

# A Study on Various Software Models as Inclusive Technology for Sustainable Solutions

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*Abstract:* This article presents various recent work on various software models as inclusive technology for sustainable solutions. The complete references are presented for further work in this direction. Mostly the references indicate the work done by the author along with his research scholars jointly.

## **COST EFFICIENT SOFTWARE RELIABILITY GROWTH MODEL DESIGN FOR FAULT DIAGNOSIS**

To develop a two dimensional software reliability growth model, which makes use of Cobb- Douglas production function that includes testing time and testing coverage effecting on the number of faults removed in the software system. To develop a software reliability growth model for estimating the software error, failure rate and thus calculating the reliability. To develop a SRGM for estimating software testing costs with the intention of determining an adequate time to stop debugging and release the software to the users.

## **DECISION TREE BASED OCCLUSION DETECTION IN FACE VERIFICATION AND ESTIMATION OF HUMAN AGE USING BPNN**

The research work deals with the following:- • To classify the occluded and non occluded part of the facial image using Decision Tree based Occlusion Detection Classifier (DTOD).

- To Verify the face with the training set using Maximum Likelihood Classifier
- To estimate the age of a human with the Back Propagation Neural Network(BPNN)
- To understand the parameters of the proposed work with respect to the classification of facial image, face verification and age estimation. The aforesaid key points are carried out in the proposed research work. The results of the proposed work are compared with the existing work done using various classifiers. Decision Tree Based occlusion Detection classifier is one of the methods to classify the occluded and non occluded part of the facial image. The correctly classified instances are highly compared with other classifiers. The face verification is performed with elastic matching pattern. The Maximum Likelihood Classifier is applied to classify the face and non-face. The Back Propagation Neural Network algorithm is applied to estimate the age of a human. The future work focused on this proposed work is to find the age of a human using decision tree induction method.

## **DESIGN OF CONCEPTUAL REFERENCE FRAMEWORK FOR REUSABLE AND FUNCTIONAL VERIFICATION ENVIRONMENT AS A DECISION SUPPORT SYSTEM**

One aspect of the reuse activity that requires more research is to find out how evaluations are performed. Developers need to finish the evaluation with a sufficient understanding of the component so that they can make an informed decision to use to its suitability for the new context. The reuser will adopt a software component if the dynamic runtime behavior of the component is satisfactory as per their needs. The reuser needs to experience this runtime behavior so that they can make a judgment for the component's suitability. Coverage Driven Functional Verification (CDFV) is the evaluation of reusable software components through invoking and observing runtime behavior. The evaluation takes advantage of a component's executable nature and verification provides the experience of using component to achieve a task. The main contribution of the work presented in this thesis is to identify whether the reusable software component meets the necessary requirements before taking any decision, since the contrary is too costly by wasting time, effort, and money. The subsidiary contribution is to design an assessment model which will give high potential and high quality reusable components to increase the reuse frequency and reuse utility level. The organization of the thesis is as follows:-Chapter 2 presents literature review on software reuse, Reusable software component and functional verification. At the end of this chapter the different reusability assessment models are analyzed and discussed. Chapter 3 introduces the conceptual reference framework for verifying and reusing the software components in a system, the metrics relevant to assess the reusability and the influence of each element in the framework. It also presents a process model for reusability.

Chapter 4 presents an efficient coverage driven functional verification based on genetic algorithm. The challenges in this method are to minimize the number of test data while maximizing the coverage

rate and also to reduce the verification time. In Chapter 5, two approaches for finding the extraction time for the component from the identified set of software component are proposed. Also, these two methods and this extraction time, used as a qualifier for qualifying the component for reusability are compared. Chapter 6 describes Qualitative analysis model for evaluating the components for reusability with the help of fuzzy approach. We design a tool for collecting the metrics for the component assessment and qualification. Chapter 7 presents a case study in a real time environment for our proposed conceptual reference framework. Finally in this chapter we present our experimental results and analyze the effectiveness of our approach. Chapter 8 concludes the thesis work by summarizing the major contributions and set of limitations of this research work

