinational model tries to capture more knowledge by integrating two or more reliability growth models. Unlike the existing linear combinational models that simply adds up the weighted results by G-O, M-O and L-V model, this paper proposes the combinational model from G-O and S-Shaped model, at the level of failure distribution to reduce fitting errors and to maintain the mathematical properties of non-homogenous Poisson process. To evaluate the effectiveness of the proposed model, we use the failure data sets (21 projects) available in public sources. Ten out of the twenty-one projects, which pass the distribution test and have feasible solutions in parameter estimation, are selected to conduct experiments. We use mean squared error (MSE) to evaluate the historical predictive validity. The results show that our model is consistently stable and has lower MSE. It reduces 51.3% MSE of G-O, 67.2% MSE of S-Shaped, and over 56% MSE of the three linear combinational models in average. The proposed model tends to have a larger estimation of the expected number of failures, which can overcome the under estimation by G-O and S-Shaped model in some degree.

1.4 An Analysis Tool towards the Fault Tolerance System Based on AADL Error Model

Wenbing Zhang, Guohua Shen, Zhiqiu Huang, Zhibin Yang, Lei Xue

Abstract:

Fault-tolerant embedded systems can provide the correct service with the active faults. It is important to verify the ability of fault tolerance in system design phase especially for safety-critical systems. Besides, the verification of models can reduce the cost of the system development. The Architecture Analysis and Design Language (AADL) and its Error Model Annex (EMV2) provide the ability to model a fault tolerance system. The error event, error propagation and error state machine provided by the AADL Error Model Annex can model an embedded system. However, there is a problem that whether the model satisfies the requirement of fault tolerance or not. We design a component-based algorithm to verify the ability of fault tolerance. The error and warning messages will be produced by our algorithm. Finally, a plugin based on the Osate2 tool and a case study are given.

1.5 A Fast and Efficient Coding Algorithm for HEVC System Based On Texture Analysis of

Entropy Difference

Qiuwen Zhang, Kunqiang Huang, Xiao Wang, and Yong Gan

Abstract:

With the video display technique developing, High Efficiency Video Coding (HEVC) to optimize coding efficiency for video coder is proposed recently. However, the latest coding standard HEVC has a good performance, in the meantime, it introduces large computational complexity in mode decision process. In the coding process, the encoding mode of a coding block is selected in numbers candidate. Therefore, once a coding block in the sequences encoded as skip mode, coding time would be saved largely since the simplification of rate-distortion (RD) cost calculation. In this paper, a decision method of coding blocks (CBs) based on texture analysis of entropy is proposed. Even though a CB included in homogeneous regions in natural test video sequences, the entropy value between current and neighbouring reference coding blocks is computed to decide the CB could be encoded as skip mode. Early skip mode detection can omit unnecessary mode decision since it results in huge computational complexity for RD cost calculation in conventional method. After the detection process, the CBs would be encoded as skip mode directly. Extensive experiment provides the conclude that our method has better performance for computational complexity compared to conventional coding method with a negligible loss.

2.1 Service selection method based on the Skyline in cloud environment

Yan-Pei Liu, Su-Zhi Zhang, Rui Yang

Abstract:

In view of the present problems of the reliability and instantaneity which the SaaS service selection cannot guarantee, a dynamic selection strategy of SaaS service based on the Skyline (SSBS) is proposed. In this method, for the matching selection of all the services in the SaaS services library, the Skyline computation is used to reduce the redundancy, and service selection can be made by using the mixed integer programming. The experiment results show that the proposed method can accurately select the most suitable could service.

2.2 An efficient moving optimal radial sampling method for reliability-based design optimization

Li Xiaoke, Ming Wuyi, Ma Jun, Qiu Haobo, Chen Zhenzhong

Abstract:

Reliability-based design optimization (RBDO) plays an essential role in structure and system

design. However, its application in practical engineering is hindered by the huge computational cost in performance function evaluation. In this paper, a moving optimal radial sampling (MORS) method is proposed for RBDO problems to substantially improve the computational efficiency of Monte Carlo simulation (MCS). In MORS, the failure probability and its gradient are calculated using radius based importance sampling (RBIS) method. The initial radius is selected according to the target reliability, which can also be used to check the feasibility of probabilistic constraints afterwards. The arc search scheme in enhanced performance measure approach (PMA+) and linear interpolation scheme are used to calculate the optimal radius of RBIS. After the failure probability and its gradient are calculated, the optimal design is obtained using sequential approximation programming (SAP). The computational capability of the proposed MORS method is demonstrated using a honeycomb crashworthiness design application, a nonlinear mathematical problem and a speed reducer design. The comparison results show that the proposed MORS-SAP method is very efficient and accurate.

