ADAPTING SCRUM FOR IMPROVING UNIVERSITY PLACEMENT PROCESS.

Dissertation submitted in fulfilment of the requirements for the Degree of

MASTER OF TECHNOLOGY

in

INFORMATION TECHNOLOGY

By

RAVNEET KAUR

11508306

Supervisor

MR. KRISHAN BANSAL

School of Computer Science and Engineering

Lovely Professional University

Phagwara, Punjab (India)

May 2017

TOPIC APPROVAL PERFORMA

School of Computer Science and Engineering

Program : P173::M.Tech. (Information Technology) [Full Time]

COURSE CODE : INT545 **REGULAR/BACKLOG :** Regular **GROUP NUMBER :** CSERGD0265

Supervisor Name : Krishan Bansal **UID :** 16348 **Designation :** Assistant Professor

Qualification : _____ **Research Experience :** _____

SR.NO.	NAME OF STUDENT	REGISTRATION NO	BATCH	SECTION	CONTACT NUMBER
1	Ravneet Kaur	11508306	2015	K1520	9872629711

SPECIALIZATION AREA : Software Engineering **Supervisor Signature:** _____

PROPOSED TOPIC : Adapting scrum for improving result of placement classes in university

Qualitative Assessment of Proposed Topic by PAC		
Sr.No.	**Parameter**	**Rating (out of 10)**
1	Project Novelty: Potential of the project to create new knowledge	6.75
2	Project Feasibility: Project can be timely carried out in-house with low-cost and available resources in the University by the students.	6.50
3	Project Academic Inputs: Project topic is relevant and makes extensive use of academic inputs in UG program and serves as a culminating effort for core study area of the degree program.	6.75
4	Project Supervision: Project supervisor's is technically competent to guide students, resolve any issues, and impart necessary skills.	6.75
5	Social Applicability: Project work intends to solve a practical problem.	6.75
6	Future Scope: Project has potential to become basis of future research work, publication or patent.	6.50

PAC Committee Members		
PAC Member 1 Name: Gaurav Pushkarna	UID: 11057	Recommended (Y/N): Yes
PAC Member 2 Name: Mandeep Singh	UID: 13742	Recommended (Y/N): NA
PAC Member 3 Name: Er.Dalwinder Singh	UID: 11265	Recommended (Y/N): Yes
PAC Member 4 Name: Balraj Singh	UID: 13075	Recommended (Y/N): Yes
PAC Member 5 Name: Harwant Singh Arri	UID: 12975	Recommended (Y/N): Yes
DAA Nominee Name: Kanwar Preet Singh	UID: 15367	Recommended (Y/N): NA

Final Topic Approved by PAC: **Adapting scrum for improving result of placement classes in university(Are we proposing the model specifically for LPU or a generalized one. Clarify.)**

Overall Remarks: Approved (with minor changes)

PAC CHAIRPERSON Name: 11011::Rajeev Sobti **Approval Date:** 26 Oct 2016

ABSTRACT

With growing interest of applying agile practices in every aspect of technology, education and software development processes for better results and faster outcome, scrum is the framework used for introducing advanced technologies in traditional education system as education fields requires innovation, new ideas, new subjects to improve student's knowledge, along with that it analyzes the capacity of each student, as it is an iterative approach for getting work done and works on principle of continuous improvement, teamwork and focuses on quick and frequent deliveries provides higher productivity, adaptability, communication, high quality results, team cooperation and greater responsibility of each member participating in the process. This study includes adapting scrum for improving university placement process and proposing a method that will ease student selection process for placement and also to improve the effectiveness of student's learning that will improve their performance in placement process and other education fields.

DECLARATION BY SCHOLAR

I hereby declare that the research work reported in the dissertation entitled " ADAPTING SCRUM FOR IMPROVING UNIVERSITY PLACEMENT PROCESS" in partial fulfilment of the requirement for the award of Degree for Master of Technology in Information Technology at Lovely Professional University, Phagwara, Punjab is an authentic work carried out under supervision of my research supervisor Mr. Krishan Bansal. I have not submitted this work elsewhere for any degree or diploma.

I understand that the work presented herewith is in direct compliance with Lovely Professional University's Policy on plagiarism, intellectual property rights, and highest standards of moral and ethical conduct. Therefore, to the best of my knowledge, the content of this dissertation represents authentic and honest research effort conducted, in its entirety, by me. I am fully responsible for the contents of my dissertation work.

Signature of Candidate

Ravneet Kaur

11508306

SUPERVISOR'S CERTIFICATE

This is to certify that the work reported in the M.Tech Dissertation entitled "**ADAPTING SCRUM FOR IMPROVING UNIVERSITY PLACEMENT PROCESS**", submitted by **Ravneet Kaur** at **Lovely Professional University, Phagwara, India** is a bonafide record of her original work carried out under my supervision. This work has not been submitted elsewhere for any other degree.

Signature of Supervisor

Mr. Krishan Bansal

Date:

Counter Signed by:

1) **Concerned HOD:**
   HoD's Signature: _____

   HoD Name: _____

   Date: _____
2) **Neutral Examiners:**

   External Examiner

   Signature: _____

   Name: _____

   Affiliation: _____

   Date: _____

   Internal Examiner

   Signature: _____

   Name: _____

   Date: _____

ACKNOWLEDGEMENT

I owe a debt of deepest gratitude to my dissertation supervisor, **Mr. Krishan Bansal**, Department of computer science and engineering, for his guidance, support, motivation and encouragement throughout the period within which this work is caring out. His readiness for consultation at all times, his educative comments, his concern and assistance even with practical things have been invaluable. I would also like to express my gratitude to all my friends in the department of computer science for their support and encouragement.

I am grateful to **Mr. Dalwinder Singh,** head of the department, computer science and engineering for providing me the necessary opportunities for working on thesis. I also thank the other faculty and staff members of my department for their invaluable help and guidance.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Introduction to Scrum

In agile methodology, Scrum is considered as the best frameworks for implementing agile. Agile is an iterative approach that builds software incrementally from the starting of the project and delivers result frequently, instead of delivering it all at once, near the end. Scrum works on the principles of continuous improvement, teamwork and empiricism.

Characteristics of agile:-

- It provides incremental release and is an iterative process.
- It focuses on frequent delivery of products.
- Active user involvement.
- Timescale is fixed.
- Testing is integrated throughout the project lifecycle.

In scrum methodology, the project is built in a series of fixed length iterations called sprints that gives team a framework for shipping software on a daily basis. [7] It is a tangible progress as the end of sprints comes very frequently and each cycle focuses and energies everyone. Short iteration results in good estimation of delivery of result along with fast feedback.

Scrum is a management methodology with a specific end goal of improving as well as maintaining the system that exists and also a production model. The scrum assumes that the sequence of project existence as well as source code in the object-oriented software development is because of the class libraries. Scrum not only emphasis on the development efforts of legacy systems or totally new systems in fact it adapts fully developed systems. [7]

The release in scrum is planned for accompanying these variables.

• User requests: for current system, what are the improvements needed?

• Time pressure: In competitive advantage, which timeframe is needed?

• Quality: How much quality is needed?

• Vision: what changes are needed, for realization of desired model?

• Resources: what are resources that are available?

These are the conditions that initialize the plan for improvement of Information System. Alteration of these conditions is done during the project, and a development methodology is needed to consider these conditions successfully, along with their vigorous nature. The major difference that exists between the conventional methodologies such as waterfall approach, spiral approach or iterative approach and the empirical approaches, such as Scrum assumes the investigate design and phenomenon processed in the sprint phase are uncertain. A control mechanism is expected to design to deal with this uncertainty for controling risks.

Each sprint consists of following parts:-

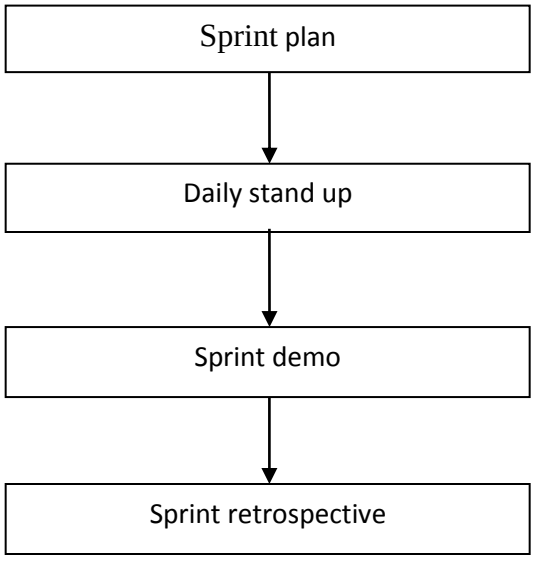

Fig1.1 (sprint phases)

1.2 Scrum Framework

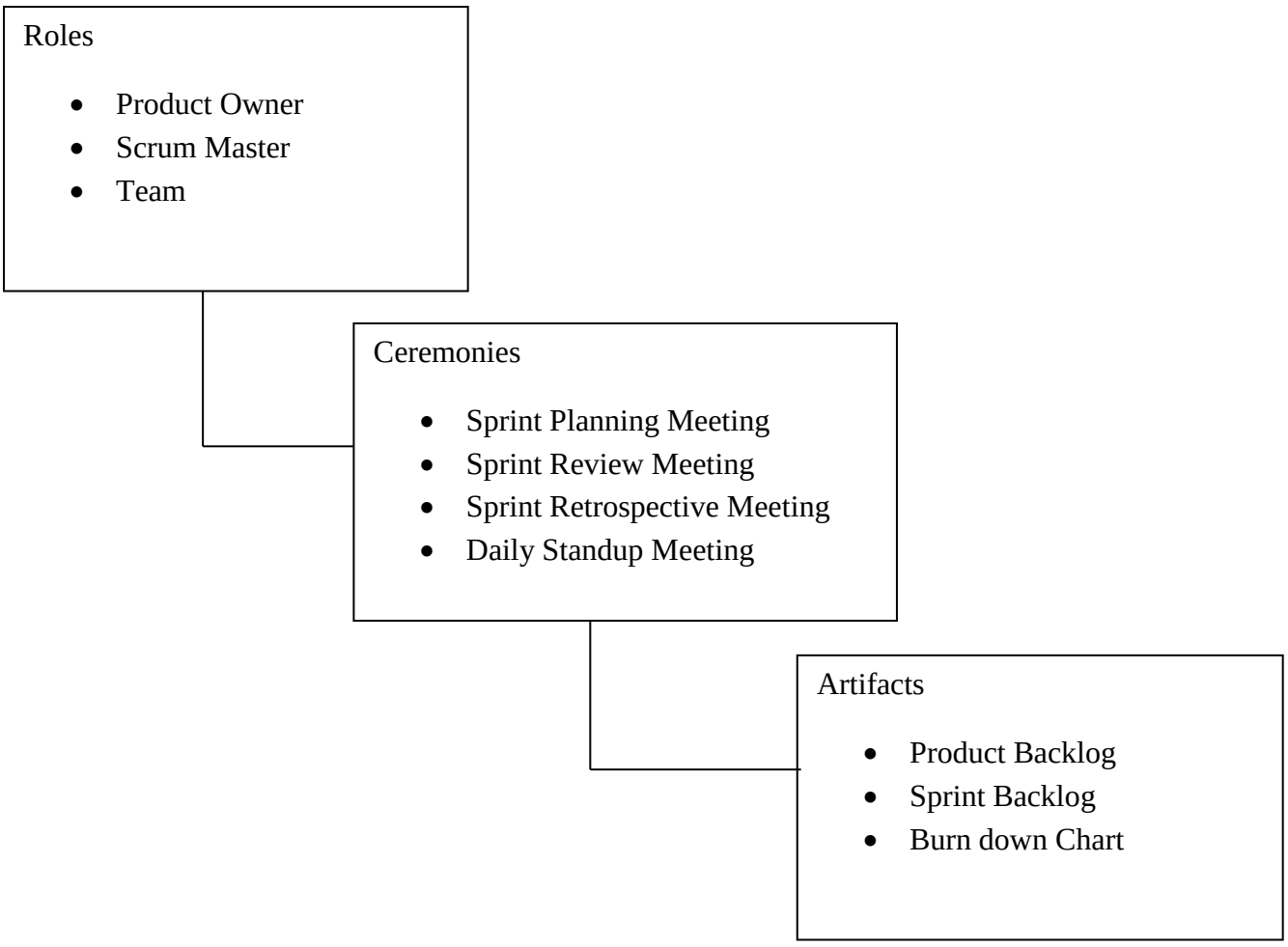

Fig 1.2(Scrum Framework)

1.2.1 Scrum Role

- **Product Owner**

  Product owner is the person with vision, availability and authority who is responsible for communicating in continuous manner the vision and priorities for the development team and his availability is required to answer the questions from the team, also Product backlog is maintained by product owner where Product backlog is list of things need to be done within the project. Product owner is partner with the business and he is responsible for making everyone to understand the work items in the product backlog.

Product owner gives team a transparent guidance on which features to deliver next sprint and he is the one to decide when to ship the product towards more frequent delivery.

- **Scrum Master**

  Scrum master is representative of the customer and facilitator for team as well as product owner and helps the team to understand their common objectives, also helps them in planning to achieve the goal. With the help of scrum master, team remains creative and productive while assuring that its success is visible to the product owner. Scrum master act as adviser for the product owner for maximizing the investment for team; schedules the needed resources for both sprint planning, review and retrospective.

