International Refereed Journal of Engineering and Science (IRJES)
ISSN (Online) 2319-183X, (Print) 2319-1821
Volume 6, Issue 9 (September 2017), PP.76-84

A Survey Based Learning-Teaching Model To Enhance The Programming Skills of Undergraduate Students

[1*]Dr. Mrs. Ananthi Sheshasaayee, [2]Ms.Menaka.N
[1]*Research Supervisor, PG and Research Department of Computer Science, Quaid-E-Millath Government College For Women(A), Chennai.*
[2]*Research Scholar(M.phil), PG and Research Department of Computer Science, Quaid-E-Millath Government College For Women(A), Chennai.*
Corresponding author: [1]Dr.Mrs.Ananthi Sheshasaayee,

ABSTRACT: Students of Computer science and Information technology, in the undergraduate level have provided with blend of theory, and practice for their programming languages is complicated. The student's faces many difficulties to learn and understand programming languages, to tolerate such difficulties, students should focus on syntax of the programming language and they should be versed in how the program works step by step. This paper discusses about the learning and teaching model which encourages the students to learn their programming language and to increase to their programming skill by visualizing the syntax and the procedure how does the programs work.

Date of Submission: 20 -09-2017 Date of acceptance: 03-10-2017

I. INTRODUCTION

In educational institution, grading homework and test for large lecture courses can be monotonous work. Even in lower grades, teachers often find that grading takes up a significant amount of time, time that could be used to interact with students, prepare for class, or work on professional development. While machine learning may not ever be able to truly replace human grading, it's getting pretty close. One of the key ways machine learning will impact education is through the application of greater levels of individualized learning. There will always be a role for teachers in educational domain, but what that role is it entails may change due to new technology in the form of intelligent computing systems. Machine learning can take over tasks like grading, can help students improve learning, and may even be a substitute for real-world tutoring. The machine learning technique is applied to the set of C programs to extract the syntax and the program explanation will be retrieved for the particular uploaded program. This methodology makes the students to understand and learn the programming language easier.

II. LITERATURE REVIEW

Tzu-Chi Yang1, Gwo-Jen Hwang, Stephen J. H. Yang and Gwo-Haur Hwang[1] in their work they have proposed "A Two-Tier Test-based Approach to Improving Students' Computer- Programming Skills in a Web-Based Learning Environment" In this paper they have explained that computer programming is an important skill for engineering and computer science students. However, teaching and learning programming concepts and skills has been recognized as a great challenge to both teachers and students. They have propose a two-tier test-based programming language learning system to support web-based learning activities for computer-programming courses and established a web-based learning environment with client- application-database server architecture. Moreover, it is the user interface to adapt to the screen sizes of different devices; so that students are able to interact with the system using personal computers, notebooks, tablets, or smart phones. Individual students can log into the system to review the teaching materials they have learned and to take tests.

Frances Miley and Andrew Read [2] they have proposed a research work on "Using word clouds to develop proactive learners" This article examines student responses to a technique for summarizing electronically available information based on word frequency. Students used this technique to create word clouds, using those word clouds to enhance personal and small group study. This is a qualitative study. Small focus groups were used to obtain student feedback. Feedback indicated that students comfort ability with use of word clouds in ways consistent with their learning style preferences. Kolb's learning styles inventory was used. Student response also indicated that word clouds have potential in the workplace.

Carrie Heeter[3] have proposed a "Technology-Enhanced Learning" Technology-enhanced learning for classroom learning at a distance, online learning, digital libraries, special collections and online resources, virtual laboratories, e- collaboration, and virtual environments. Recognizing the potential of small changes in

technology to have large effects on learning and learning systems, treating the development process as a living laboratory, documenting and collecting technology-enhanced learning anecdotes (both positive and negative), gathering hard data across projects, and designing with dissemination to real teachers and learners in mind are highlighted. This article describes research on technology- enhanced learning spanning a range from micro to macro focus, starting with basic brain research and ending with the study of complex systems development.

Sumit Das, Aritra Dey, Akash Pal, Nabamita Roy[4] have reviewed on "Applications of Artificial Intelligence in Machine Learning" The ultimate goal of AI is to develop human like intelligence in machines. However such a dream can be accomplished through learning algorithms which try to mimic how the human brain learns. Machine learning, is a field that had grown out of the field of artificial intelligence, is of utmost importance as it enables the machines to gain human like intelligence without explicit programming.