2.3 Recognition of Opinion leaders in Micro-blog Based on Linked Data

Zhi-yun Zheng, Peng-fei Li, Xing-jin Zhang, Dun Li

Abstract:

In view of the lack of subjectivity and accuracy in the traditional micro-blog opinion leader recognition method to measure the important factors of users, a new micro-blog opinion leader recognition method is proposed. This paper used the linked data to describe the micro-blog data, used the association rule mining algorithm to quantitatively determine the important factors that affected the users' ranking, and constructed the opinion leader recognition model according to the index scoring method. Experiments show that our method using linked data identifies the opinion leaders as same as the standard leaders, and are more accurate and better feasibility than that of traditional data.

2.4 Predicting Accidents in Interlocking Systems: an SHA Model based Approach

Yan Wang , Wen Zhong , Xiaohong Chen, Jing Liu

Abstract:

In recent days rail transit accidents happen from time to time, but the causes are difficult to be found. According to the stochastic and real-time characteristics of equipment faults, three layer models based on stochastic hybrid automata (SHA) are proposed for interlocking systems. The three layer models consist of a system model, a monitoring model and a fault prediction model. The accidents caused by the equipment faults are predicted by simulating these models together on UPPAAL-SMC platform. The main contributions of this paper include: (1) extracting model patterns for interlocking systems; (2) presenting a pattern-based system model generation process

and an automatic generation method of monitoring model based on time constraints; and (3) defining the accidents prediction model of collision accidents to predict the accidents and monitoring accident causes through model simulation.

2.5 Entity Disambiguation with Markov Logic Network Knowledge Graph

Jiangtao Ma, Yaqiong Qiao, Yongzhong Huang, Rui Zhang

Abstract:

Disambiguating named entities is an important problem in natural language processing, knowledge base, question answering system. In the paper, we propose a Markov logic network knowledge graph solution for solving entity resolution problem. First, we employ knowledge graph to represent the entity relationship between linked entities in the knowledge base. Then, we utilize MLN to inference the inconsistent relationship in the knowledge graph, and disambiguate the entities in the process of entity disambiguation. As far as we know, inferencing with MLN is a first attempt for entity disambiguation in the knowledge graph. We evaluate the proposed solution with three real world knowledge bases and make comparison it with four baseline solutions. The experimental results demonstrate that our solution is 7% higher than other baseline methods with F1 measure. We also test our scheme and comparison entity resolution systems on four datasets with three knowledge base corpora. Extensive experiments show that our solution achieves higher precision and recall than baseline solutions.

3.1 Solar Cell Surface Defects Detection Based on Computer Vision

Xiaoliang Qian, Heqing Zhang, Huanlong Zhang, Yuanyuan Wu, Zhihua Diao, Qing-E Wu,
Cunxiang Yang

Abstract:

Various types of defects exist in the solar cell surface because of some uncontrollable factors during the process of production. The solar cell surface defects detection is indispensable for the production of solar cell. The automatic defects detection methods based on computer vision have been widely used because of its convenience, real time and low cost. The state-of-the-art methods of solar cell surface defects detection based on computer vision are reviewed in this paper. Firstly, the typical defects of solar cell surface are summarized. Secondly, the state-of-the-art methods which are classified into three categories: local scheme, global scheme and local-global scheme based methods are separately introduced, and compared with each other. Thirdly, the datasets and evaluation methods which are used for the comparison between state-of-the-art methods are presented. Finally, the main contents of this paper and future development trends are concluded.

3.2 A Research for Aerospace Complex Software System Runtime Fault Detection

Chenjing Yan, Wei Zhang, Xiaochuan Jing, Hui Ge, Xiaoyin Wang

Abstract:

Aerospace complex software system is the keypoint of aerospace industry informatization. The complexity and scale of aerospace complex software system is growing with the increase of system requirements. Therefore, the possibility of runtime failures is also increasing. The runtime failures may lead to some serious problems of the aerospace software system and may make a great damage. To reduce the loss of software failures and to ensure the normal operation of aerospace complex software system, this paper focus on runtime fault detection based on runtime verification. Runtime verification aims to monitor a running system and check whether executions of the monitored system satisfies or violates a given correctness property. This paper try to propose a method to realize runtime fault detection and solve the runtime failure problem.

