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Learnability Metric in Software Quality Assurance

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Abstract

Software quality can be defined as a measurable attribute of a software system which depends on usability. Software usability is nothing but the capability to be used by human easily and effectively. Easiness to a specified level of subjective assessment. Effectiveness to a specified level of human performance. Software life cycle development tries to identify the activities that occur in software development. The success of many software systems depends on usability primarily. Many models are available to use software usability as a parameter to improve the quality of software system. Even some models have ignored software usability in the development process, the main reason for failure of many of the software is poor contribution in software usability. In this work we have analyzed different methods to improve software quality by means of using various usability metrics.

Keywords
Software quality, Quality parameters, Quality models, Quality dimensions, Software usability metrics, Interaction characteristics table, Usability specification table.

I. Introduction

Usability is not only just the appearance of the user interface it relates how the user interacts with the user and it consists of some important attributes like learnability, efficiency, user retention over time, error rate and satisfaction. User's experience quality (UX) and delight (DOD) can also be measurable by different ways[1]. Almost in all applications developers are collecting information related to the user when they are using the software and user also giving vital information which are used for the purpose of further improvement and to provide better quality of service to the user[2]. At any cost the developer should respect the privacy of the user not misuse the information. Many interesting applications of this information mining also available.

II. Literature Survey

Lot of workable models available promising software quality assurance. But some are giving priority to Usability metrics and some are not. Here we are going to discuss only popular models. Nielsen's usability model deals with the usability characteristics such as Learn ability, Efficiency, Satisfaction Memo ability and Error[3,4]. An ISO 9241-11 usability model deals with Effectiveness, Efficiency and satisfaction. MGQM usability deals with Simplicity, Accuracy, Time taken, Feature, Safety and Attractiveness. PACMAD usability models deal with effectiveness, Efficiency, Satisfaction, Learn ability, Memorability, Errors and Cognitive load. QUIM usability model deals with Effectiveness, Efficiency, Productivity Satisfaction,Learnability,Safety,Truthfulness,Accessibility,Universalizability and usefulness. MUSIC usability model deals with Effectiveness and Efficiency[5]. SUMI usability model deals with Questionnaire method for quality assessment of measuring users perception of the usability software. In addition to the usability parameters some models uses usability factors like utility, adaptability,

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playfulness, simplicity etc. So the usability can be attributed by effectiveness and easiness[6,7]. The main challenge in our work is to identify which of the above models uses interaction as an important parameter to the development.

III. Common interaction types

Some of the common interaction types include instruction, conversing, Manipulating and exploring. Instructing is nothing but issuing commands and selecting options. Conversing interaction is by as if having a conversation. Manipulation is interaction with objects by manipulating them. Exploring is moving through a virtual environment or a physical space. Depending upon the device configuration and software capability any type of interaction can be chosen and implemented to achieve maximum satisfaction. These types of interaction implementation lead us to find an interesting factor called UX (user experience) which can be measured as quality of experience and involves UX design also the other one is Degree of Delight (DOD).Even though measuring these values for software is out of this work it is worth to mention here how much interaction plays an important role in software design.In Human computer interaction it refers how user can communicate or otherwise interact with the computer system[8]. It can be categorized into four major types. Command Language interaction, Form filling interaction, Menu selection and Direct manipulation. Some interaction methods are conventional and provide good volume of information about the user. On the other hand some interaction styles like menu selection provides limited information about the user[9]. Interestingly some applications uses combination of the above methods which provide useful information also. .

IV. Existing implementation

In this method sample questions are prepared covering all attributes of the application, and the user is expected to answer based on the answer given by the user usability of the system will be evaluated. In a research work “usability study of a web based platform for home motor rehabilitation” Jorge luis perez medina,Mario gonzalex, Hennry Mauricio pilco, Karina beatriz jimenes vargas, patricia Acosta vargas, Sandra sanchez Gordon, Tania calle Jimenez, Danila esparza and Yves rybarczyk pIt ,they have already categorized like SYSUSE,INFOQUAL,INTERQUAL ,INTERQUAL and OVERALL. This work is very much for the developers and supported by by IBM. The authors are very much thankful and acknowledge their work in health system. A table is prepared and a small experiment will be conducted between novice, intermediate and expert level of users on a popular platform. The table will have values before and after interaction. Surprisingly the experiment gives useful results and showed the importance of interaction at each and every step of working.A Usability specification table table is prepared and given in a research work “Usability basics for software developers” by Xavier ferre and Natalia jurist, Helmut windl, larry Constantine explained. To check usability by interaction and sample attributes may be minimum acceptable level , planned target level, Best possible level and Observed results.