Roy d. Pea and d. Midian Kurland [5] proposed a study **"**On the cognitive effects of learning computer programming" the analysis is based on a developmental cognitive science perspective on learning to program, incorporating progressive and cognitive science considerations of the mental activities. It highlights the importance for future research of investigating students' interactions with instructional and programming contexts, developmental transformation of their programming skills, and their background knowledge and reasoning abilities.

DESIGN OF THE SYSTEM

The clustering and classification algorithms can be implemented, to develop a machine learning application which can motivates and encourages the students to enhance their learning and understanding capability.

PHASE I - CLASSIFICATION

In machine learning, set of sample documents are classified into the certain classes, and used to train some classifiers, which in turn classifies other documents. This method is domain independent and works well in case features of prediction. Generally, an inductive process built a system using a classifier by analyzing a set of pre-classified documents, based on the characteristics of the categories.

In decision analysis, a decision tree can be used to visually and explicitly represent decisions and decision making. The common motive of implementing **Decision Tree** is to create a training model which can **use** to predict target variable or class value by learning **decision** rules accurately from prior data (training data). It uses a tree-like model of decisions. Though a commonly used tool in data mining for deriving a strategy to reach a particular goal, it's also widely used in machine learning in the proposed work the tree learned from programming language dataset which has set of Syntax and comments lines of C programs. In the first split or the root, all attributes/features are considered and the training data is divided into groups based on this split to find most homogeneous branches, or branches having groups with similar responses. The mean value of responses predicted from the training data inputs of particular group is taken as prediction for that specified group.

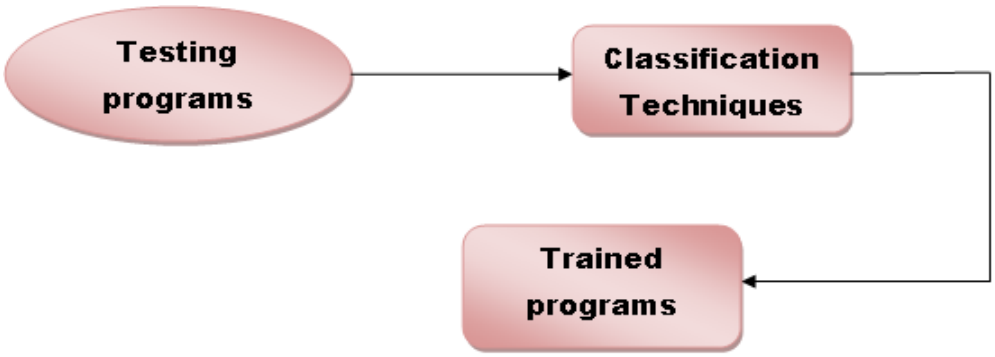

Fig no 1: Work flow of proposed system for classification

PHASE II - CLUSTERING

From the overview of machine learning, clusters resemble to hidden patterns and search for clusters is classified as unsupervised learning. From a practical perspective, clustering plays an outstanding role in data mining applications such as scientific data exploration, information retrieval and text mining, spatial database applications, Web analysis, CRM, marketing, medical diagnostics, computational biology, and many others.