3.3 Research on Cloud Computing Task Scheduling Based on Improved Particle Swarm Optimization

Shasha Zhao, Xueliang Fu, Honghui Li, Gaifang Dong, Jianrong Li

Abstract:

Particle swarm optimization (PSO) is a popular intelligent algorithm to solve the task scheduling optimization problem of work-flow system in cloud computing environment. However, this algorithm is easy to fall into the local optimality. It is the reason that the execution time and cost of the scheduling scheme are higher than other methods. Therefore, by improving the calculation method of the single particle success value, the traditional adaptive inertia weight particle group task scheduling algorithm is optimized. Through each particle fitness and local optimal value and global optimal value that divided into four cases to compare, the inertia weight improved can be used to adjust the particle velocity more accurately. It can better equilibrate search capacity of particles between global and local, and avoid the local maximum of the particles. In this paper, we more accurately describe the particle state and improve the inertia weight. We can get a scheduling scheme with lower execution time and lower cost. The analog results show that the improved algorithm is stable. The convergence accuracy is obviously improved. It can effectively avoid prematurely falling into the local optimality.

3.4 Task Scheduling Algorithm Based on Improved Genetic Algorithm

Hu Yao, Xueliang Fu, Honghui Li, Gaifang Dong, Jianrong Li

Abstract:

Cloud computing is a new type of business computing model. It is connected through the network

and can obtain various applications, data and IT services. The core of cloud computing is task scheduling, and the application of genetic algorithm (GA) in cloud computing task scheduling is also a hot topic in recent years. In this paper, the "three-stage selection method" and the genetic strategy of "total-division-total" are put forward to improve genetic algorithm. Doing by simulation experiments in cloud computing simulation software named cloudsim, the experimental results show that comparing with the simple genetic algorithm (SGA), the improved genetic algorithm (IGA) is better than the simple genetic algorithm on completion time, and it is an effective task scheduling algorithm in cloud computing environment.

3.5 Micro-blog real time personalized recommendation based on partial indexing

Dun Li, Meng Wang, Lun Li, Zhi-yun Zheng

Abstract:

Micro-blog is a new social networking service platform and users are very concerned about real-time personalized information. However, the existing micro-blog platform does not fully consider the user's real-time personalized demands. The paper proposed a micro-blog real-time personalized recommendation model. We constructed partial index mechanism to maintain the latest release or update of micro-blog, and inferred the topic distribution of micro-blog and user interest vector based on the LDA model to meet the real-time personalized demands of users. Experimental results on real datasets show that the proposed method is real-time and effective.

3.6 A New Improved Algorithm for SLP

Zhan-Jie Guo, Hui Liu

Abstract:

For SLP (superword level parallel) algorithm cannot effectively handle the large-scale applications which covered few parallel codes, and the codes which can be vectorized may be adverse to the vectorization. A new improved algorithm for SLP is proposed. First of all, Attempt to transform the non-isomorphic statements which can't be vectorized to isomorphic statements as far as possible. namely, locate the opportunities of vectorization which SLP has lost, and then build the MCS (Max Common Subgraph) through adding redundant nodes, process some optimization such as redundant deleting to get the supplement diagram of SLP, it can greatly increase the parallelism of program. At last, using the method of cutting eliminate the codes which is harmful to the vectorization, and excuting them in serial, just vectorizing the revenue codes, improving the efficiency of programs as far as possible. Experimental results show that, compared with the SLP algorithm, its performance in average is better than it 9.1%.

4.1 A visual cryptography scheme based DNA microarray

Xuncaizhang, Zheng Zhou, Yangyang Jiao, Ying Niu, Feng Han, Yanfeng Wang

Abstract:

Visual cryptography is a cryptographic technique which allows visual information to be encrypted in such a way that the decryption can be performed by human. The power of DNA molecule comes from its memory capacity and parallel processing. In this article, a visual encryption algorithm based on DNA chip is proposed, which successfully integrates the advantages of the algorithm in information security with the natural advantages of modern biotechnology. The algorithm converts plaintext into QR code, then using the visual encryption scheme to encrypt the QR code image, combined with DNA chip technology to achieve information encryption and decryption. Security analysis shows that this algorithm has high security.