V. Technologies Used For Typical Applications

Natural language processing is an important tool used here**.** The agent a key term in AI is called as in an Intelligent Agent(IA) is the one which acts upon on the inputs and generates responses. We can say an agent in AI any entity which perceives its environment through sensors and acts upon the environment through actuators. These sensors may be cameras, Infra red range finders and the like. The actuators may be different kinds of motors.

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The key AI technologies are list below

1. Machine Learning (ML)
2. Deep Learning (DL)
3. Natural Language Processing (NLP)
4. Computer Vision (CV)

1. **Different Machine Learning Algorithms (M.L)**

(i)Linear Regression ,(ii)Logistic Regression,(iii)Linear Discriminant Analysis,(iv)Classification and Regression Trees,(v)Naive Bayes,(vi)K-Nearest Neighbors (KNN),(vii)Learning Vector (viii)Quantization (LVQ)(ix)Support Vector Machines (SVM)

2. Different Deep Learning Algorithms (D.L)

(i)Convolutional Neural Network (CNN),(ii) Recurrent Neural Networks (RNNs)(iii) Long Short-Term Memory Networks (LSTMs)(iv)Stacked Auto-Encoders,(v)Deep Boltzmann Machine (DBM)(vii) Deep Belief Networks (DBN)

3.Natural Language Processing (NLP)

Natural language processing (NLP) is a type of artificial intelligence that is mainly helps computers understand, interpret and manipulate human language.

4.Computer Vision (CV)

Computer vision is a field of artificial intelligence that trains computers to interpret and understand the visual world. Using digital images from cameras and videos and deep learning models, machines can accurately identify and classify objects and then react to what they "see."

VI.PROPOSED SYSTEM

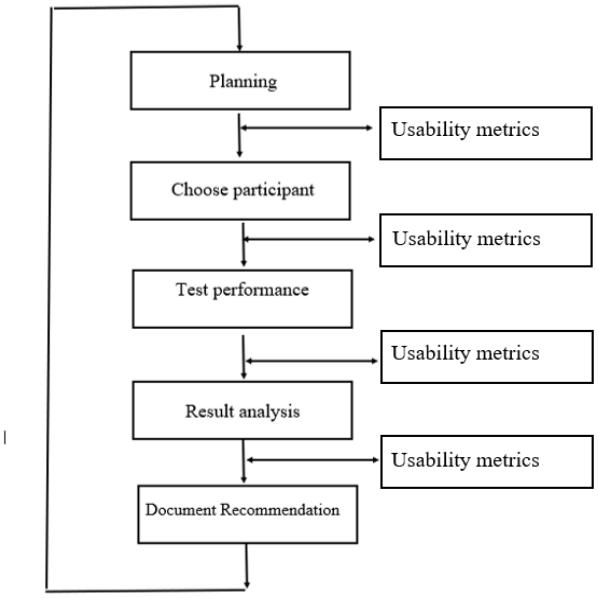

Fig 6.1 Proposed system

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The proposed model to develop a software application with the help of usability at all levels are shown in Fig6.1. Initially planning will be the first stage to start the executions. Then the usability metrics will be taken for the execution of second stage. The out put of planning will be the input for the choose participant. After chosen the exact participants the test performance will be carried out. After finished the test performance the result analysis can be executed in the precious way. Finally the document recommendation will be executed. Then the out put of document recommendation will be given as the feed back to the planning if necessary. At each and every intermediate execution stages the usable metrics have been selected in the optimised way.

II. Result and discussion

Learnability is nothing but how easy to learn the main system functionality and proficiency to complete the task. To support this work, we have conducted a manual experiment with three kinds of students (novice, intermediate and expert level of) higher secondary school students for a popular online platform. To make the experiment for analysis purpose we have prepared sample questions and given values from 0 to 9 for each attributes and showed as sample table 7.1. In future the same work can be done and atomized for all other usability parameters instead of doing manual experiment.

Learnability Effectiveness		
Novice	Intermediate	Expert
0	5	9
1	4	8
0	4	9
3	3	8

Table 7.1: ICT on Learnability

VIII. Conclusion

By using this proposed system the software can be easily handled by the normal person in the effective manner. Based on the proposed assessment we came to understand that the Software life cycle development tries to identify the activities that occur in software development environment. Subsequently the usability matrices al so playas the vital role for an efficient software development in the noise free environment. Hence the software quality has been enhanced effectively by using various usability metrics**.**

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