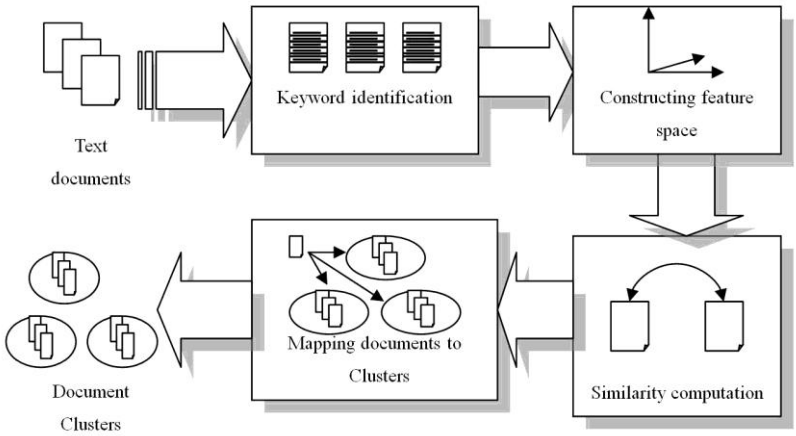

Fig no 2: Steps in text clustering

Machine learning using k-means algorithm becomes popular it is fast and easy retrieval. *K*-means clustering is a type of unsupervised learning, which is used when there is unlabeled data (i.e., data without defined categories or groups). The main goal k-means clustering algorithm is to find groups in input data, with the number of groups represented by the variable *K*. This algorithm works iteratively to assign each data point to one of *K* groups based on the features provided. Data points are clustered based on feature similarity. K-Means clustering aims to partition, n- objects into k- clusters where each partition of the object belongs to the cluster with the nearest mean value. This method produces exactly *k* different clusters of greatest possible distinction. The best number of clusters noted with greatest distance is not known as a derivable and it must be computed from the data.

Generally clustering may take number of iterations, eventually to cluster centroids, in the proposed K-means clustering which identifies and cluster the syntax and comment lines from the trained data (classified data) in a single iteration in terms of basic structure of C programs. K-means clustering works as follows:

1. Place K points into the space represented by the objects that are being clustered. These points represent initial group centroids.
2. Assign each object to the group that has the closest centroid.
3. When all objects have been assigned, recalculate the positions of the K centroids.
4. Repeat Steps 2 and 3 until the centroids no move further. This produces a separation of the objects into groups from which the metric to be minimized can be calculated.

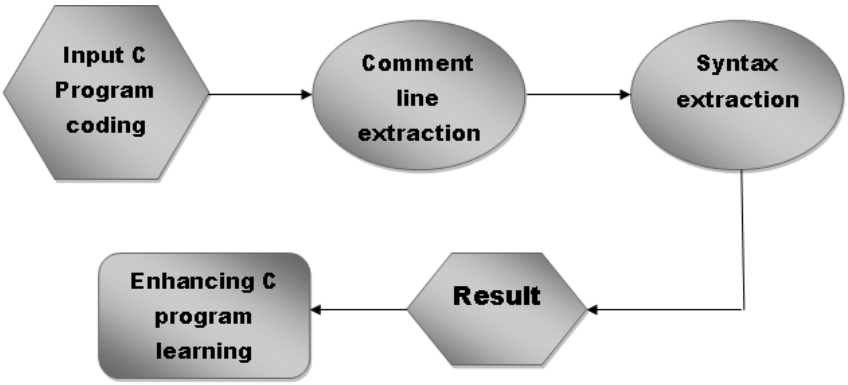

Fig no 3: Work flow of proposed system for clustering

PHASE III - SURVEY OF THE PROPOSED WORK

Feedback from students has always played an important role in the maintenance of quality and standards in higher education. In the proposed system, a survey has been conducted among 570 students from 4 colleges. The set of 20 questionnaires are framed based upon the proposed work and it is circulated to the computer science students to collect their responses.

In responding to the consultation exercise, institutions referred the main purposes of student feedback as:

• Enhancing the students' experience of learning and teaching
• Contributing to monitoring and review of quality and standards.
• Ensuring the effectiveness of course design and delivery

• Enabling a dialogue with students
• Helping students reflect upon their experiences
• As part of the teaching and learning process
• Identifying good practice
• Measuring student satisfaction

QUESTIONS FRAMED FOR COLLECTING FEEDBACK ON PROPOSED WORK

1. The software lets me completely perform entire work routines
2. The function implemented in the software support me in performing my work
3. The software is well suited to the requirements of my work
4. In a given screen, I find all of the information I need in that situation
5. The terminology used in the software reflects that of my work environment
6. The presentation of the information on the screen supports me in performing my work
7. I understand immediately what is meant by the messages displayed by the software
8. The terms and concepts used in the software are clear and unambiguous
9. when executing functions, I have the feeling that the results are predictable
10. The software lets me keep the original data even after it has been changed
11. The software can be easily adapted to suit my own level of knowledge and skill
12. I am able to understand the amount of information displayed on the screen to my needs
13. The explanation provided in the software helps me to understand the program so that I become more and more skilled at using it
14. I was able to use the software right from the beginning by myself, without having to ask coworkers for help
15. I find it easy to understand the commands and syntax
16. The use of software makes to remember all the syntax of the particular language
17. I feel encouraged by the software to learn programming language
18. The software provides me with useful information on how to recover from error situations
19. The software designed is valuable for students learning programming language
20. The output of the program gives the clear solution.