- **Team**

  Team is self-managing, self organizing to complete work. A team generally consists of self-governed dedicated roles with five to nine team members who are responsible to meet the goals of sprint. These team members attempt to build a potentially shippable product. The team determines that how they will accomplish the task to be completed, in each sprint. A team consists of members:-

  - Software engineers.
  - Architects
  - Programmers
  - Analyst
  - QA experts
  - Testers
  - UI designers

1.2.2 Ceremonies

- **Sprint Planning Meeting**

  Sprint planning meeting held at the beginning of each sprint and focuses on what to do? And how to do? The task are assigned to the team members. Each member chooses the responsibility or task they are going to perform during the sprint. One single user story from the product backlog is selected and the work is started on that user story in each sprint.

- **Sprint Review Meeting**

  Sprint review meeting occurs at the end of each sprint. Whole team, scrum master and product take part in this meeting. A sprint review is conducted in which team discuss about what they've built during the sprint. It involves inspection of work along with adaption related to the product increment of functionality.

- **Sprint Retrospective Meeting**

  The sprint retrospective meeting takes place after Review meeting in which development team participate to discuss about obstacles they are facing, also experiences faced for improvement of the project further. It involves inspection and adaption related to the process and environment.

- **Daily Scrum Meeting**

  Daily scrum is a meeting of around 15-20 minutes in which scrum roles discuss about what they did since last meeting and what to do next. Also in daily meeting problems faced during project are discussed and planned how to solve them in coming days of sprint.

1.2.3 Artifacts

- **Product Backlog**

  A product backlog is list of user stories where user story is requirement described by user as specified in SRS. Product backlog need to be clear so that it is easy for team to select user story out of it and start working with that. A good product backlog is detailed appropriately, estimated that is product backlog is refined regularly, each sprint item may be added, removed, modified, split and in priority. A product backlog needs to be prioritized as well as estimated about the current release and effort estimate for each item.

- **Sprint Backlog**

  The sprint backlog consists of ordered list of items of product backlog or list of user stories listed in prioritized manner that the team has to complete in coming sprint. During sprint planning meeting, the items i.e. user stories are pulled from the top of the product backlog. In sprint backlog, each user story is assigned with a point value based on estimated amount of relative effort it will take to complete the story during the sprint.

- **Burn Down Chart**

  A burn down chart is used for tracking the progress during sprint. It is estimation of the remaining work. Team members are responsible for updating their estimate of efforts that are remaining to complete the current work. It is represented as a graph where remaining work is estimated against the number of days left in completion of sprint.

1.3 Other Essential Part Of Scrum

Other important role in the software development projects are.

- **Customer**

  The customer is the person who is funding for the project and the key differences to the role of the product owner. In essence, the customer wants to get a certain problem solved and consents to trade his money for a solution to his problem. In contrast to the product owner, the customer frequently does not by any stretch of the imagination recognize what he wants. In spite of the fact that this sounds contradicting, it explains the role of the product owner, being an intermediary between business (the client who offers money) and the project teams (who can make a solution). One can distinguish two types of customers in which one is internal customers and other is external customers. An internal customer is for example the navigation systems department of an auto manufacturer that needs certain circuit boards from the gadgets department. Therefore, the navigation systems department is the client who needs a solution to its problem, in this way getting a circuit board that fulfills a few prerequisites. Additionally, likewise external customers exist; a matching example would be a shop owner who asks a software company to make a web-shop system as indicated by his or her needs.[13]

- **User**

  The user is the person who will work with the product at last. To continue the example of the shop owner who wants to have a web-shop, it is unlikely that this shop owner will enter every one of the articles he or she wants to offer into the web shop system. In all likelihood he or she will ask an employee to enter the details of the articles into the system. Utilizing this example it turns out to be clear why the customer is redundant an indistinguishable person from the user. As the user is the main target of the product the team is developing, it is one of the principles of Scrum to embed the user into

the project team, matching the approach of cross-functional teams as described previously. Nonetheless, this is regularly impractical. Still, the team needs to get frequent feedback from the user as his or her perspective is of huge importance. One needs to remember that the user is the person who is utilizing the product as a part of the end [13].

- **Management**

  Managers are important people. Additionally inside the Scrum environment, this remains genuine. One of their main tasks is to ensure that the right offices are available and that employees must be all around trained to have the capacity to deliver great work. In this context, an office means that the team has a room where they can work and that this room is equipped with all that they require. Management needs to support the Scrum

1.4 Software Engineering Models

The agile methodology came into existence after various models of software development. These models are:-

- Waterfall model
- Incremental model
- Rapid development model
- Evolutionary process model
- Spiral model

To understand the working of scrum, there is need to understand these models. So brief description of these models are:

- **Waterfall Model**

  Waterfall model is very common software development model that suggests a systematic sequential approach for software development that's why it is known as linear sequential model. It begins with customer specification of requirement which is a document that describes requirements of user and then it progress through planning, modeling, constructing and deployment. It has a proper documentation. But disadvantage of waterfall model is that it is a slow model and cannot go in the backward direction while SDLC perform.

- **Incremental Model**

  Incremental model is combination of the waterfall model in an iterative manner. It applies in sequential linearly as calendar, time, progress. In this model basic requirements are addressed but many auxiliary features are undefined. The core product is used by end customer or user and also undergoing the detail evaluation results in use and evaluation, a plan is developed for next increment.

- **Rapid Development Model**

  It is a proposed model in which requirements and solutions are modularized as independent system of software component, each of these module can be developed parallel by different teams, so it is a parallel processing. The RAD model is version of waterfall model with high speed in which the rapid development is achievement of component based approach but with disadvantage that RAD model requires sufficient human resources for creating right no. of RAD teams.

- **Evolutionary Process Model**

  This process model is iterative and evolves over period of time. This model deals with delivering the result in an incremental process over time, so it is also called big bang release. The development cycle is divided into smaller, incremental waterfall models in such a way that users are able to get access to the product at the end of the each cycle; also it consists of prototype model. In prototype, it begins with communication between developer and customer/user in which user define its need and overall objectives of software. Until the needs of customer are satisfied, the iterations keep on occurring while at the same time it enables the developer to better understand what needs to be done. Thus, requirements do not freeze.

- **Spiral Model**

  Spiral model is a risk analysis model that follows incremental process for development. The goal of spiral model is to provide a framework that is required for design which is guided by risk levels in project. In spiral model, software development takes place as series of evolutionary release. There are 4 phases of spiral model. First one is planning then risk analysis then comes engineering and last one is evaluation. A software project is passed through iterations called spirals. In risk analysis phase

indentifies risk and find alternative solution. Engineering produces software with testing and evaluation deals with customer to evaluate output before next spiral.

After these models agile methodology came into existence which is generally an extension to iterative approach to build applications in a nimble fashion with a light weight process. The iterations in agile methodology are coupled with the short feedback loops to accommodate the changes quickly and appropriately guide the project forward. Extreme programming and scrum are two of the agile software development methodologies

- **Extreme Programming**

  Extreme programming is deals with the delivering as well as developing very small increments of functionality relying on improvement constant code along with user involvement in development team and also pair-wise programming. Extreme programming is incremental planning, small releases, have feature of on-site customer and continuous integration. Also extreme programming is software development discipline that organizes people to organize high quality software more efficiently.

1.5 Clustering

Cluster examination or clustering is the exercise that groups a set of objects in such a manner that the entity in the same group called as a cluster are more comparable or similar to each other than to those in different groups (clusters). It is a primary task of exploratory data mining, and a typical terminology for statistical data investigation, utilized as a part of many fields, involving machine learning, design recognition, picture examination, information retrieval, bioinformatics, data compression, and computer graphics [2].

Cluster investigation itself is not one particular algorithm, but rather the general task to be solved. It can be accomplished by different algorithms that vary essentially in their notion of what constitutes a cluster and how to productively discover them. Mainstream notions of clusters incorporate groups with little distances among the cluster members, thick areas of the data space, interims or specific statistical distributions. Clustering can in this manner be formulated as a multi-objective enhancement issue. The appropriate clustering algorithm and parameter settings (counting qualities, for example, the distance function to utilize, a density threshold or the quantity of expected clusters) rely on upon the individual data set and intended utilization of the results. Cluster examination all things considered is

not an automatic task, but rather an iterative procedure of knowledge discovery or intelligent multi-objective improvement that includes trial and failure. It is frequently important to modify data preprocessing and model parameters until the result accomplishes the desired properties [3].

Various types of clusters are

- Well separated clusters
- Prototype-Based clusters
- Density-Based clusters
- Graph Based clusters
- Shared Property clusters

1.6 Classification

Classification predicts a specific result based on the given input and keeping in mind the end goal for predicting the result. The algorithm results in forming a preparation set that contains a set of attributes and the respective result, ordinarily called goal or prediction attribute. The algorithm tries to find relationships among the attributes which will make it conceivable for predicting the result. After that the algorithm is given a data set that has not seen some time recently and called as prediction set in which the same set of attributes is contained except for the prophecy attribute that are not yet known. The algorithm investigations the input and produces a prophecy and its accuracy is defining how "good" the algorithm is.

The supervised learning is a method based on the classified data generated from a set of data which has the exact classes known before. There are various scenarios that involve the classification mechanism. For instance, the assignment of lesser information related to financial and other personal data and various treatments for diseases which might help in providing first aid. There are various decision problems arising in day to day lives with the growth in technology. The tree main categories involved within this technology are statistical, machine learning and neural network. There are various goals as per the technologies. There are various procedures developed by each of this technology for handling different issues and further be utilized in various practical applications [7].

- **Statistical Procedure Based Approach**

The statistical classification involves two main phases of this process which are the classical and the modern phase. The early work on linear discrimination is enhanced within the classical phase. The flexibility of the classes of models is higher in the case of modern phase. The estimation related to the features having joint distribution is done for each class which also defines the classification rule within the system. A precise fundamental probability model is utilized for categorization of the statistical procedures. This gives a probability through which the classification is not only limited and is provided within each class available. Various statisticians utilize the techniques and so the humans are also involved here which provide choosing a variable and transformation which further provides issues for the structuring problem of the complete system.[8]

- **Machine Learning Based Approach**

On the basis of logical or binary operations, the automatic computing procedures are involved within the machine learning process. These steps include learning of various tasks with the help of some sets of examples related to previous work. The main focus here is on the decision tree approaches which provide a sequence of steps for classification. With the help of very specific data involved, this type of classification method helps in providing a proper representation of the complex issues as well. There are techniques that are still being enhanced such as the genetic algorithms and the ILP techniques. The dealing with more genuine data types which include various types of attributes is the objective here. The classifying expressions that are very easy to be understood by humans are classified within the machine learning techniques. The development process might include the statistical approaches within the background. However, there is no human involvement within this operation. [8]

- **Neural Network**

There is a wide range of diversity of sources which include the understanding and emulation of human brain along with the broader issues related to copying the human properties such as speech in the Neural Network field. Various other fields, such as banks, medical, news, etc. are also involved in this technique which can classify their data as an intrusive or normal. There are various interconnected nodes present within the

neural networks in which each node is producing a function which is non-linear from the input provided. The input data or the other nodes are present which provide such input data to the other nodes. The output of the network is also held by some other nodes present within the network. The recognition of various patterns as well as making decisions related to them are involved within the complete applications to which the neural networks are applied. There are various tools and output units which are utilized for modifying the controls of the plane in an appropriate manner within the autopilot modes of airplanes. This is all done with the help of neural networks. The quality control can also be maintained with the help of these systems. Neural network classifier contains of count of units that are arranged in the form of layers, which is converting an input vector into output and in which each unit is taking an input that is applied on a function that finally passes the output to the next layer [8]

1.6.1 Criteria for Classification

There are huge numbers of data mining applications that are generated only due to the presence of diverse disciplines which are related to data mining. Thus, clear classification systems are to be defined as per the needs. The distinguishing of data mining techniques becomes easy for the user through this and they can choose the perfect system as per their own requirements. Following are some criteria given for classifying data within the data mining systems:

- **Classification according to the kinds of databases mined**

  Different types of databases that are to be mined can help in classifying the data mining systems. As per the various criteria, the classification of each database systems is also done. A different data mining technique is to be utilized for each different database system. Thus, the classification also depends on all such factors. When data models are to be classified for instance, they are done within the categories namely relational, transactional, object-oriented, object relational, or data mining and warehousing applications. As per the various types of data handled, the classification can be done within spatial along with time-series and text multimedia data mining systems or WWW

mining systems. There are also the heterogeneous data mining systems as well as the legacy data mining systems involved within these classification types [9].

- **Classification according to the kinds of know ledge mined**

  As per the knowledge that is mined, the systems are classified within the data mining. The criteria might be on the basis of functionalities like characterization, discrimination, association, classification, clustering, etc. All such characteristics help in determining the different categories. There are multiple as well as integrated data mining functionalities present within the comprehensive data mining system. On the basis of various granularity levels or the level of abstraction of the knowledge that is to be extracted, the data mining systems can be categorized or classified. The categories such as generalized knowledge, primitive-level knowledge or the knowledge at various levels are included within this criterion. At various levels of abstraction, the knowledge is to be discovered in the case of the advanced data mining systems. [9]

- **Classification according to the kinds of techniques utilized**

  As per the employed data mining techniques, the systems of data mining can also be classified and the involvement of degree of user interaction various techniques are to be described within the data mining. Also there are various methods employed within the analysis of data mining which include the visualization, pattern recognition, neural networks, machine learning, etc. An integration of techniques that help in combination of advantages of specific approaches is done with the help of variety of data mining techniques in a sophisticated data mining system [10].

1.6.2 Classification Schemes

- **Decision Tree Induction**

  The process which involves learning decision trees from various classes described training tuples is known as a decision tree classification mechanism. Similar to the tree structures the decision tree design can be seen in the form of a flowchart. Here, a test of specific attribute is represented by an individual internal node. The branch helps in defining the output of the test and the class label is held by the leaf node

There are various merits that are resulted within the systems that use the decision trees within them. The understanding level as well as interpretation of the decision trees is much easier as compared to other techniques. Very less amount of data is required here and the numerical as well as categorical data is also handled easily within this technique. The statistical tests are also helpful in validating the model. The nature of this technique is robust due to which it performs well even in the cases where the assumptions are violated by the true model with the help of which the data is generated. Huge data is processed in very less duration of time with the help of decision trees. Personal computers are utilized for analyzing the huge data within very short range of time such that the stakeholders can make decisions on the basis of such analysis made in the process [11].