4.2 A Plan Recognizing Algorithm Based On Fuzzy Cognitive Plan Map

Yuan Feng, Zengyu Cai, Xuhui Wang, Jianwei Zhang, Yong Gan

Abstract:

With the plan recognition applications continuously expanding, the speed of traditional plan recognition is too slow, which hampers the plan recognition applying to some areas. So it is important to construct simple and efficient plan recognizing algorithm. Based on the studying of plan knowledge graph, the concept of fuzzy cognitive plan map is proposed firstly. And then the recognizing algorithm based on fuzzy cognitive plan map is proposed. In this algorithm, it uses the operation of matrix to recognize agent's plan, which can overcome the inefficiency of searching graph in plan knowledge graph. Experimental results show that the plan recognizing algorithm has excellent performance in plan recognition and the same recognition result with plan knowledge graph. And it can reduce the recognition time greatly. The algorithm of plan recognition do well in intelligent game, smart home, network security and other fields, which has an important significance for extending the application area of plan recognition.

4.3 Software Trustworthiness Static Measurement Model and the Tool

Yan Li, Zhiqiang Wu, Yixiang Chen

Abstract:

Software trustworthiness has become one of the prominent studies in software quality assurance, in which the trustworthiness measurement is the primary topic. Compared with the method to evaluate the software development process, we measure to what extent the entity of software better fits users' requirement. In this paper, we propose a bottom-up method of software trustworthiness measurement based on the source code. Firstly, for the trustworthiness

measurement of attributes, a comprehensive model is proposed. Secondly, the validity and stability of the model are verified by Monte Carlo simulation. Finally, the proposed method is developed based on the open source static detection tool for Cppcheck, which forms the software trustworthiness static measurement tool for TSMT.

4.4 An Effective Rate Distortion Optimization Method for Reliability HEVC System

Jinchao Zhao, Kunqiang Huang, and Qiuwen Zhang

Abstract:

High Efficiency Video Coding (HEVC) possess a specially intact coding flow frame involving four basic procedures: prediction, transformation, quantization and entropy coding. The whole processes have high computational complexity especially the transformation and quantization, which obstruct HEVC for real-time application. To reduce the computational complexity and the computing time or resources, a fast rate-distortion optimized algorithm for HEVC is presented. The rate distortion optimized transforms (RDOT) with reclassification and the rate-distortion optimized quantization (RDOQ) extensional bypass decision method are employed to save the computational complexity. The RDOT performs initial classification and reclassification for each class to simplify the decorrelation of residual data transform. Moreover, the RDOQ bypass could reduce the computational complexity through skipping the unnecessary candidates of transform blocks with high computation. Experimental results reveal that the proposed algorithm implemented on reducing for HEVC coding complexity and achieves almost the same coding performance.

4.5 Automatic Generation of the AADL ALISA Verification Plan with ATL

Tianyi Wu, Zhiqiu Huang, Zhibin Yang, Lei Xue

Abstract:

Architecture Led Incremental System Assurance short for ALISA presents a method to check if a system implementation meets its requirement. There are four parts in this method—requirements specifications, architecture models, verification techniques and assurance cases. Verification part in ALISA is used to verify if system requirement is met. As for the hierarchical architecture model with increasing complexity, the system may be divided into several parts and it is difficult to accomplish the assurance manually for each tier of the architecture would correspond to a requirement in different abstract level. Assurance also needs to respond to the ever-changing demands rapidly. The consequences of assurance are significant metrics as the reference to validate the system. When designing requirement specification and verification plan, new faults may be introduced in artificially. In the paper, we propose a way which ATL transformation technique is used to help generate verification plans automatically. The meta-model of the

verification plan and of requirement specification are given. Thus designing the transformation rules from verification part to requirement part is naturally. Using a lightweight template described in ATL, which is combined with the information from requirement specification and AADL model, could generate the verification plan for critical requirement and quality property.

5.1 An Automated Test Case Generation Approach based on the Activity Diagram of SysML

YuFei Yin, YiQun Xun, WeiKai Miao, Yixiang Chen

Abstract:

Model based software testing is one of the most popular software quality assurance technique adopted by industrial practitioners. The SysML Activity Diagram (AD) can describe dynamic behaviors of a software system under testing in an intuitive way. That is, the AD is a promising foundation for generating test case to test the target software system. Unfortunately, there are few effective AD based testing approaches for industrial practitioners due to the lack of automated generation technique and powerful tool support, especially for whose shape is out of structure. To tackle this problem, we propose an automated generation approach with a supporting tool. For a specific AD, we first transform it into an intermediate representation form — Intermediate Black box Model (IBM). Then the IBM is used to generate test cases automatically. The approach presented in this paper can make up the deficiency of automated test case generation with the unstructured SysML AD.