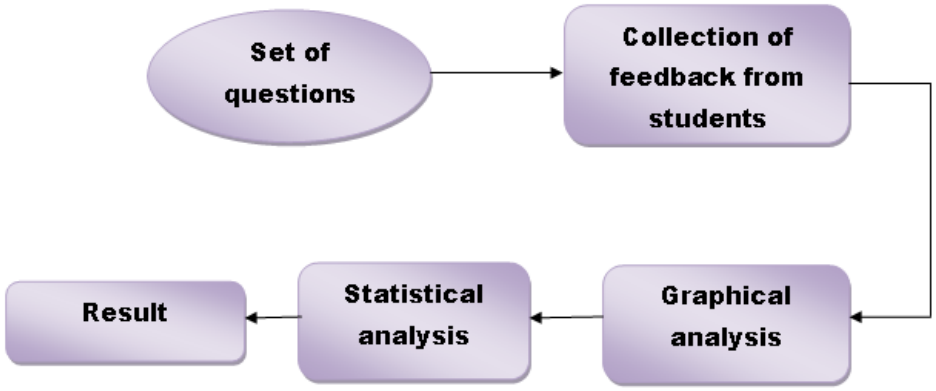

Fig no 4: Work flow of proposed work for analysis

III. RESULT AND FINDINGS

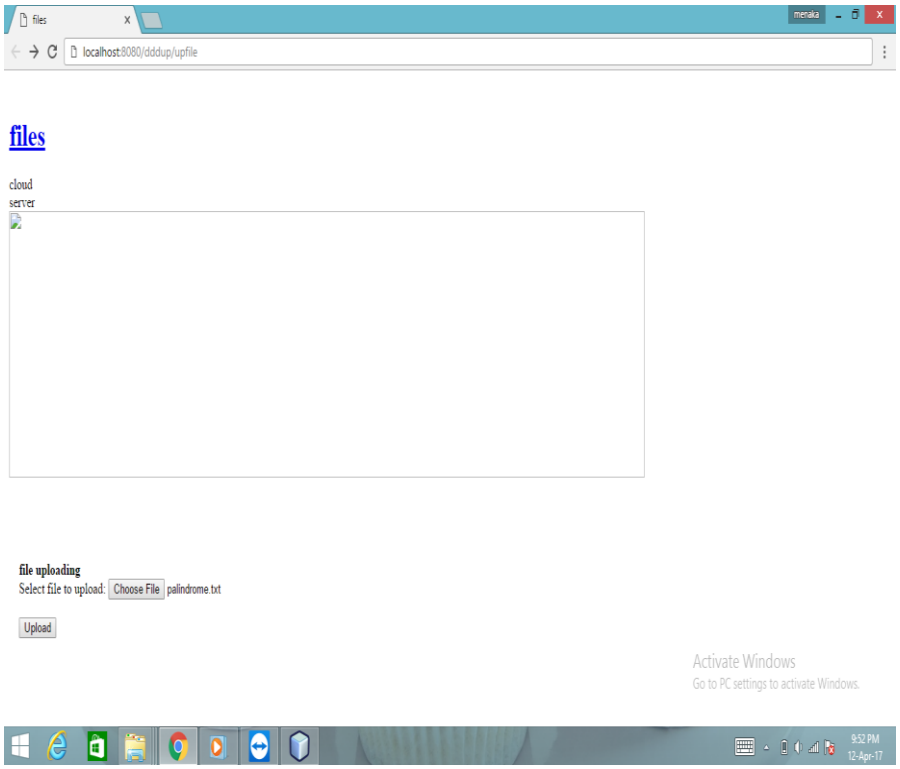

Fig no 5: A web page to upload C program

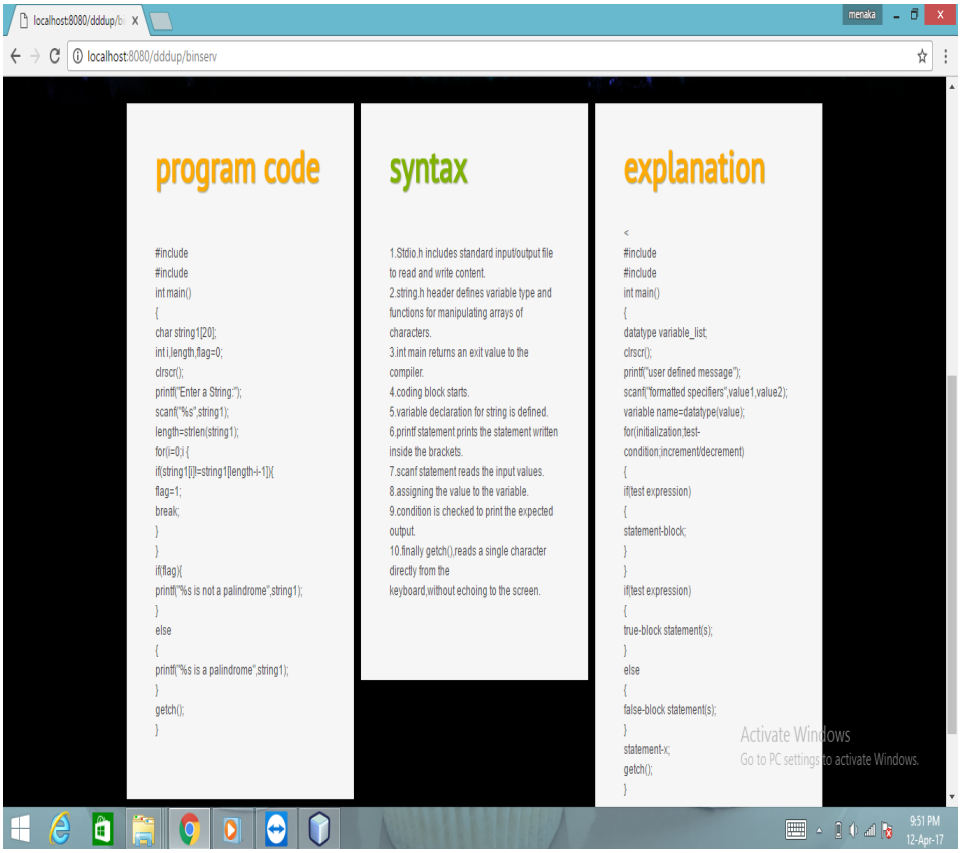

Fig no 6: Displays comment line and syntax for the program Palindrome

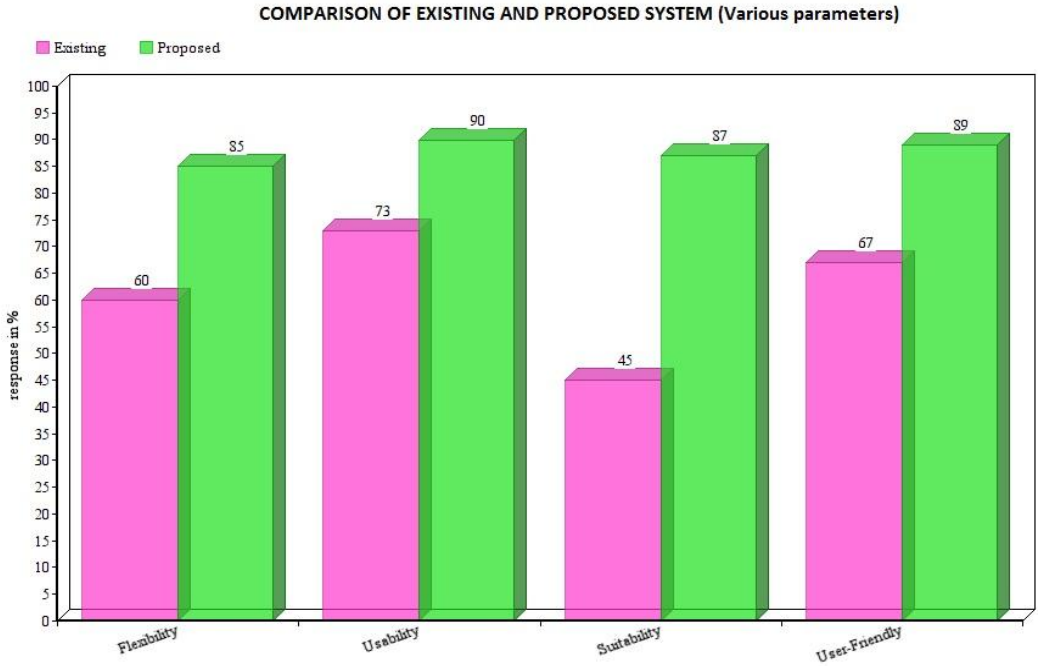

Fig no 8: comparison chart for existing and proposed system-part I

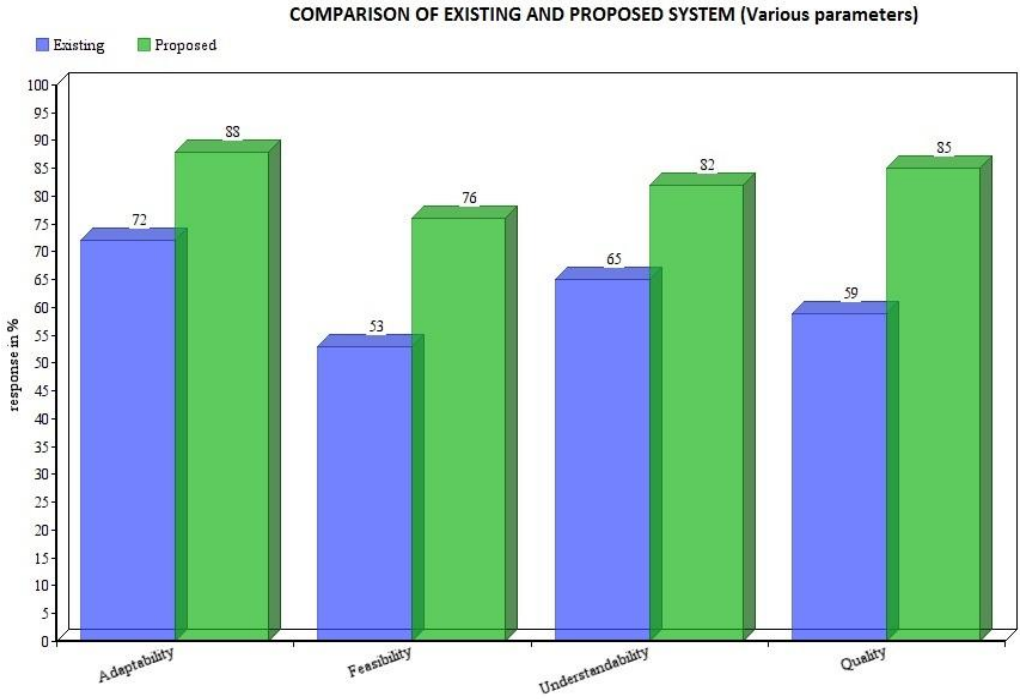

Fig no 9 comparison chart of existing and proposed system part II