The issue which is related to the learning of an optimal type of decision tree is the NP-complete. On the basis of certain heuristic algorithms for instance greedy algorithm the practical decision-tree learning algorithms are generated. Here, at each node the optimal decision are generated locally. The globally optimal decision tree cannot be returned for sure within these algorithms. The data is not generated well in the case of decision tree learners that create over-complex trees. This situation is known as an over fitting situation and to avoid this, the mechanisms such as pruning can be utilized.

- **Nearest Neighbor Classifier**

On the basis of the closest training examples of the feature area the objects are classified in the k-nearest neighbor's algorithm. The regression process also utilizes this method. The simplest method amongst the machine learning algorithms is found to be the k-nearest neighbor algorithm. Various locations and labels of the training samples are utilized for partitioning the space into various regions. Amongst the k nearest training samples, if the most frequent class label is a specific point within the space it is assigned to the class c. For determining the distance metric, the Euclidean distance is utilized which is only applicable in the case of numeric values. Another overlap metric also known as Hamming distance is utilized for the text classification process. During the run time, the data samples are to be present within the memory. Thus, it is known as the memory-based method. The KNN that mainly focuses on weights and as per the distances of the sample data point, the weights are assigned to the training points. The major focus

however, here is on the computational complexity and the memory requirements. There is a reduction in the size as there is only limited memory space available. There are some patterns that are present twice within the space. For maintaining the storage space efficiently, all such repetitive parameters are removed from the memory space of the data set used for training. The results are not affected from certain objects which are also eliminated from this data set similarly. By organizing various systems for improving the memory limitations of KNN approach, the organization of NN training data set can be done. The further categorization of the tree structured as training data amongst the nodes along with other techniques such as NFL. As per the planes, the training data is then divided with the help of appropriate metrics. The speed of the basic KNN approach can also be improved with the help of such algorithms [12].

- **Artificial Neural Network**

There are many such tasks that involve intelligence and are really difficult to automate. They are assumed to be much easy than they actually are. The neural network is the network which learns from the previous experiences and derives new values for which it uses input and semantic weights. The basic architecture consists of three neuron layers i.e. Input layer, the hidden layer and the output layer. The multiple layers help in data processing which can help in the signal flow from input units to the output units with feed forward network. Neural networks training can be done in two different modes. They are the online mode and the batch modes. If same numbers of data presentations are taken, the number of weights for both of them will be completely different from each other. The weights are to be applied to various layers individually. The back propagation method involves applying the weight first from the output layer to the hidden layer. Further this is processed from the hidden layer to the input layer. The rate at which the network adapts is known as learning process. There are multiple processors that are built with the help of the parallel nature of ANN. It also provides higher speed along with the reduction if development cost. Within such minimum time, the huge amount of data is processed with the help of the parallel architecture provided by ANN.

.

CHAPTER 2
REVIEW OF LITERATURE

Janakova(2014) *et,al.* assimilated knowledge about agile technology , scrum and e-learning that, as with increasing trend of information technology, education is also offering modern methods for learning with relation to information technology that is called e-learning which deals with providing effective and interesting education methods for students using computer technology that includes audio lectures, video lectures, online and virtual courses and many other creative methods for making students to learn easily and quickly. The objective of this paper is to merge Scrum with e-learning to reduce the errors in e-learning and information technology. It focuses on teaching the students knowledge and skills needed and reduces the errors using Scrum. Scrum method is used to improve this process of e-learning. This paper presents a method of combination of project education with scrum agile method for implementation of IT that focuses elimination of errors in education sysrem for better knowledge and skills in information technology. Every subtopic concludes with example from practice along with different exercises for individual or student work group. In this paper the proposed model defines these activities in the form of processes and transitions and provides a approach part brings a method that is so transparent for resolving the tasks assigned, for attaining required knowledge and skills. The focus is on organizational work and communication with students, challenges for students along with their teachers and using of information technology practically with adaptation of dynamic changes in information technology and e-learning. [20]

Eduardo Valentin, Jos´e Reginaldo Hughes Carvalho, Raimundo Barreto(2015) *et,al.* discussed in this paper, case study with students as participants of four research groups and 23 SCRUM teams of capital of the state of Amazonas in Brazil. Students and alumni for their recruitment in any company needs hard and soft skills but issues relies more on soft skills than hard skills. Soft skills is the enter barrier to job market. The objective of this research paper **is** to analyze the impact after introducing agile coaching to the alumni and students in higher education. It involves activity aiming to address soft skills in the academic course of students and then analyze the result of introducing scrum as academic task. In this paper for improving the

soft skills of students using scrum, the students have given clear communicated project goals, where students have specific roles, with assigned accountable peers. This activity is in context of PROMOBILE. This result in increase of progress visibility by advisors, the improvement of student's communication and writing skills and qualification on SCRUM software development process tools and documentation. This process of using scrum in improving students soft skills also results in relevant improvement of student's profile. This paper concludes with implementation of SCRUM in students academic course increases their soft skills. The presented work uses SCRUM as the framework to conduct research projects within academic context that describes its applicability to any institution of higher education. [21]

Guillermo Rodríguez, Álvaro Soria, and Marcelo Campo(2016) *et,al.* in this paper present work that introduces agile coaching in the student's software engineering course. Integration of scrum in training and undergraduate courses results in increasing student's technical and non-technical skills. The work introduced in this paper is original Scrum-based training model for enhancing the agile coaching and it is validated by a case study on a capstone project in scrum course which results in maximum coverage of software engineering practices. Also a survey data shows student under training gained more valuable insightation into the internalization of Scrum. The model based on Scrum in this paper explains mapping of the software engineering practices by Capability Maturity Model Integration Framework that explains the support to these practices by Scrum. Students understands visual management strategies for supporting Scrum that includes planning cards for user estimation stories, burn-down charts for assessing team performance and also a chat room for holding Daily meetings of sprint and white boards for organization of user stories in Product backlog and also Sprint Backlog. The result of the proposed work is shown in the table that shows students score in the survey that the students under agile coaching are more able tackle problems then the students who were not under the agile coaching group.[22]

Emam Hossain, Muhammad Ali Babar, Hye-young Paik (2009) *et,al.* presents a systematic review on applying agile practices with Global software development project and Scrum is best agile approach in distributed development projects. In this review, 366 papers are indentified, among which 20 papers are identified relevant to the research on use of scrum in global software development and the data is extracted from these papers for identifying various

challenges of using Scrum in GSD i.e. global software development [23]. This paper also presents how to help many researchers in understanding the obstacles involved in using Scrum for GSD projects and the strategies available for dealing with them. For this purpose this paper presents Scrum method and place Scrum in context of GSD and for collecting the data for research from various database of IEEEXplore, Google Scholar, Elsevier science direct, Springer and AIS eLibrary. And in the end explains various finings from the survey and draw the conclusion. The result of the review provide information that is helpful in understanding the various factors that challenges and may have impact on communication, collaboration and coordination process that restrict the use of scrum practices. This review also indentifies many research challenges that are needed for addressing the future research efforts by agile researchers.[23]

Raoul Vallon, Stefan Strobl, Mario Bernhart, and Thomas Grechenig (2013) *et,al.* discussed that distributed development of software projects for a single organization is an overhead. But if there is a second organization that joins for co-development of project, it increases the complexity to the next level. On this scenario a case study is presented in this paper to understand how to manage two different organizations in distributed environment. This paper presents case study for investigation of agile approach from the perspective of real world project, which involves two unaffiliated IT organizations that collaborates in a distributed development environment and the objective of case study is to find root causes of failure of integration of two different organizations in distributed development environment [24]. In this case study regular scrum process are indentified and evaluated over a period of six-month in which these two IT organizations are collaborated to develop three software products and the two organizations which are developing their own sites, separated by several distance. The research method is divided into three phases that are observation, case analysis and presentation of result. An external observer is hire to participate in scrum meetings, observe the problems and the last phase of presentation and discussion of problems with team members. In observation phase, scrum teams are developed and two-tiered planning process take place in which one sprint is performed by one organization and second sprint is performed by other organization. The sprint review takes place after the joint sprint review of both organizations. The result or evaluation of this case study involves a problem described in detail with root cause analysis and also presents the suggestions that which issue should be handled first. Also the key lesson that is learned after

this case study on two IT organizations is that the whole team members participating in one scrum team should not be distributed in several sites and also each site should have at least one scrum master and one product owner. The result of this case study suggests single-site self-organizing teams formation is better than multi-sites. [24]

Sebastian Hanschke, Jan Ernsting, Herbert Kuchen (2015) *et,al.* In this paper focus is to answer two main questions whether and how agile methods such as scrum can be used to create architecture deliverables. How enterprise architects can collaborate with agile software development teams. This paper is based on expert interviews in a major German consultancy, a railway company and an automotive OEM an integration of the TOGAF i.e. The Open Group Architecture Framework ADM i.e. architecture development method and scrum has been developed and evaluated following the design science research process [25]. Both the questions in this paper are answered using two different procedure models, in which one to be used on TOGAF's enterprise strategic and segment architecture level and other on capability architecture level. On the enterprise strategic level framework architecture is created and its refinement and implementation in vertical cuts through all architecture layers, as proposed by scrum, are enabled. So the TOGAF ADM is split up into four different scrum projects, each of them consist of an Architecture Product Owner, an Architecture Scrum Master and further business, information system and technology architects as team members. The demonstration of the above integration can take several years. Therefore, the demonstration could not be completely carried out, yet. Instead, the solution was presented to the interviewers as well as in several presentation and discussions. Overall, the interviewers considered it promising to apply Scrum to areas to see, whether the integration, especially the collaboration between EA and ASD is going to work in practice. [25]

Michael hicks, Jeffrey S. foster(2010)*et,al.* Author, in this paper works on producing high quality research result for PHD students by merging scrum as a management approach called SCORE to help students to become independent researchers while working in a group. Implementation is based on the idea that instead of fixing a slot for discussions, SCORE will hold 15 minutes STATUS meeting 3 times per week. Whenever there will be need of technical discussion then according to SCORE, students can schedule ON-DEMAND meeting for longer discussions. A survey on 21 PhD students is done, in which 8 students experienced original

research method and 13 students followed SCORE method. The survey results prove SCORE a successful model. As the students who manages their research work according to SCORE get high quality result, more interaction with faculty, Enthusiasm for research.[19]

Thomas reichlmayr(2011) *et,al.* in this paper, Author presents a report on the experience of student teams in a classroom who are developing Android applications using Scrum. He addresses what are the benefits and what are the limitations of adoption of scrum by student project team. The survey is done on students developing 3 different android applications in which one is a training app, a university bus System and a game. According to scrum at the end of each sprint number, story points are created out of these applications, helps to plan and track future release. User stories are considered to be completed when it meets the acceptance criteria that are selected by product owner. This results in continuously producing operational software in small increments. In this survey scrum helps students to produce high quality results by easy identification of work, estimation in case of time, cost and other factors, also planning and tracking of activities and deliverables. The scrum framework is flexible enough for accommodating a variety of software engineering courses and their outcomes and for supporting student teams working on different projects.[14]

Jorden Soderback, Stefan Hrastinki, Lena-Maria Oberg in this paper, author performs survey to examine how distributed scrum can support online collaborative learning along with benefits and outcomings on distributed scrum from a student perspective. For this author performs survey, in which 20 students have taken in a 5 week online course, where they are participating in scrum projects as members in distributed teams. Tools like Visual Studio Online, HipChat, myBalsamiq, PlanninPoker were introduced to them in first week of scrum and in the last four weeks they have participated in a practical software development project and then student's perceptions were captured using well managed and semi-structured interviews. The result indicates that students are satisfied with scrum and they have experienced high degree of flexibility. This transparency in scrum is perceived as a key for open communication and effective collaboration.[15]

Simao filho, Marum, Medeiros,Celso, Gois, Nauber, Albuquerque, Adriano Bessa(2014)*et,al.* in this paper presents the benefits of using scrum methodology in the software

project for which survey on institution of software development department of education through application of certain practices of scrum to software development process is done and author performs the survey that identifies whether the team satisfaction has increased with method utilization and what is the impact of the scrum practices introduced on the team. A grounded theory method is applied along with case study, to identify the relationship between various aspects that is experienced using scrum in this context. From this case study, the result obtained is that, scrum appears as a good choice for small teams for project management as it produced result that is of high quality in case of effectiveness and accuracy. [35]

Satoru kizaki, Yasuyuki tahara(2014) *et,al.* in this paper author discussed the method for improving PBL i.e. (project based learning) which provides an environment that is aims at collaboration of software development education. The method is proposed for dealing and handling with problems such as shortage of communication among the members, the customer and the difference in technical capabilities of members and the burden that is to be placed to individuals. The development process scrum is adopted for solving this problem. Result of adopting scrum is that, scrum is able to perform solution to the problems in which the diversity of members was exploited and improves the relations of team by positive participation in customer's project. The case study results in success of projects in case of greater productivity, adaptability, communication and also improves quality of the final outcome.[25]

Gangjun Yang(2010) *et,al.* When the business of Yangtze River and Pearl River delta in China was blasting, most OEM endeavors were attempting to keep up or for exploitation of market through rapid development and as innovation of customized design. With the design period to be chopped down greatly and keeping in mind that the end goal for improving the design quality on the current circumstance of industrial design in China. This paper proposes the method for agile industrial design, as well as for building the agility model with three major factors of element group, lightweight process, and flexible methods [26]. The method adaption is for the conceptual design process that is filled with uncertainty, particularly in creativity and demand. In light of it, the paper introduces Scrum utilized as a part of software development and breaks down its usability along with industrial design. At long last, agile industrial design management mode according to the view of Scrum is constructed. The problem of rapid response capacity in meeting the quality requirements of customers has tackled. This mode helps

endeavors in improving the scientific management in agile design environment. Because of agile method is emphasizing on the communication of implicit learning and application of flexible method, the controllability and stability of teamwork design that is appearing poor. The rapid design of the various reconstructions and vigor of agile industrial design is the further study task.