#### **SOFTWARE COST ESTIMATION BY FUZZY ANALOGY APPROACH USING NEUROTICISM FOR STATIC AND DYNAMIC DATASET**

The main objectives of the study are given as under:- To analyze the existing methods of software cost estimation and study their merits and de-merits.♣ To determine the suitability of analogy approach for specific data set and to select a fitting method to eliminate the aberrant data points to improve the accuracy levels in cost estimation. Integrate and utilize the selected methods for a known dataset to overcome the imprecision and uncertainty problems and check their compatibility. Optimizing the integrated method to improve the exactness of the estimation process.♣ To formulate and develop a method by considering the team characteristics using the neuroticism feature of a team for the estimation of Software Cost. The findings and results of the present study will be beneficial for user agencies engaged in software cost estimation.♣ Scope of Work: A thorough study of the prior research work in the field of software cost estimation has been made to select the appropriate methodology. Among the existing methods, Analogy Based Estimation (ABE) is considerable to be the most flexible method for better estimates during initial stages of effort estimation. ABE is compared with other cost estimation methods to find out the compatibility of ABE to develop an integrated method. Subsequently, Fuzzy Analogy is developed using fuzzy logic concept to handle the categorical data in an efficient manner. However, it is difficult to produce accurate estimates of effort due to the imprecision and uncertainty of the data collected during the early stages of software development life cycle. An approach, namely, FUZZY ANALOGY NEUROTICISM (FUZANN) involving the team characteristics, “Neuroticism”

have been developed to estimate the effort of a project team. FUZANN utilizes fuzzy logic based on analogy reasoning to assess the influence of neuroticism character on the members in a project team in addition to other social characteristics like joy, skill and anger. The proposed method is tested with the static and dynamic dataset (STDA) using historical and real time project and the results indicate that this method performs in a satisfied manner

#### **Optimization of Component Extraction for Reusable Software Components in Context Level – A Systematic Approach**

A component can be considered as an independent replaceable part of the application that provides a clear distinct Function. A software component is said to be reusable if the cost required to reuse is remarkably smaller than the implementation of the component with the same functionality and also within a limited time. Software component reuse is the search for components that supply the functionality needed by the user. Calculating the extraction time for each component in the entire identified component set based on coverage driven functional verification method in context level remains unexplored. Effective component extraction methods are essential to assist the reuser to speed up the process of extracting the appropriate components for the given task. In this paper, we have designed a systematic approach for software component reusability in context level and also proposed two methods for calculating component extraction time. Optimization of component extraction is based on minimum extraction time to achieve better reusability in terms of speed. By evaluating the two methods, the Minimum Extraction Time First (METF) method provides the optimal path and the extraction time for each component from the current reuser. The minimum extraction time of the component serves as a qualifier in qualification phase and achieves high potential reuse in terms of speed.

#### **Design of Dynamic Component Reuse and Reusability Metrics Library for Reusable Software Components in Context Level**

Reusability is about building a library of frequently used components based on the functional requirements of the reuser. A well organized component reuse library is the key for successful reusability in terms of economics benefits. Reusability metrics is a set of guidelines to help reuser to judge the quality of the component that is to be reused. Reusability metric library is an essential ingredient of a successful reuse in context level. In this paper, we outline architecture for reusability driven methodology in context level and we also design dynamic libraries for qualitative analysis of the components. These libraries have to

be designed for reusing efficient and quality reusable software components. Our approach for identifying and qualifying of reusable software components is based on functional coverage report, extraction time and reuse frequency of the component. In this paper we describe some case studies to validate our experimental approach. This architecture will be a base to develop efficient searchable, reuser-friendly, useful and well organized dynamic libraries. Component reuse percentage is measured by the percentage of qualified components for reuse. So, the proposed architecture and the dynamics libraries can be used to improve the productivity and quality of reusability