5.2 AdaRate: A rate-adaptive traffic measurement method in software defined networks

Jixing Tang, Yue Zhang, Yan Li

Abstract:

Traffic measurement is the basis of analysis and prediction of network traffic. Its accuracy directly affects the reliability of upper applications. This paper proposes a rate-adaptive traffic measurement method called AdaRate. It adjusts the polling period according to fluctuations of flow rates which is calculated with a sliding window queue. We noticed that some fluctuations of flow rates may be dropped in AdaRate while the polling period is too long. Then we propose RAdaRate. It adjusts the polling period according to AdaRate or sets the polling period to minimum randomly. We compared the performance of AdaRate and RAdaRate with SWT in CeMon and Payless in Mininet when monitoring those VBR flows with frequent and large fluctuation. The results show that the accuracy of RAdaRate is the best while the overhead of AdaRate is the least. The overhead of AdaRate is 68.75% less than periodic polling.

5.3 A Novel Ensemble Classification for Data Streams with Class Imbalance and Concept

Drift

Yange Sun, Zhihai Wang, Hongtao Li, Yao Li

Abstract:

The processing of streaming data implies new requirements concerning restrictive processing time, limited amount of memory and one scan of incoming instances. One of the biggest challenges facing data stream learning is to deal with concept drift, i.e., the underlying distribution of the data may be evolving over time. Most of the approaches in the literature are under the hypothesis that the distribution of classes is balance. Unfortunately, the class imbalance issue is common in the real-world. And the imbalance issue further increases the difficulty of solving the concept drift problem. Motivated by this challenge, a novel ensemble classification for mining imbalanced streaming data is proposed to overcome both issues simultaneously. The algorithm utilizes the under-sampling and over-sampling techniques to balance the positive and negative instances. Moreover, dynamic weighting strategy was adopted to deal with concept drift. The experimental results on synthetic and real datasets demonstrate that our proposed method performs better than competitive algorithms, especially in situations where there exist concept drift and class imbalance.

5.4 The quantitative analysis of approximate correctness for real-time system

Yanfang Ma, Liang Chen, Haiyu Pan

Abstract:

Correctness is a key attribute for a real-time system. Strong timed bisimulation in timed CCS has provided an abstract characterization to verify the correctness of system, in which the time delay and usual action must be matched between implementation and its specification. However an exact matching of time delay and usual actions are unrealistic. In this paper, in order to characterize the approximate correctness of real-time system, the strong timed bisimulation in timed CCS is generalized to numerical version. Firstly, the definition of global timed bisimulation index of a binary relation is established to describe the relation between implementation and specification. Secondly, in order to quantify the approximate degree between implementation and specification, the global timed λ -bisimulation is defined. Finally, the substitutivity laws of the global timed λ -bisimulation is proved to guarantee the modular development and hierarchic design methods which are used in the real software development.

5.5 A Partial Supply Simulation Relation and Its Proof System in PADS

Xinghua Yao, Hengyang Wu

Abstract:

PADS (Process Algebra for Demand and Supply) is a formal framework to analyze hierarchical scheduling in real-time embedded systems. Inspired by the supply simulation relation in PADS, we introduce a partial supply simulation relation in order to describe the fact that an unschedulable task maybe finishes on time. It is more general than the supply simulation relation. Then, we explore some properties of partial supply simulation relation. Furthermore, we establish a proof system for the partial supply simulation relation in a decomposing-composing way, which helps to infer tasks' partial schedulabilities. Finally, it is proved that the proof system is sound and complete with respect to the semantic definition of partial supply simulation relation.

6.1 A Subjective Logic Based Approach for Assessing Confidence in Assurance Case

Yuan Chunchun, Wu Ji, Liu Chao

Abstract:

Assurance case has been widely used to justify safety, security and other properties of systems. The extent we can trust the assurance case, i.e., confidence in assurance case, is still an open issue in the area. This paper proposes a subjective logic based approach to assess the confidence in assurance case. Compare to other quantitative tools such as Bayesian Belief Network or Dempster-Shafer theory, subjective logic can (1) handle uncertainty and vagueness that usually are contained in expert opinions, and (2) provide appropriate logic operators to deal with different argument types. In the paper, we firstly define the concepts of confidence, sufficiency and necessity to measure the affecting factors to the confidence. Then, we identify four basic argument types and define confidence propagation rules for them. The confidence in assurance case can be calculated iteratively from the bottom up. The application of the proposed approach is illustrated by an industry case study.