Julio Ariel Hurtado Alegrıa(2010) *et,al.* Scrum is a generally known model of agile software process which is particularly designed for controlling non-technical activities in software development. The process of introducing scrum is formally defined in EPF and its adoption is done by a few software companies the world over. In this paper AVISPA, a tool for restricting error patterns in software process models determined with EPF is developed [27]. People are break down in general community specification of Scrum utilizing AVISPA and discoveries are reported .As the Scrum process model is broken down with the AVISPA tool which finds the specification that is broadly utilized by the community has been not entirely defined. This may explain, in any event to some extent, the gap that lies between the expected and the reported performance of Scrum, also AVISPA is applied likewise to analyze software process models that have been defined by Chilean companies. As a major aspect of this work, author in this paper possessed the capacity to prove its helpfulness for process engineers for adapting a method that supports their work mostly when the process evolves. Additionally the capacity is possessed to approve and refine the error patterns that have been initially identified. [27]

Hycinta Andrat(2015) *et,al.* in this paper, author describes that agile processes are generally utilized with the end goal of software project development since they have overcome the limitations faced in traditional software project development and also risk management is a vital part in project development which helps in eliminating the risks prevailing in software project. Despite the fact that risk management is associated with agile approach, still there prevails the scope for improvement [28]. Along these lines the motto of this paper is to investigate agile methodology, Scrum and highlight the degree to which risk is overseen in it and propose a model to overcome its limitations in risk analysis stage. Agile risk management process comprises of different stages which can be utilized to tackle the distinctive risks happening amid project development. Thus, the smarter usage of every one of these phases will lead to a client satisfactory product. Despite the fact that Scrum gives many advantages, certain

risks are not precisely broke down, as the risk pyramid model utilized as a part of risk analysis stage at times may give couple of incorrect risk appraisal results. So to overcome this limitation, agile risk arranges model is proposed as an alternative approach that aids better comprehension of the impact of each identified risk.

Zulkarnain Azham(2011) *et.al*, in this paper, author describes that for the development of software rapidly, nowadays the fast software product delivery is required by development team, so the end goal is to deliver the product speedier, the development teams transforms customary software development lifecycle to agile development method which can empower them towards quick delivery of software adapting to the requirements changing phenomenon [29]. In this situation, a standout amongst the most popular systems in agile development is the Scrum methodology which is criticized in term of its security aspect cycle that is ignoring the security risk management activity, so the current practices propose that security ought to be considered aiming at all stages of the software development life cycle. With a specific end goal to address the issue, this paper is proposing the integration of security principles along with development of phases utilizing scrum and suggests the element of security overabundance that can be utilized as security features analysis and execution in scrum phases. The result of the proposed arrangement will be presented soon after enough data has been collected from different studies, meetings and experiments that are in progress and planned.

Tomohiro Hayata(2011) *et.al*, In this paper, author discuss that Numerous organizations are gradually making up for lost time with adoption of agile practices at working environment, yet they appears to be in battle with choosing the agile practices and blend them into their IT software project development and management. The organizations that have already had their own particular development styles, a large portion of them have adhered to the traditional plan-driven methods, for example, waterfall [30]. The inherent corporate culture opposes the change and delay the abandon that what they are building up for a radical new methodology hampers the process change. In this paper, auditing the current state of agile adoption in business organizations is discussed and it proposes another approach to IT project development and management by blending Scrum, an agile method, into traditional plan-driven project development and management. The management activity that is need in Scrum is discussed along with that the group and meeting composing of Scrum are investigated, the challenges and

benefits of applying Scrum in traditional IT project development and management are broke down that blends the structure which is illustrated and discussed, and the iterative process with Scrum and planned process without Scrum are compared.

Sven Overhage(2012) *et.al,* as agile development methodologies are gaining great interest in research and practice and their presentations are extensively changing traditional working propensities for developers, the long-term acceptance of agile methodologies is turning into a basic achievement figure. However, current reviews primarily examine the early adoption stage of agile methodologies [31]. For exploring the long term acceptance, the paper is presenting a study at a leading insurance agency that introduced Scrum in 2007. By utilization of a qualitative research design and the Diffusion of Innovations Theory as a lens for analysis, in-depth insights into factors are influencing the acceptance of Scrum. Especially, developers felt Scrum to be more compatible to their actual working practices; also they perceived the utilization of Scrum for delivering the numerous relative advantages. Additionally, it is identifying the conceivable barriers for acceptance since developers felt both the complexity of Scrum and the obliged teaching to be higher in examination with traditional development methodologies and by determining interrelations between the factors, it is conceivable for elaborating the acceptance of agile methodologies in more detail.

Damian A. Tamburri(2012) *et.al,* Global software engineering (GSE) is a business procedure for understanding a vocation thought for the development projects which are speedier, through round-the-clock productivity. In any case, GSE is making a volatile as well as shaky process in which numerous actors are associating together against eccentric premises (e.g. cultural or time differences) and on regular basis, produces the unexpected outcomes (e.g. compacting impacts of distance and time) [32]. Up until now, Scrum has been utilizing the extensive embark in global software engineering; however a large number of the problems in Scrum-based GSE could at present beneficial for making use of ad-hoc supporting tools (e.g. information continuity between time zones, cultural differences, developers' awareness, and so forth.). Agile Service Networks (ASNs) are networks that provide service oriented applications called hubs and that collaborate adaptively towards a common goal. ASNs are offering an approach to represent GSE professionals through service-oriented "social" hubs in a "small-world" system much like a Facebook for a particular GSE project. This paper presents an

examination within the two approaches, to be specific Scrum and ASNs, for determining the ASN's possibilities as mechanisms to keep up awareness in GSE.

Merem Elallaoui(2015*)* *et.al*, UML models that are created from user stories can be conflicting, incomplete and incorrect task, which may requires an expertise, effort and time. In this paper, author is discussing an algorithm for the automatic transformation of user stories into sequence diagrams in the Scrum process, which can easily use to generating the test cases [33]. For automatic process of transformation, an algorithm is implemented that will read a text file, which is containing an arrangement of user stories, then it generates a XMI file for every user stories. The Meta models are defined by the approach that includes requirement specification and another inter-requirement traceability for utilizing the mentioned traceability in the application design model. The approach aims to generate an application model conforming to a DSL from the requirements specification. Domain expert or developer can interpret a similar sentence in two distinctive ways, which makes the transformation of user stories into UML diagrams a difficult task to accomplish. This task can also be time devouring, which requires expertise and effort. The resulting XMI file is then transformed as a sequence diagram that utilizes the UML2 tool SDK plug in for Eclipse.

Jeff Sutherland(2007) *et.al,* Agile project management along with Scrum has become the best business operations in companies like Fuji-Xerox, Honda, Canon, and Toyota. Toyota routinely accomplishes four times the productivity and 12 times the producitivity of contenders [34]. Two Agile companies, SirsiDynix and StarSoft Development Laboratories is accomplishing the comparable performance that is developing a Java application with more than 1,000,000 LOC. Amid 2005, is a distributed team of 56 Scrum developers which works in delivering 671,688 lines of production Java code. At 15.3 function points, for every developer/month, the most operative Java project at any point is documented. SirsiDynix are best operations that are similar to those observed on distributed Scrum teams at IDX Systems, not quite the same as those are as promotions of PMBOK, and the practices advocated by the Scrum Alliance. This paper is analyzing and recommending the best practices for disseminated agile teams globally. It is highly unlikely that disseminated outsourced teams utilizes the current Agile Alliance for best practices of circulating work to independent Scrum teams crosswise over geographies and that could accomplish the level of performance accomplished for this situation study. In this way,

SirsiDynix is setting another degree of best operations for distributed and outsourced teams along with a previously demonstrated high level of agile competence.

M.Mahalakshmi(2015) *et.al,* in this paper, author describes that the Internet technologies and communication along with mobile technologies emerges as transcendent paradigm for erudiction of students and these various automation are creating numerous occasion for the learners to explore in the learning landscape [35]. Despite the fact that traditional learning techniques are still popular in India, but the extent for Web based education is positive. It is frequently be convinced that the Web based education is ready for penetrating deep into the educational framework in India in not only distant future but also in global electronic education framework with distinctive subjects, thoughts and diverse sort of talented students and the greatest challenge is communication and tracking the performance of student's. To deal with this challenge, scrum is the essence that is one among the powerful agile methodologies. This paper presents about scrum and scrum backlog with the frequent meeting based on product backlog and also sprint backlog will help in tracking and improving the performance of the learners/students. As scrum gives a greater adaptability with improved quality, also the team co-operation, and greater responsibility for every member participating as a a team and this concept is helping the young generation in learning a lot of proposed concept called electronic collaborative learning environment utilizing scrum which is enhancing powerful self learning, self-motivation for the learners.

Geir K. Hanssen(2016) *et.al,* in this paper, author discuss about various agile methods that have several quality assurance mechanisms which is installed itself in the process and with no expliciting QA role. The team is dealing with quality assurance amid sprints as a major aspect of daily stand-ups, sprint audits and retrospectives. Author in this paper is defining a SafeScrum that is a variation of Scrum with some additional XP strategies which can be utilized for developing safety-critical software and is having the software certified by the IEC 61508 standard. It is imposing a load of supplementary requirements on the process [36]. In a recent industrial case, the quality assurance mechanisms in Scrum is ending up noticeably and insufficiently in such a manner that analysis the standard, consulting an independent assessor and working with the Scrum team for identifying important supplementary tasks for a team-internal QA role to be append to the SafeScrum process. As a major aspect of further work, opportunities

are to be streamlined and culminated in this new role as it is vital for keeping up the efficient SafeScrum process and for meeting the requirements of the IEC61508 standard and the assessors desires. The viable step is adding up a tool support for assisting the QA role and keeping in mind that the end goal is to collect and analyze quality information with less endeavour and with more capacity.

Edgar Caballero (2011) *et.al,* the small venture are getting influenced by the actual global economic crisis and in this situation productivity improvements are required. This paper is presenting an agile methodology in a small venture, as due to global economic crisis; mandatory for organizations to adapt their business approaches for remaining competitive in the market, also for maintaining an indecorous quality and project management in software organizations, the cost invades low quality and canceled projects [37]. Organizations must be improving the aggressiveness through the improvements in productivity while keeping in mind the end goal is to survive in a market weakened by the crisis. At this situation, there is no sufficient delivering a quality product and organizations required a more efficient assets management for assembling more in less time with the same or less cost. So there is need of improving the process for the accomplishment of this goal, however a small organization does not have enough time or assets for investing in it. The organization is expecting for improvement in their projects productivity without compromising the quality and they are deciding to introduce Scrum keeping in mind the end goal is to verify its effectiveness and this paper analysis the efficiency and quality by contrasting the Scrum pilot project and a past similar ordeal based in TSPi.

Thais Cristina (2011) *et.al,* in this paper, author describes that scrum framework in agile methodologies, are invariably more acceptable for Development Software Companies. As the specified companies can't always apply each attributes of the scheme so, this paper is presenting an application of methodologies that is the Verbal Decision Analysis (VDA) framework for generating a rank of the SCRUM characteristics to be applied in an organization and the utilization of agile methodologies for overseeing projects and turning them out to be more popular among the Development Software Companies such as for creating high quality products in less time and spending less on documentation. A particular agile methodology is considered for studying: framework SCRUM [38]. This scheme is applicable in dealing with the developing software's, gathering the management along with input for the team as well as correction of

impediments which are composition of steps and operations to apply. The paper comprises on an application of a poll that gathers experienced Scrum Masters and considers the elicitation of inclinations of a decision creator for making the final rank of alternative, this methodology is selected from VDA framework to be applied for ranking the alternative. The final rank of alternatives is indicating a list of SCRUM practices, from more favored to less favored one, as per the determination producer reply.

Yuan Jia(2012) *et.al,* in this paper, author describes that usability strategies that is introducing software development practices from so long time and in that meantime numerous the teams developing software products have begun to utilize the agile development process with Scrum framework for planning and for organization of their software projects [39]. Author in this paper, explores the usability procedures that are merged amid software development in Scrum projects and the utilized usability procedure as workshop of Scrum projects followed by lo-fi prototyping and the interviews along with meetings with users, all utilized by the greater part of the participators. The procedure that is most often utilized is prototyping of lo-fi that is utilized by the greater part of the participants two to four times every month. All of the usability systems are informal, implying that the methods can be utilized quickly without any much preparation, whereas the formal usability evaluation along the users is a highly ranked procedure by the participants yet not commonly utilized by them. The consequential correlations of the usage among various usability systems in Scrum projects are considered as a novel contribution of this study. On the off chance that IT professionals utilize workshops they will probably utilize personas is an example of these correlations.

CHAPTER 3

PRESENT WORK

3.1 Problem Formulation

Student placement process is one of the most important aspects of any university or college. It requires a proper system for managing the whole placement process for getting accurate and high quality results i.e. for getting maximum number of students to be placed in good companies along with improving the student's knowledge and also analyzing the capacity of each student. As scrum framework is an innovative and iterative approach for getting work done and works on principle of continuous improvement, teamwork and focuses on quick and frequent deliveries provides higher productivity along with adaptability and communication, also high quality results, cooperation among team members and greater responsibility of each member participating in the process, So scrum practices can be applied on placement system for improving the number of students to be placed in companies and also improving the performance of students participating in the placement process.