### **A Novel Approach for Face Recognition and Age estimation using Local Binary Pattern, Discriminative approach using Two layered Back Propagation Network**

The recent technology of image processing forms the basic principles of research entitled “A Novel Approach for Face Recognition and Age estimation using Local Binary Pattern, Discriminative approach using Two layered Back Propagation Network” has been developed to overcome the inconveniences faced by the organizations in recognizing the exact person. The proposed system sustains a high recognition rate in a wide range of resolution levels and it breaks the other alternative methods. Skin patches are also one of the features of our proposed work. We propose a face detection algorithm for different lighting conditions. Human Skin patches is also one of the parameter in the algorithm. The new methods using Local Binary Pattern, Discriminative approach, facial algorithm and two layered back propagation algorithm for identifying the face and as well as age estimation. The Texture features and Global features are extracted from the image in different scales. The Gradient Orientation Pyramid can be formed for calculating the Age Progression and Age Estimation. The proposed method having high calculation speed compared with the existing method using Back propagation network with single layer. The dataset are taken from FG-NET and Morph Dataset. The performance comparison has been done using different datasets.

### **Decision tree based occlusion detection in face recognition and estimation of human age using back propagation neural network**

Occlusion detection in face verification is an essential problem that has not widely addressed. In this study the research is deals about occlusion detection in face recognition and estimation of human age using image processing. The objects hide from another object is called as occlusion. Occlusion conditions may vary from face wearing sunglasses, wearing of scarf in the eyes and mouth

positions. The proposed work consists four stages. Initial stage is to extract the features using canny edge detection technique and to classify the occluded and non occluded region using Decision Tree Based Occlusion Detection (DTOD) classifier. Secondly the face verification and recognition is carried out using Elastic Matching Pattern (EMP) and Maximum Likelihood Classifier (MLC). Back Propagation Neural Network (BPNN) can be used to estimate the age of the human in the third stage. Our experiments are conducted on the database images for the first stage. By considering the first stage the various performance measures of the classifiers are analyzed. The correctly classified instances rate are high compared with the existing classifiers like random forest and bayes classifier. Experiments are conducted using ORL dataset for the second and the third stage. On the basis of the results obtained from the second stage we observed that the face verification was completed with 95% of accuracy. In the third stage, the age estimation using BPNN algorithm shows better performance results compared with the existing neural network algorithm

### **Performance Evaluation of Software Effort Estimation using Fuzzy Analogy based on Complexity**

Rapid industrialization in the past few decades has necessitated the ever increasing demand for newer technologies leading to the dramatic development of sophisticated software for cost estimation and is expected to grow manifold in the forthcoming years. The improper understanding of software requirements has often resulted in inaccurate cost estimation. In analogy concept, there is deficiency in handling the datasets containing categorical variables though there are innumerable methods to estimate the cost. The proposed fuzzy analogy method is a new approach based on reasoning by analogy for handling both numerical and categorical variables where the uncertainty and imprecision solution is ascertained by studying the behaviour pattern of linguistic values utilized in the software projects. The performance of linguistic values in fuzzy sets has improved in the proposed method. The performance of this method analyzed using Mean Absolute Relative Error (MARE) and Variance Absolute Relative Error (VARE) criteria indicates that the fuzzy analogy outperforms other techniques in terms of both quality and accuracy of the results in software cost estimation.

### **ANALYSIS OF SIZE METRICS AND EFFORT PERFORMANCE CRITERION IN SOFTWARE COST ESTIMATION**

Effective management of any software process requires quantification measurement and modeling. Software metrics provide a quantitative basis for

the development and validation of methods utilized in software cost estimation process and can also be used to improve the productivity and quality of the process. During initial stages of software cycle, it is imperative for the project managers to recognize the merits and de-merits of the metrics and use the appropriate metrics in the estimation process. Software size and effort performance metrics continues to be a controversial issue in the software engineering environment. The paper gives an overview of the metrics that are used for software size and effort performance by the software estimation community. The metrics that are in vogue are inadequate to achieve optimum results in estimation. The present analysis depicts that the prevailing metrics are not applicable for diverse techniques. The results are bound to improve by continual analysis with various metrics and techniques.