6.2 Schedulability Analysis and Symbolic Verification Method for Heterogeneous Multicore Real-time Systems

Wei Wang, Dong Guo, Hui Zhang, Changwu Hu, Jianing Tong

Abstract:

As heterogeneous multicore real-time systems are increasingly applied in safety critical systems, it's important to ensure the correctness of these systems. One key attribute of real-time systems is the schedulability that guarantees to satisfy the timing requirements. This paper presents a method for modeling and verifying schedulability of heterogeneous multi-core systems and the method we presented uses timed-automata(TA) to model tasks and resources of heterogeneous systems considering their special features. Also this method allows us to establish complex dependences between tasks and use different scheduling policy. After that we choose CPU-GPU heterogeneous multi-core systems as an example and we model three TA networks according to three levels of

this system which are real-time tasks, resources and scheduling management modules. Finally, we use UPPAAL to verify if the model we established satisfy habitudes. According to our method, we present a link between model checking methods and schedulability analysis method for heterogeneous multicore real-time systems and we can automatically and accurately verify the schedulability of selected systems.

6.3 Development of Lighting Control System for Smart Hotel Rooms

Jiajia Feng, Yongjie Yang

Abstract:

In order to overcome the shortcomings of traditional lighting control system with single function, poor efficiency of management, and the low degree of timeliness and automation and other shortcomings, this paper designs and implements a kind of intelligent guestroom lighting control system, which is used to manage manual control and automatic control of housekeeping light. The system adopts the multilayer distributed structure, which is the organic integration of the embedded technology, network technology, sensor technology, CAN bus technology, and the embedded ARM microprocessor as the core, combining with a variety of functional modules, and the CAN bus communication interface, so as to realize the intelligent management of guest room lights. In this paper, design of the overall structure design, software and hardware, show detailed analysis and explanation. The system was tested by Simon. It shows good stability and can effectively achieve the purpose of dimming, improve hotel management level and service quality, and help the hotel to save energy, scientific and intelligent management, enhance the competitiveness of the control system, it will be an important part of the Smart Hotel System which has a certain application value.

6.4 Simulation and Analysis of Linear Permanent Magnet Vernier Motors for Direct Drive System

Mingjie Wang, Yanyan Li, Hongbo Qiu, Cunxiang Yang, Congshan Li

Abstract:

In order to keep the motor volume and slot number unchanged, reduce the motor speed, a new type of linear permanent magnet vernier motor(LPMVM) is discussed, the characteristics of LPMVM are simple structure, low speed, and reduced thrust ripple. According to the air-gap permeance about slots only on the stator, the formulas of flux density, no-load EMF, the thrust are analyzed, and the motor structure is given. Its steady performances compared with the traditional permanent magnet linear synchronous motor (PMLSM) are simulated by using the finite element method(FEM). The results show that it has a good performance in a low speed, especially the detent force is very small, so it is suitable for the low-speed direct-drive system.

6.5 HACO-F: An Accelerating HLS-based Floating-point Ant Colony Optimization Algorithm on FPGA

Shuo Zhang, Zhangqin Huang, Weidong Wang, Rui Tian, Jian He

Abstract:

In this paper, a novel accelerating Ant Colony Optimization (ACO) algorithm based on High-Level Synthesis (HLS) on FPGA (Field Programmable Gate Array) is proposed. The proposed algorithm (HACO-F) is implemented by C/C++ programming language and calculated by floating-point. For the sake of accelerating, the algorithm mainly employs the data optimization strategy to redefine the variables precision in HACO-F to reduce resource utilization and energy consumption. Then, we explore a loop optimization strategy including pipeline and unroll to parallelize loops in HACO-F to decrease computation time. The experimental results show that the HACO-F algorithm can achieve more than 6 times accelerating performance than the AS (Ant System) at the same search ability. The resource utilization in HACO-F is 1% FF, 4% LUT, and 9% BRAM decrease. The total on-chip energy consumption of HACO-F is reduced by 23.9%.