This results in improvement of placement criteria in terms of accuracy, effectiveness and high quality with increase in number of student placements, also improving student's performance and adaptation of various changes during process. This will also result in improvement of overall placement process of university.

3.2 Objectives of the study

- Collection of placement data based on selection criteria, depending upon which students have been selected for placement process.
- Implement K-Means clustering algorithm, using K-NN classifier for segregation of student's in different categories based on parameters such as ELQ score, quantitative ability, logical ability etc.
- To propose a method based on scrum for applying techniques for sectioning, re-sectioning of students and compare results in terms of accuracy.

3.3 Research Methodology

In this work, data regarding placement of the students based on some criteria on which student's selection is done is being collected. That involves data based on the selection of students without giving any inputs for placements i.e. raw data of final year students who are eligible for placements based on certain criteria. Sectioning of students based on this is done by using k-mean clustering for generating clusters of similar and dissimilar type of data. K-NN classifier is used for classification of data as it is relevant for applying scrum practices i.e. the result one iteration at the end of sprint is used as input in the next iteration in next sprint for generation of final outcome at the end of sprint.

In this work, the existing system will be improved using the K-NN classifier. In the existing system the following steps are followed:-

1. The dataset of students participating in placement process will be taken as input.
2. In the second step, the technique of k-mean clustering is applied which will cluster the similar and dissimilar type of data.
3. In the final step, the technique of SVM classifier will be applied which will classify the similar and dissimilar data into two classes.

In proposed system, the accuracy of existing system is improved by using K-NN classifier and the model based on scrum is proposed as shown in fig 3.1

Pseudo code of proposed technique

Step 1: Input the dataset for the classification

Step 2: Classify (X,y,x)

Here X is the training set, y is the trained set and x is the number of samples

Step 3: for i=1: size of dataset

Calculate Euclidian distance (X(i) X(i+1)

End of for loop

Step 4: Check the number of points which belongs to which class, the maximum points belongs to class will be the final class for the classification

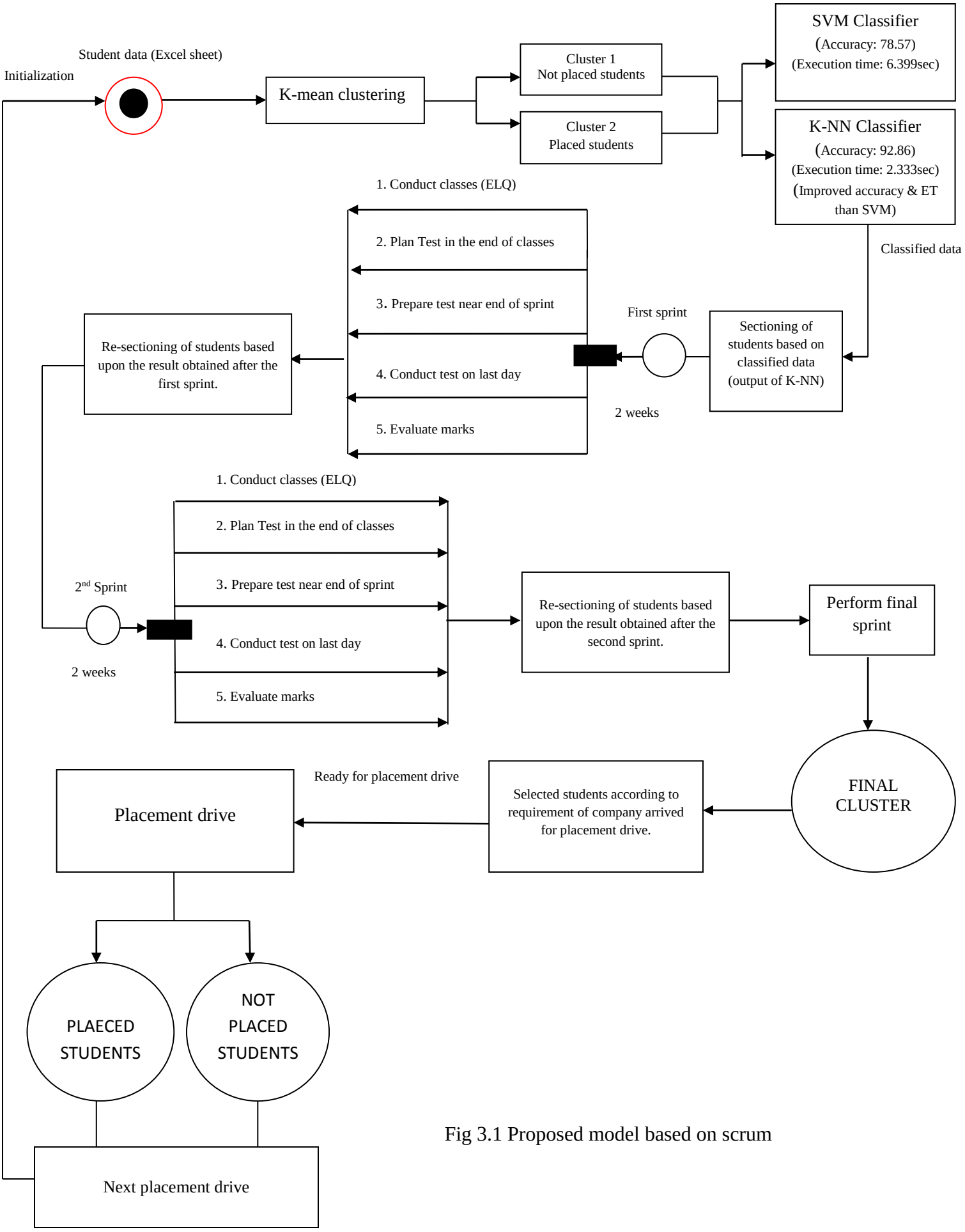

Fig 3.1 Proposed model based on scrum

Proposed Model

A model designed for improving the results of placement process in university/college using SCRUM practices is shown in the figure 3.1. The validity of the defined model is verified by starting the given condition. As the defined model is an iterative model based on practices of agile methodology and scrum framework, the whole process takes place in iterations that results in improving the performance of students after every sprint and the students lacking behind in any parameter are again re-sectioned and provided with the classes for the subjects they are lacking behind in. Student placement process is one of the most important aspects of any university or college. It requires a proper system for managing the whole placement process for getting accurate and high quality results i.e. for getting maximum number of students to be placed in good companies along with improving the student's knowledge and also analyzing the capacity of each student. As scrum framework is an innovative as well as iterative approach for getting work done and works on principle of continuous improvement, teamwork and focuses on quick and frequent deliveries provides higher productivity along with adaptability and communication with high quality results, cooperation among team members and greater responsibility of each member participating in the process.

In defined model, for the purpose of validation of results the placement data of our university i.e. LPU is used. But the model is defined for generalized one. It is applicable and useful for all universities and colleges. As the status and academic growth of any university or college can be judged by the number of students got placed every year in good companies. So there is need of proper management of placement process of university/college for getting high quality results and for getting more and more number of students to be placed in good companies. The most important parameter for selection of student is their academic marks that are considered as CGPA in our university. But companies that arrived for the selection of students for their companies not only require good marks, there are many other important parameters such as good hold of students over ELQ i.e. English , Logic , Quant. Good aptitude of students is general demand of every company. This is one parameter on which if students have good hold, they can easily tackle the placement rounds of the companies. But there is need to add more parameters that will definitely help to improve the skills of students and help them to acquire good knowledge in tackling with the rounds that takes place in placement drives of universities.

The following are the parameters that are required to be added to the existing training classes for the improvement of overall performance of students participating in placement process.

- Communication skills: A good communication skill is demand of each and every company. Every company wants their employees to be preventative. So, if we will add this parameter to the placement classes, provide students with communication skills classes, this will help to build confidence in students to present themselves. It will improve their ability to share their ideas in front of others and this will also improve their:
    - reading skills
    - listening skills
    - writing skills
    - Group discussion

Some students are bunch of knowledge but due to lack of their communication skills they won't be able to express themselves and to prove their points that affect their career. So providing these classes will help all students to tackle these problems.

- HR classes: In some cases, this also happens that student pass all rounds of placement drives, but they won't be able to clear HR round. Along with technical and communication skills, students must be able to answer personal questions like how to introduce themselves, how to tell their strength and weakness but with positive aspects. So classes on how to face the HR interview must be added to the placement process.
- Verbal reasoning: Some companies' requirement is the students must have good hold over verbal reasoning. During placement process, test is conducted to measure the ability of student that how quickly they can assess the verbal logic and extract the correct meaning from complex written information. Adding this parameter to placement classes will improve the hold of students over word analogies and find synonyms/antonyms.
- Coding: In engineering colleges, especially for CSE/IT branch the first preference of company is students who are having good hold over languages such as C, C++, Java etc. Adding this parameter to placement classes will help to get more number of students to be placed in good IT companies.

In addition to ELQ classes, adding in these parameters will help the university/college to improve the placement number of their college along with improvement in skills and knowledge

of students. In case the students are not getting placed, still there is no drawback of adding these parameters to the placement classes it will just improve the performance of students, adding more skills to students resume, nourishes their knowledge and make them more experienced with each placement drive until they got placed.

In the defined model, the process initiates with input the data of students of final year who are participating in the placement process. The data contains the list of students with their CGPA and ELQ (English, Logic, Quant) score along with data regarding placement of the students based on some criteria on which student's selection is done. First step involves the clustering of students based on their status of placement i.e. the number of the students who are placed belongs to one cluster and the students who are not placed belongs to another cluster. K-Mean clustering algorithm is used for clustering the similar and dissimilar clusters of students. After clustering the next step involves classification of the clustered data. The classification is done based on CGPA of the students and their ELQ score. Some of the students who are having CGPA but the inputs i.e. ELQ are not assigned to them belongs to same class than the students who are having CGPA and also inputs ELQ are given to them. SVM classifier classifies the data with CGPA versus ELQ score that represents on graph the students who are placed and who are not placed with their CGPA and ELQ score. But with SVM classifier some data remains unclassified. For improving the accuracy of the results K-NN classifier is used that improves the accuracy of the result.

The final result of K-NN classifier i.e. final classified data is taken as input for the first sprint and the first sprint starts as following described steps:

- Sectioning of students is done based on classified data gathered from output of K-NN classifier.

The first sprint involves the following activities starting from sprint planning. As in scrum, each sprint is time-boxed. So in defined model the time period of single sprint is fixed into 2 weeks. This step is involved as a part of Sprint planning which is an important ceremony of scrum.

- Conduct different classes for different sections.
- Plan the test according to the classes provided to students.
- Prepare the test for each section.

- Conduct test near the end of sprint.
- Evaluate the marks of students and prepare the final result.
- The final result of students i.e. marks obtained by them after providing classes is the result of first sprint.
- After getting the result of students, re-sectioning of students is done according to marks obtained by them.

The output of first sprint i.e. re-sectioning of students acts as input for second sprint and the same steps are followed in the second sprint. Then the output of second sprint act as input for next sprint and the cycle of iterations is carried out until we get a final result i.e. final cluster of students who are ready for the placement drive. Using the defined model based on scrum technology provides a consistent framework for managing the placement process as scrum provides greater productivity along with adaptability and improved quality with greater responsibility of each member who is participating in the placement process. It is flexible enough to adapt the various changes that are occurring during whole process of sectioning and re-sectioning of students according to the classes provided to them and the evaluation of results after classes. The use of scrum is most effective as it completes in multiple iterations and with progress, it apply process improvement initiatives.

The result of last sprint is final cluster, when the company visits the university/college, according to the requirement of the company and the selection criteria of company the eligible students are selected from the output of last sprint i.e. final cluster and those students participate in placement drive of that particular company. After the completion of placement drive, again the result is calculated ad the number of students who got placed and the students who do not get placed in that company. Based on that result again the data is updated according to result of that drive and the cycle begins with the same process as mentioned above.