#### **An efficient software reliability growth models with two types of imperfect debugging**

Software reliability is the probability of the failure free operation of software in a given period of time under some certain conditions. Software testing can be defined as the process to detect the faults in totality and worth of developed computer software. Testing is very much important in assuring the quality of the software by identifying faults in software, and also most possibly removing them to make the software more efficient. But testing of the software for a long time may not ensure a bug free software and high reliability. Optimum amount of code also needs to be covered to make sure that the software is of good quality. Testing time alone may not give the correct picture of the number of faults removed in the software. Therefore to capture the combined effect of testing time and testing coverage we propose two dimensional software reliability growth models by using Cobb-Douglas production function by incorporating the effect of testing time and testing coverage on the number of faults removed in the software system. The faults in the software may not be removed perfectly; this is mainly due to complexity of software or nature of testing team. This phenomenon is known as imperfect debugging. When the faults are not removed perfectly and leads to further generation of faults, this process is known as error generation. In this paper, we develop an S-shaped model with imperfect debugging and fault generation to solve the above issues occurred during the testing of software. The proposed model is validated on real data sets.

#### **An efficient coverage driven functional verification system based on genetic algorithm**

In Coverage Driven functional verification is a measure of the completeness of a set of tests and the measurable actions is called a coverage task.

Functional coverage is defined as functional requirements derived from the user's requirement and test plan specifications. A coverage driven test generator finds paths through the finite state machine model and its goal is to find a path satisfying each task. Two major issues are how to reduce the time and how to ensure complete verification. To overcome such issues an efficient coverage-driven functional verification approach based on genetic algorithm is presented and customized to verify the functional behavior of Software under Verification (SUV). The main intension of this research is to automatically generate proper directives for random test generators in order to activate multiple functional coverage points and to enhance the overall coverage rate. The proposed method will effectively improve the coverage and detect the errors based on the techniques used.

#### **A NOVEL APPROACH FOR DECISION TREE OCCLUSION DETECTION (DTOD) CLASSIFIER FOR FACE VERIFICATION AND ESTIMATION OF AGE USING BACK PROPAGATION NEURAL NETWORK (BPNN)**

The emerging trend in Face Recognition System is based on Occlusion Conditions. Occlusion Detection is one of the major area of Face Recognition System. Occlusion in the face image like one feature can be hide by some objects like (Wearing scarf, sunglasses, beard etc.,) are considered as an occlusion conditions for the Proposed work. The DTOD classifier is based on decision tree c5.0 algorithm is used to classify the Occluded and Unoccluded parts in the facial features. The proposed system have high recognition rate compared with the existing work using decision tree C4.3 algorithm. The features like, left eye, right eye, left nose, right nose and mouth are extracted using Local Binary Pattern techniques and the features are classified using Decision Tree Occlusion Detection classifier(DTOD classifier). The back propagation Neural Network is used to estimate the human age estimation with wrinkles as a feature. The proposed work was implemented using Decision Tree C5.0 induction algorithm to detect the occluded part efficiently and also the Unoccluded part was taken as an input for the next processing for face verification and age estimation

#### **A Classical Fuzzy Approach for Software Effort Estimation on Machine Learning Technique**

Software Cost Estimation with resounding reliability, productivity and development effort is a challenging and onerous task. This has incited the software community to give much needed thrust and delve into extensive research in software effort estimation for evolving sophisticated methods.



Estimation by analogy is one of the expedient techniques in software effort estimation field. However, the methodology utilized for the estimation of software effort by analogy is not able to handle the categorical data in an explicit and precise manner. A new approach has been developed in this paper to estimate software effort for projects represented by categorical or numerical data using reasoning by analogy and fuzzy approach. The existing historical data sets, analyzed with fuzzy logic, produce accurate results in comparison to the data set analyzed with the earlier methodologies.

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