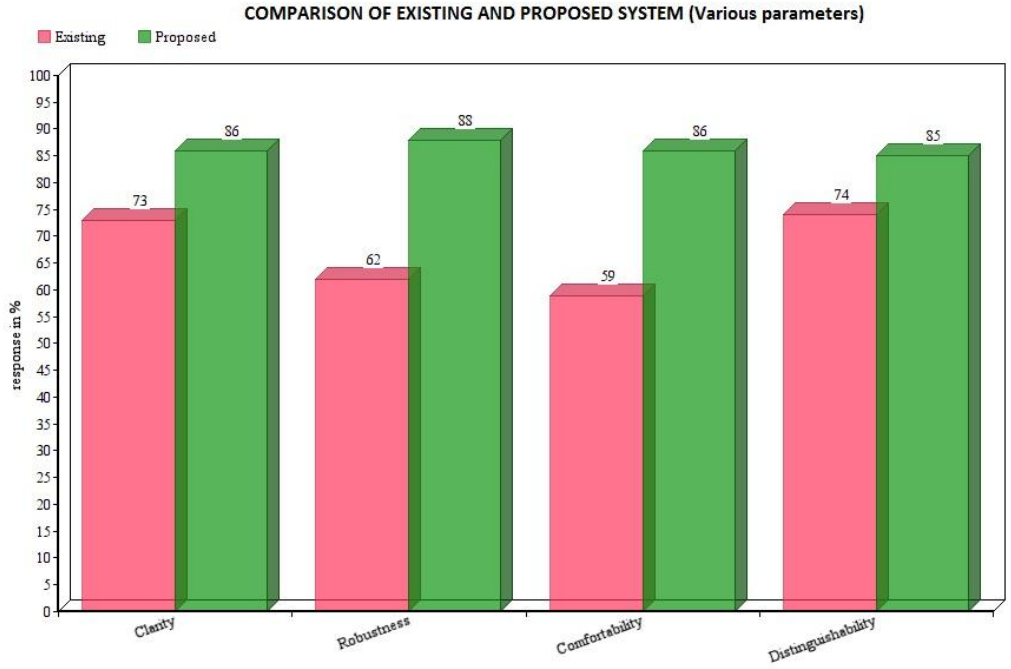

Fig no 10: comparison chart of existing and proposed system part III

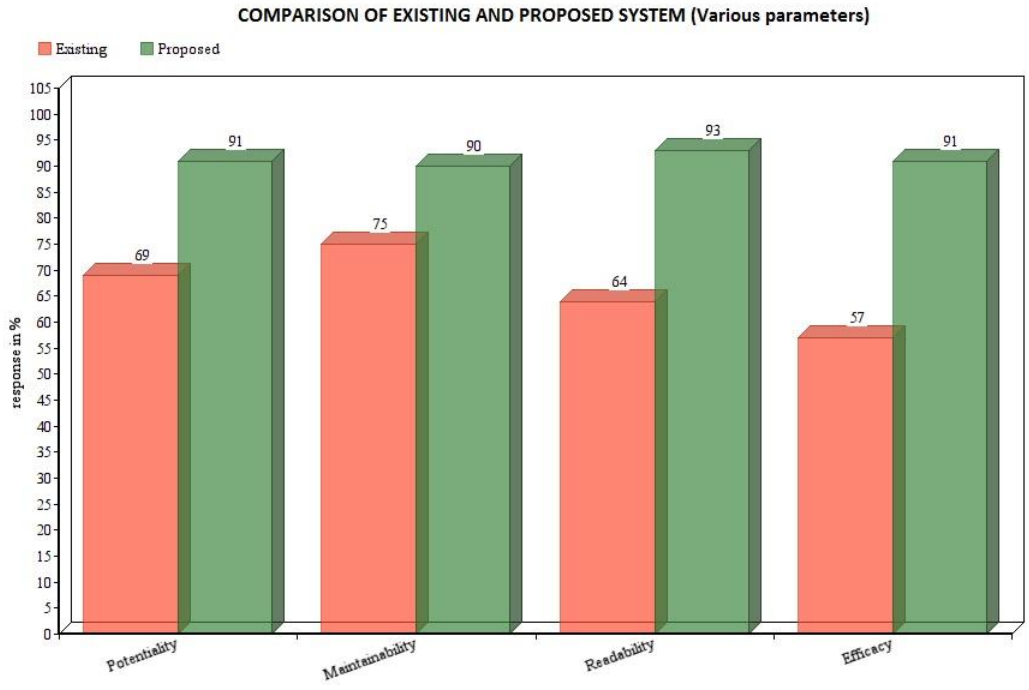

Fig no 11: comparison chart of existing and proposed system part IV

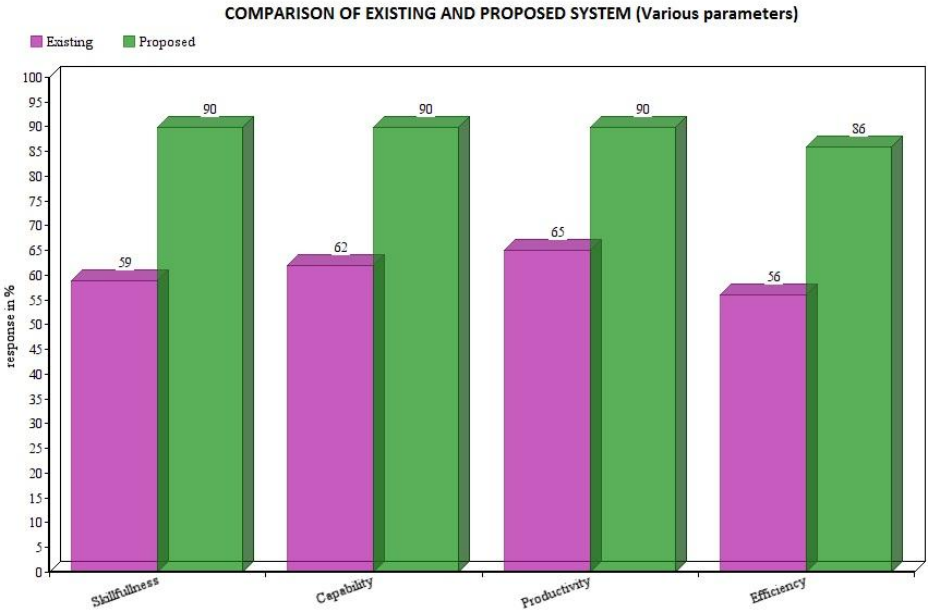

Fig no 12: comparison chart of existing and proposed system part V

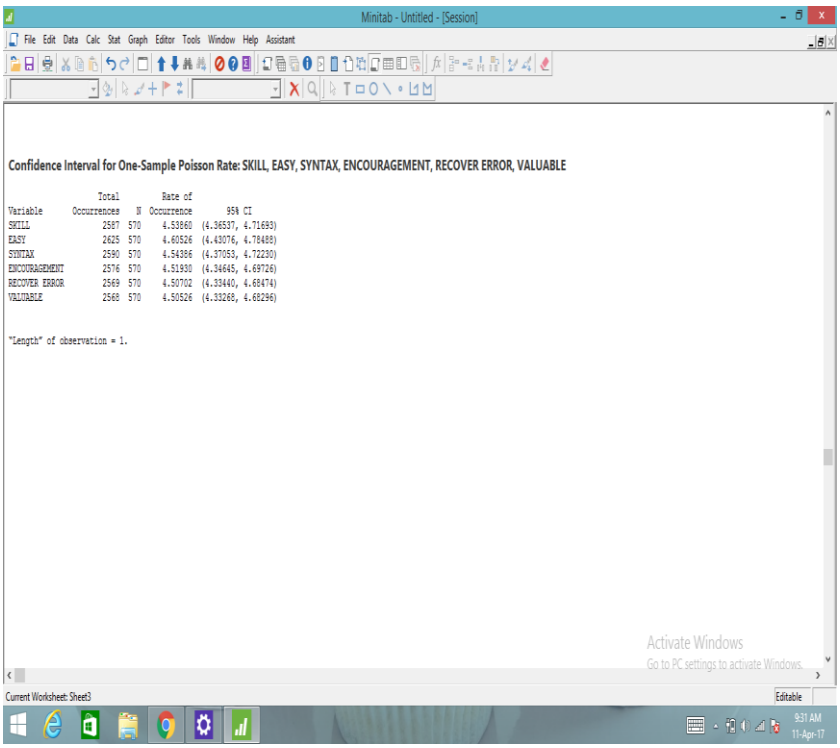

Fig no 13: Confidence interval for high ranked parameters

IV. CONCLUSION AND FUTURE WORK

The proposed research work can be used for understanding C programming language. When compared with existing word cloud system, it provides the students to prepare their experiments any time of the day. The software used in developing this system is built largely on open source code and hence can be adapted to future enhancements. Students can upload their own programs and try various scenarios since there is no risk of causing error in extraction of syntax and displaying comment lines. Hence this approach is easy to execute for students and trainers. The research work results in providing students encouragement to learn C programming

language by their own and it is ensured by the survey reported that students can score good marks in C programming languages if they follow the proposed methodology.

In this work the syntax are extracted and comment lines are displayed for C programming language by using decision tree classification and k-means clustering algorithms. This methodology can be enhanced by using neural network algorithm in order to extract syntax and comment lines for various computer programming languages as java, .net and visual basics. This can be more helpful in the field of education to fetch data for improving students' performance in their examinations and help them to take to next level.

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*Dr.Mrs.Ananthi Sheshasaayee. "A Survey Based Learning-Teaching Model To Enhance The Programming Skills of Undergraduate Students." International Refereed Journal of Engineering and Science (IRJES), vol. 06, no. 09, 2017, pp. 76–84.