As the defined model, is an iterative model, so the process continues the same way after every placement drive? This results in improvement of placement criteria in terms of accuracy, effectiveness and high quality with increase in number of student placements, also improving student's performance. This defined method eases the selection of students for placement process along with improvement in overall placement process of university/college.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Experimental Results

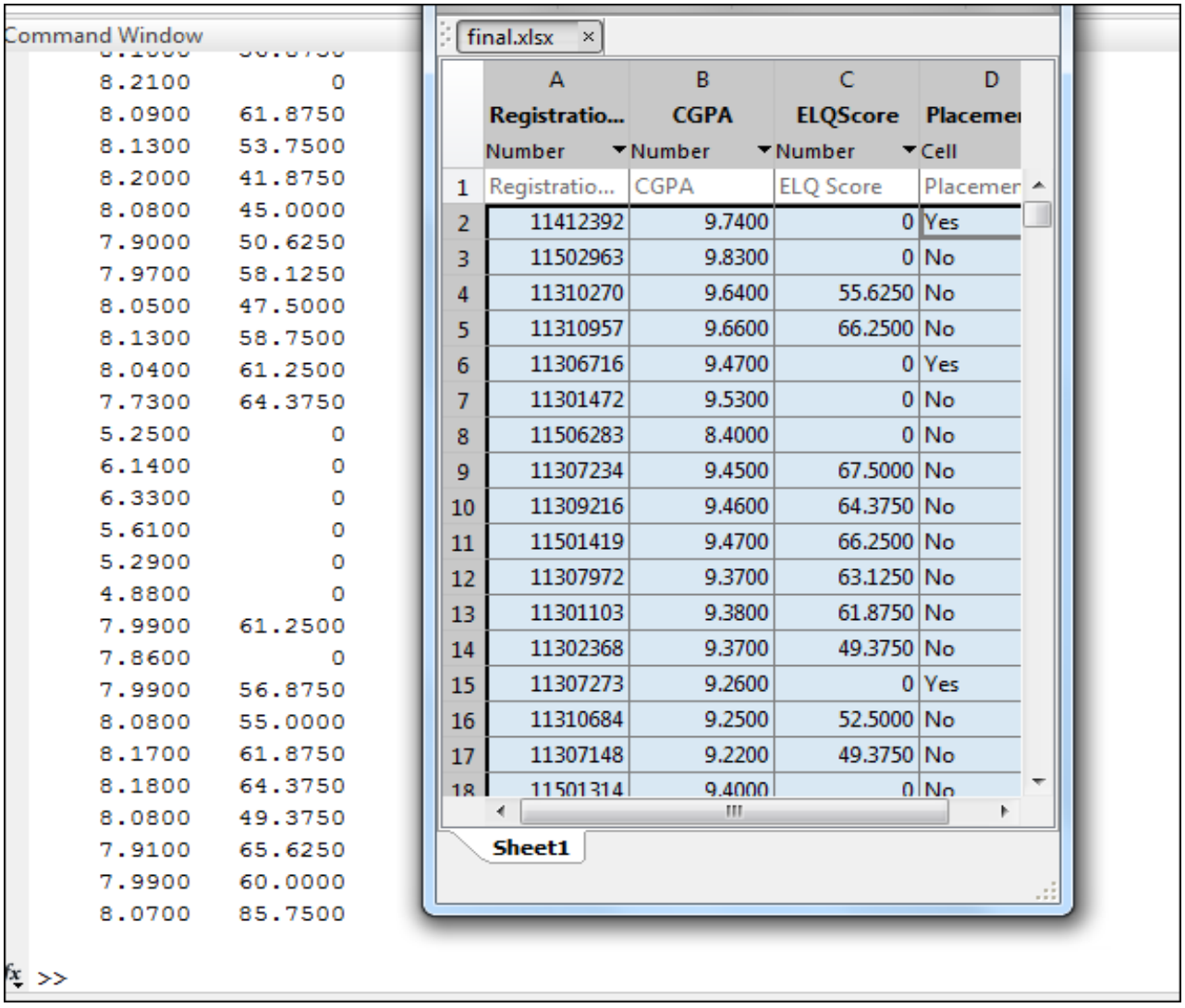

Fig 4.1 Excel file read in MATLAB

In the fig. 4.1 Excel sheet is read in MATLAB and the CGPA and ELQ score are displayed on command window.

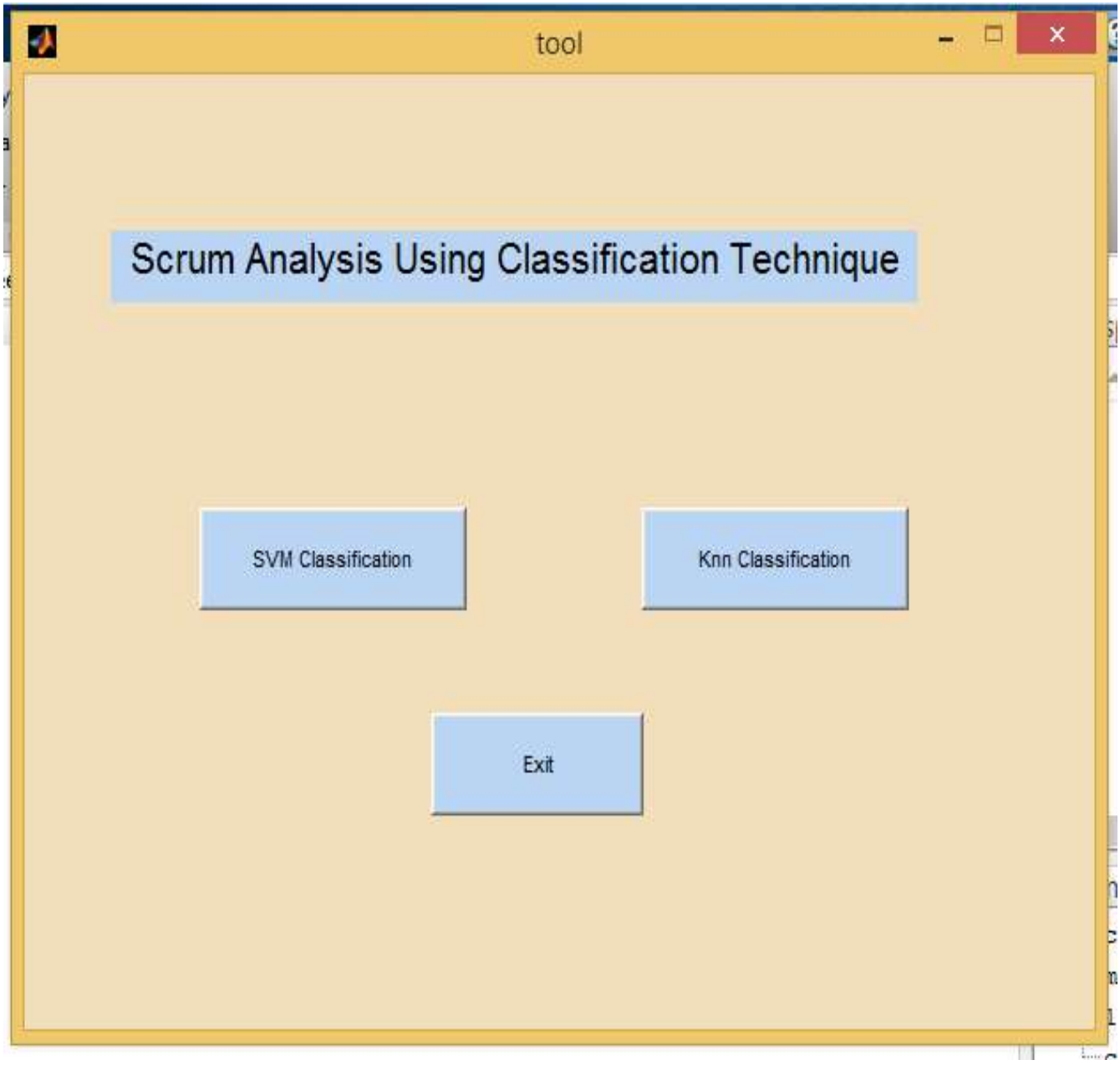

Fig 4.2: Default Interface

As shown in figure 4.2, the default interface is designed which will execute the proposed and existing algorithms for analysis of scrum technique.

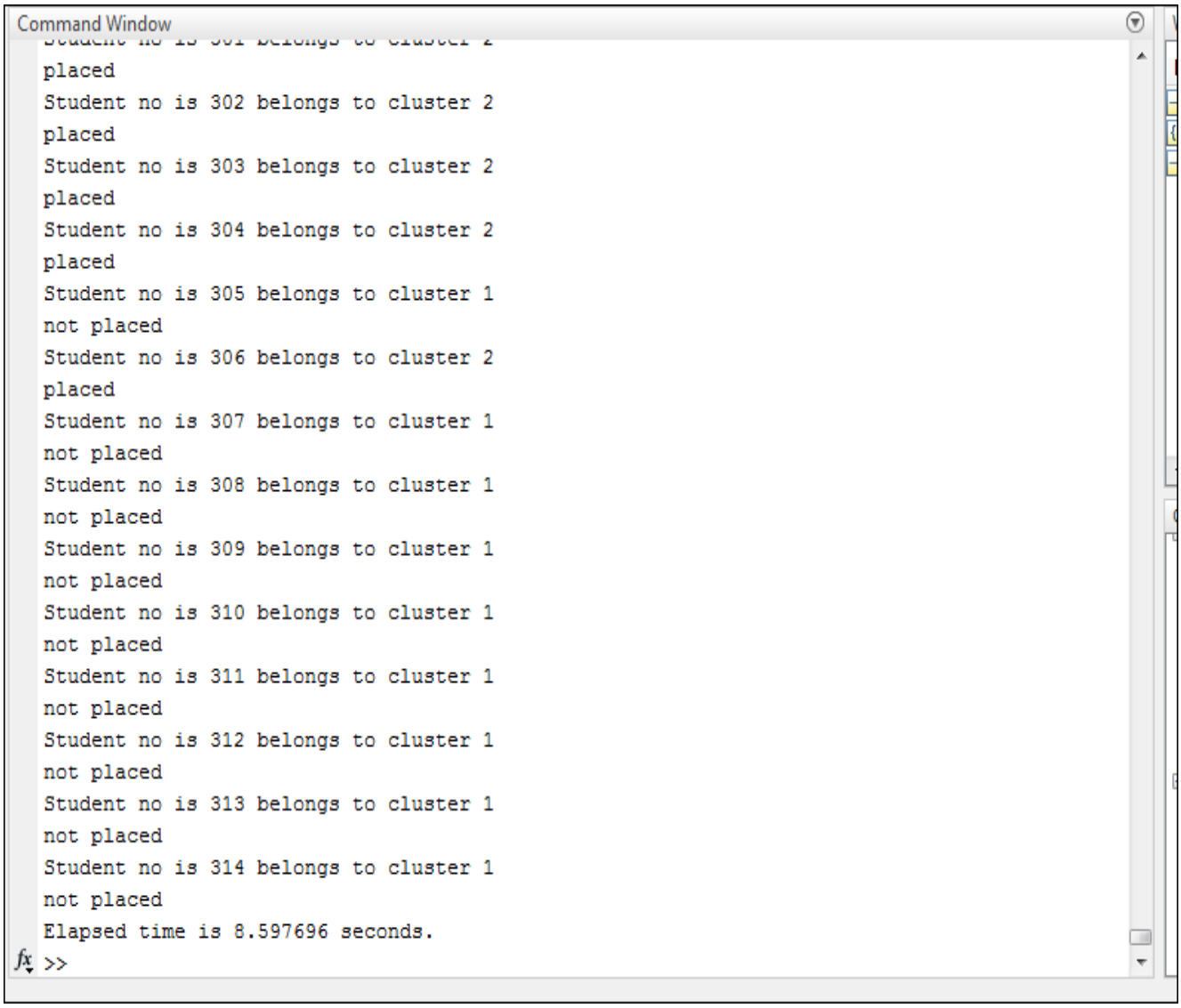

Fig 4.3: Students placement information

As shown in figure 4.3, the technique of k-mean clustering is applied which will cluster the similar and dissimilar type of data. In the shown picture, students who are not placed belongs to cluster 1 and who are placed belongs to cluster 2 and shown in the command window

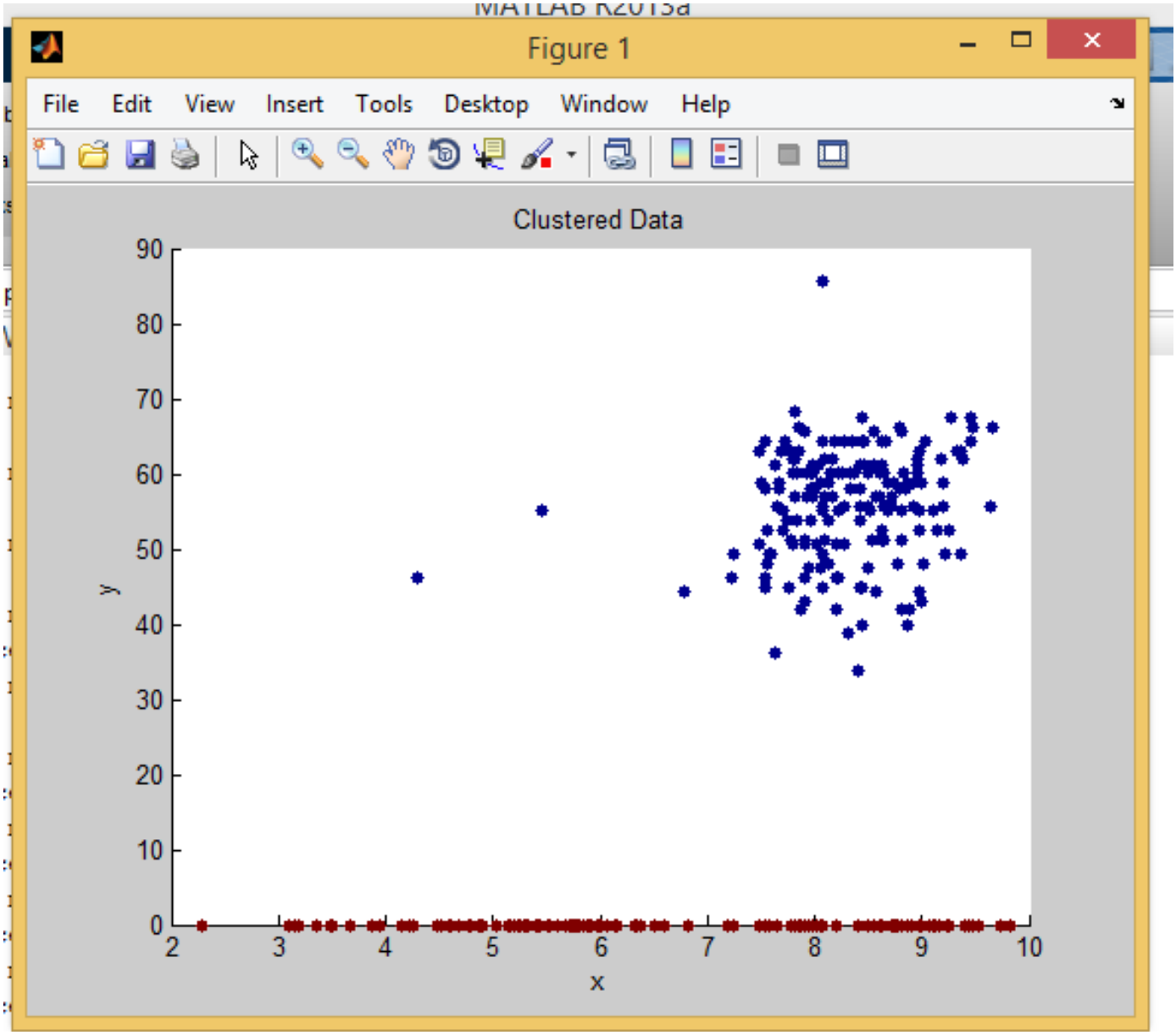

Fig 4.4: Output of K-mean clustering

As shown in figure 4.4, the k-mean clustering is applied which will cluster similar and dissimilar type of data with CGPA score at x-axis and ELQ score at y-axis and the output of the clustering is shown in the figure.

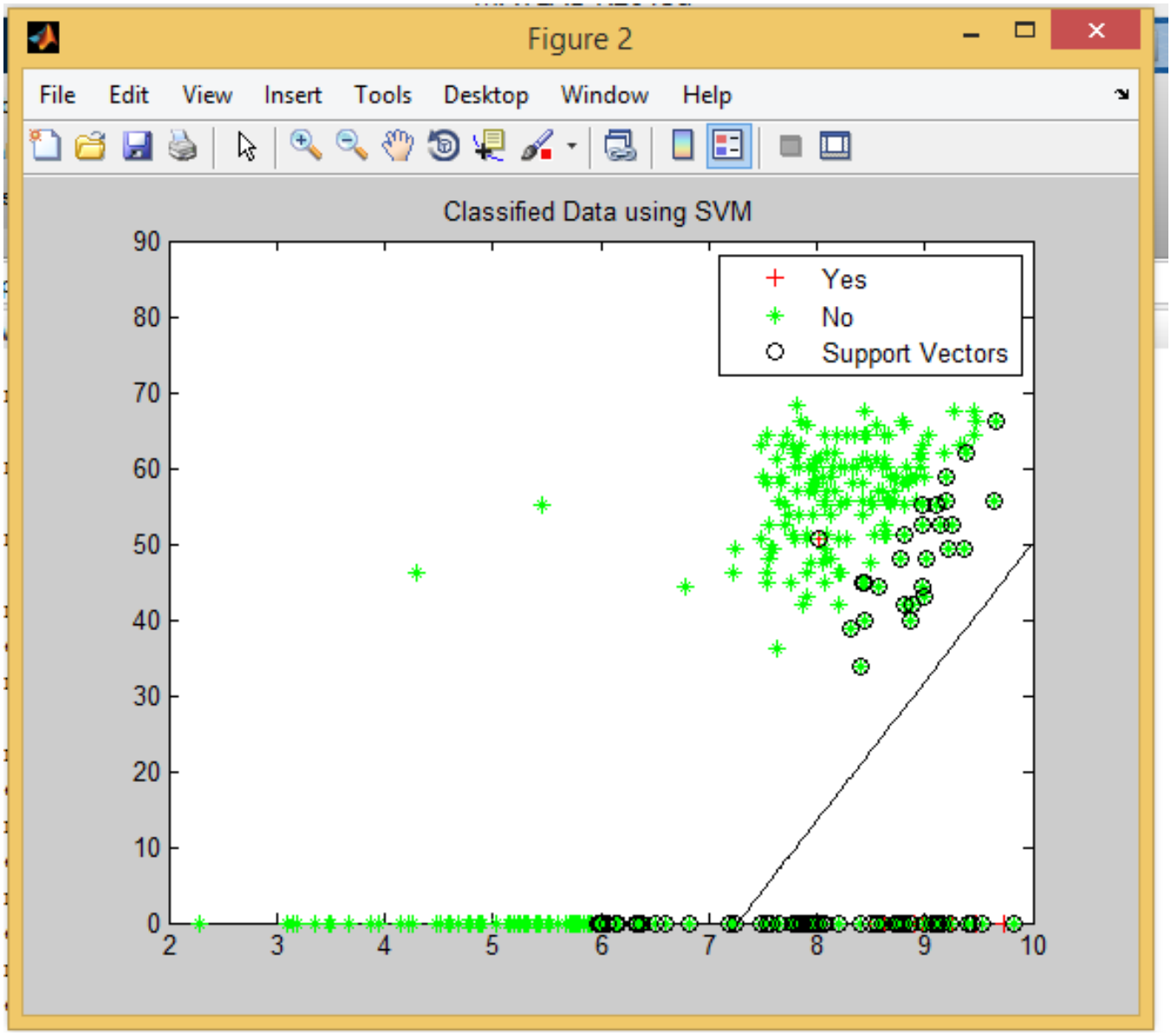

Fig 4.5: SVM classification

As shown in the figure 4.5, the k-mean clustering is applied which will cluster the similar and dissimilar type of data and then technique SVM classification is applied which will classify the similar and dissimilar type of data i.e. placed student belongs to same cluster and not placed to another cluster.

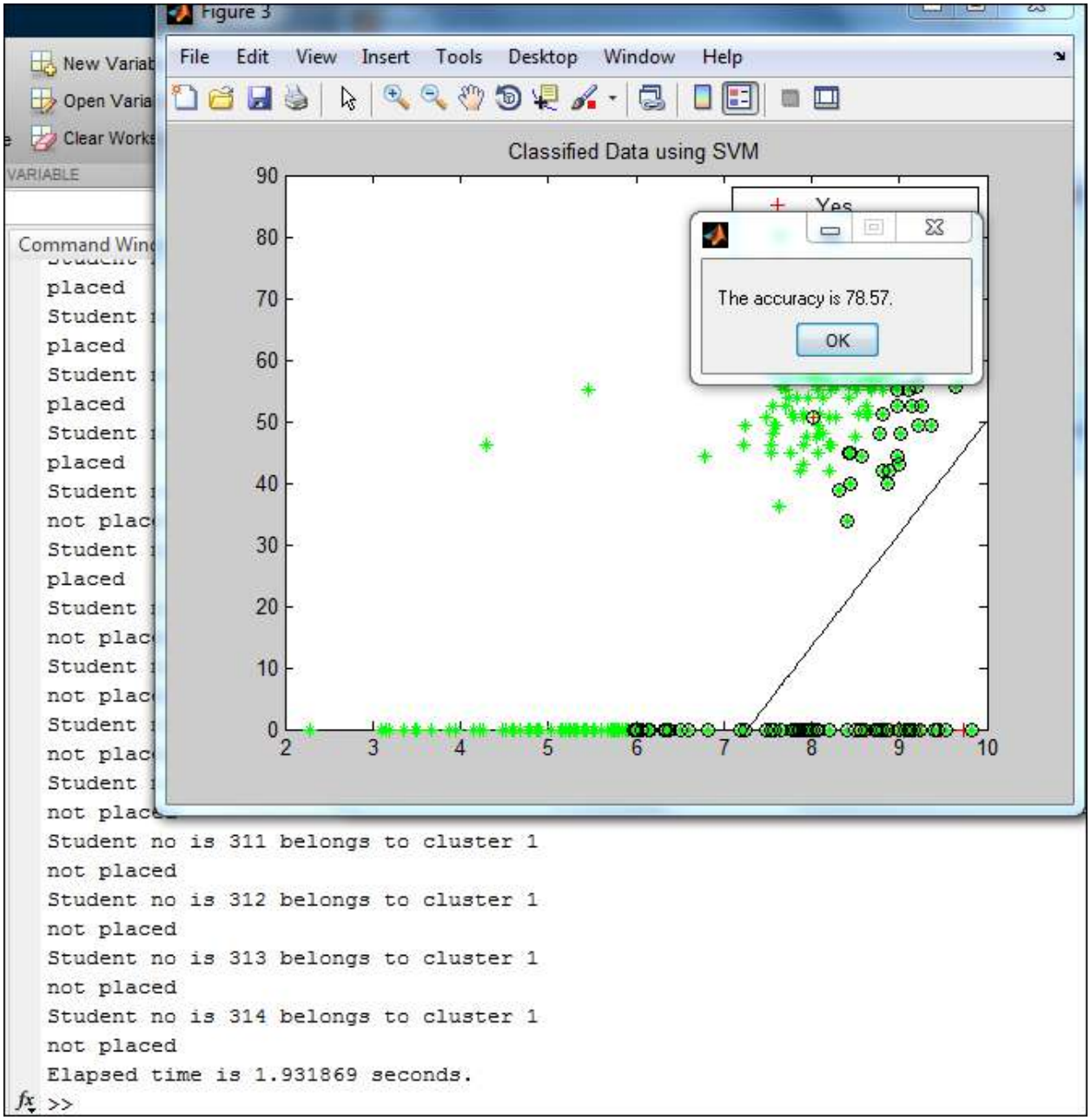

Fig 4.6 Accuracy of SVM classifier

In this figure 4.6, the pop-up box shows the accuracy of SVM classifier which is 78.57.

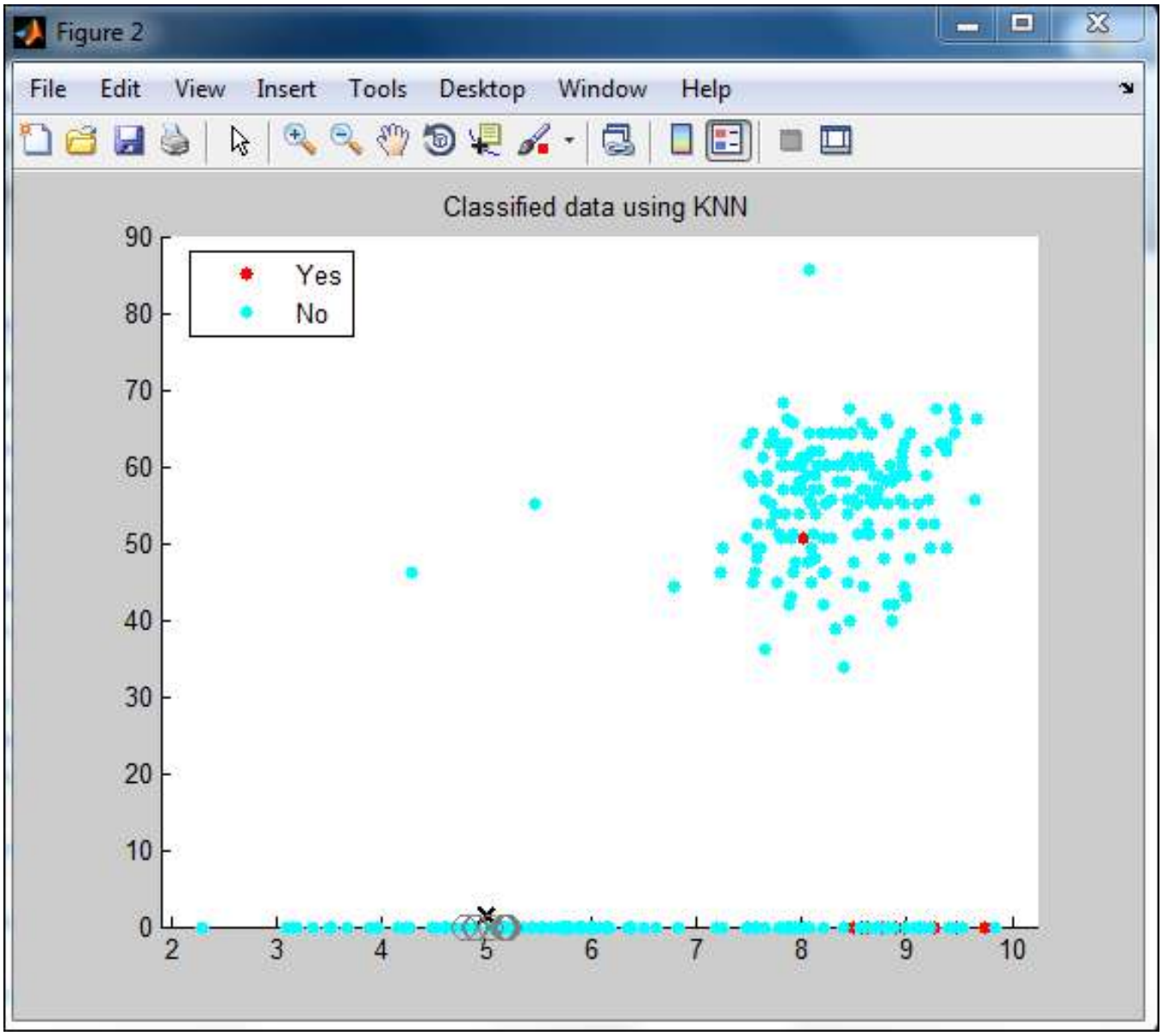

Fig 4.7: K-NN classification

As shown in figure 4.7, the clustered data is taken as input for this step and technique K-NN is applied which will cluster similar and dissimilar type of data. the two different colours shows two different status as shown in figure.

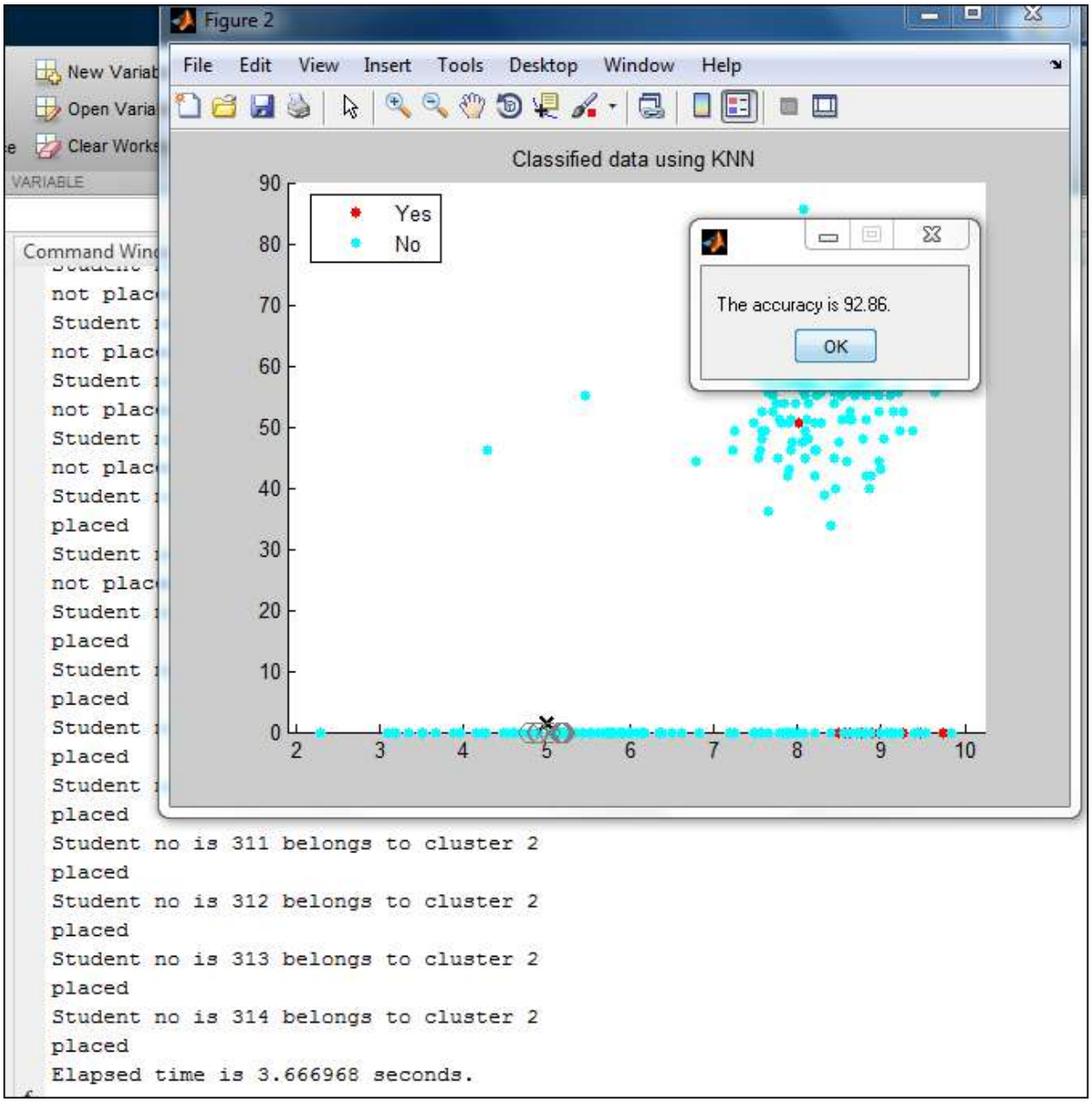

Fig 4.8 Accuracy of K-NN classifier

In this figure 4.8, the pop-up box shows the accuracy of K-NN classifier which is 92.86

4.2 Comparison with Existing Technique

In this work, the existing system will be improved using the K-NN classifier. In the existing system the following steps are followed:-

1. The dataset of students participating in placement process will be taken as input.

2. In the second step, the technique of k-mean clustering is applied which will cluster the similar and dissimilar type of data.

3. In the final step, the technique of SVM classifier will be applied which will classify the similar and dissimilar data into two classes.

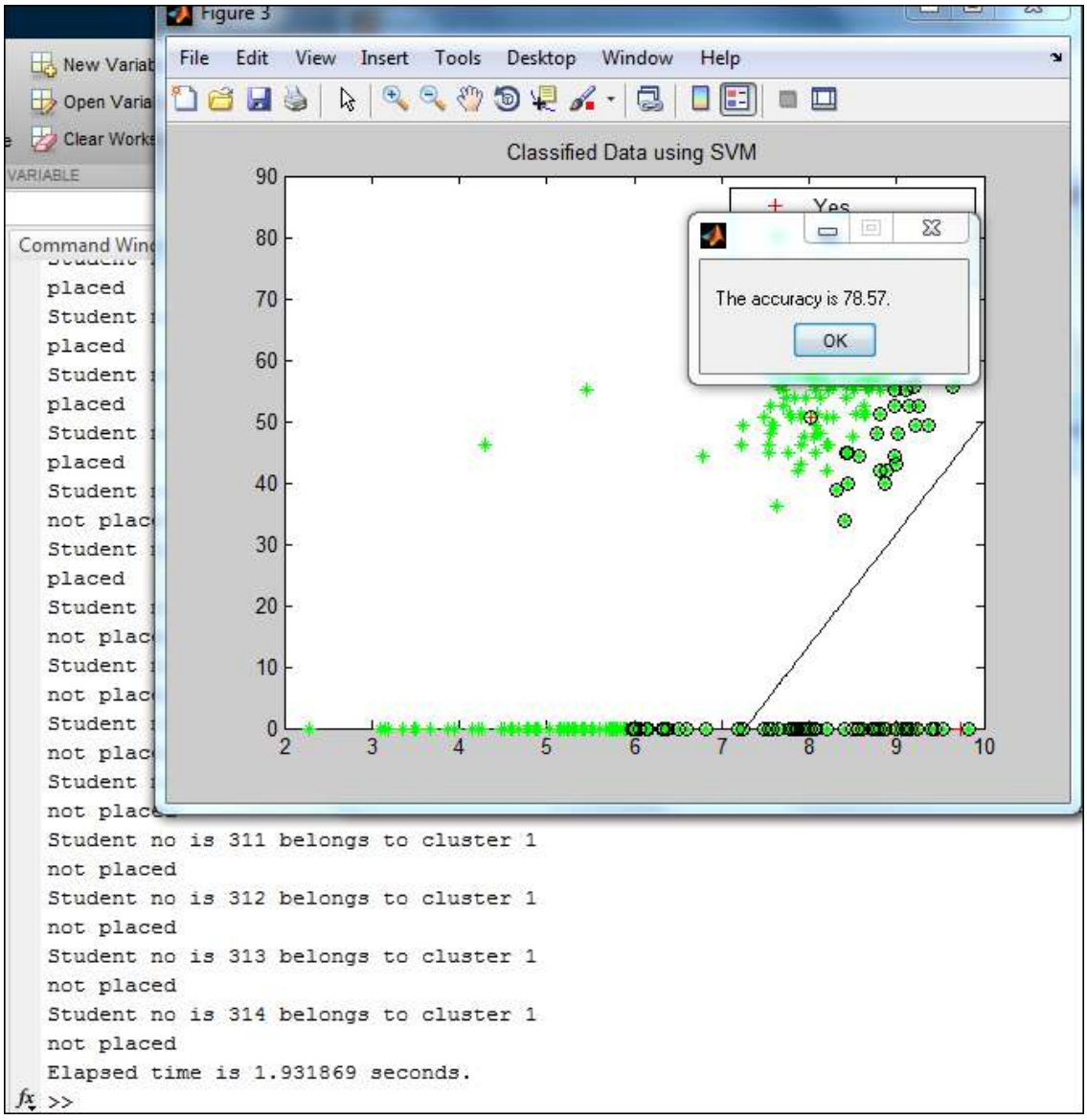

Fig 4.9 Existing system (Accuracy)

In the proposed system the improvement in the existing system will be proposed in which following steps are applied

1. The dataset of students participating in placement process will be taken as input.

2. In the first step, the technique of k-mean clustering will be applied which will cluster the similar and dissimilar type of data

3. In the last step, the technique of K-NN classifier will be applied which will classify the similar and dissimilar type of data

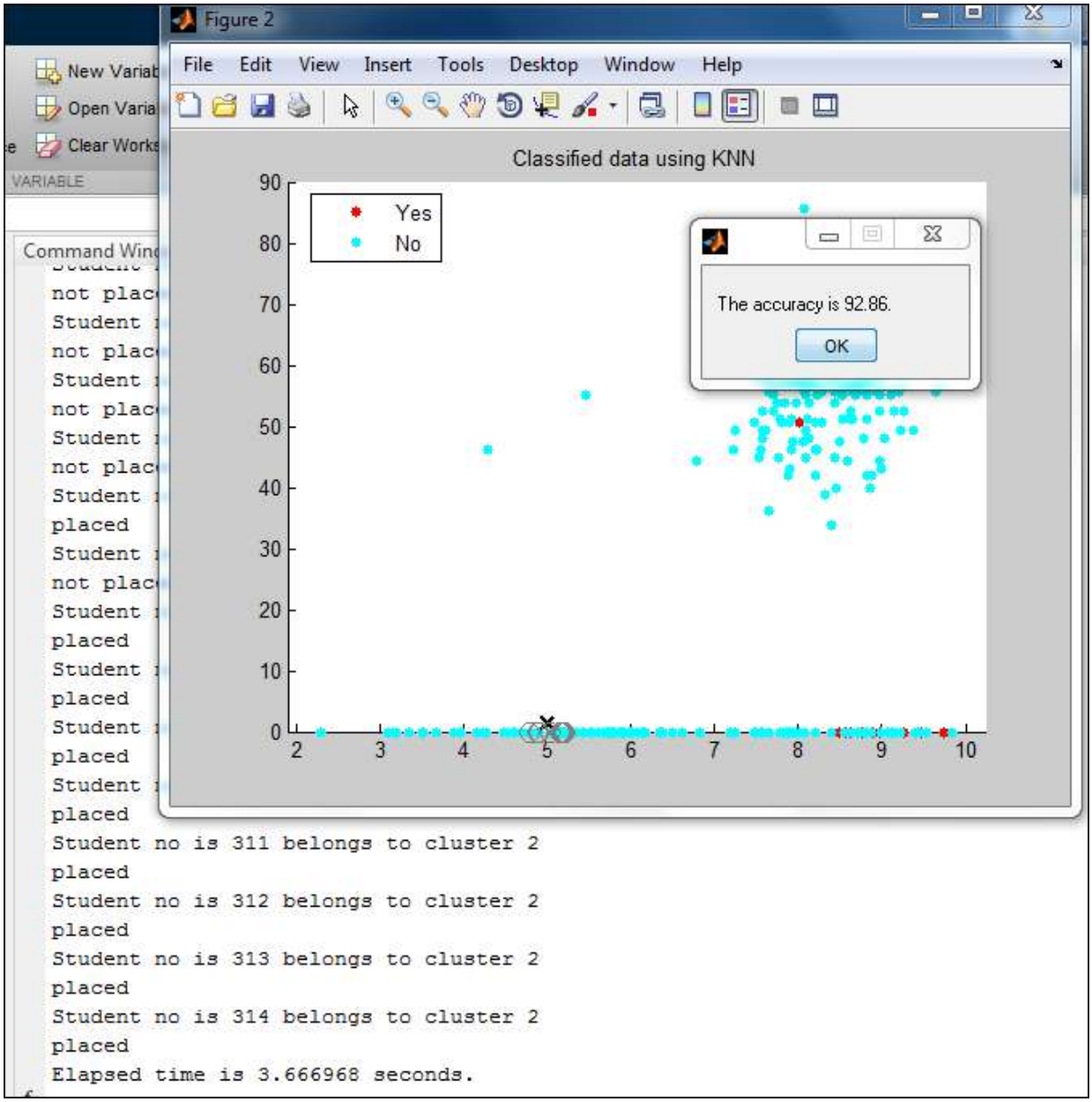

Fig 4.10 Proposed system (Improved accuracy)

CHAPTER 5

CONCLUSION AND FUTURE SCOPE

5.1 Conclusion

Use of scrum technology provides a consistent framework for managing the placement process of the university. Scrum provides greater productivity, adaptability, improves quality, greater responsibility of each member participating in the placement process of the university. The scrum framework is flexible enough to adapt the various changes that are occurring during the selection criteria of the students for placement process. The use of scrum is most effective as it completes in multiple iterations and with progress, it apply process improvement initiatives. Use of scrum technology in education, as the defined model introduces modern techniques in education, along with that Scrum framework offers several opportunities for student exercise different skills by means of well-structured events, roles and artifacts. As it is an iterative model, so with iterations the result keeps on improving along with that it improves the overall placement process of the university/college and also the performance of the students in placement drives and students will always be prepared to tackle any round of placement drive. The classes provided in iterations keep on improving the knowledge and skills of students that benefits the university/college in academic and overall growth.

5.2 Future Scope

The status and academic growth of any university or college can be judged by the number of students getting placed in good companies every year so; the defined model has scope in every university/college. The implementation of the model in the placement process of colleges will help them to acquire their target of getting more number of students to be placed in good companies. The presented work is combination of placement process with Scrum that will introduce a modern method of improvement in education system and this method brings a more transparent method of solving the problems that students faces during placement drive. This iterative model will improve the performance of students, including adding more skills to student's resume, nourishing their knowledge and make them more experienced with each placement drive until they got placed. Scrum framework can be used as a performance tracking tools for student's performance in academics as well as placement classes.

REFERENCES

[1] Sundar.C, M.Chitradevi and Dr.G.Geetharamani," Classification of Cardiotocogram Data using Neural Network based Machine Learning Technique", 2012, International Journal of Computer Applications (0975 – 888) Volume 47– No.14

[2] Smitha .T, V. Sundaram," Comparative Study of Data Mining Algorithms For High Dimensional Data Analysis", 2012, International Journal Of Advances In Engineering & Technology, IJAET ISSN: 2231-1963

[3] K Priya, R. Geetha Ramani and Shomona Gracia Jacob," Data Mining Techniques for Automatic recognition of Carnatic Raga Swaram notes", 2012, International Journal of Computer Applications (0975 – 8887) Volume 52– No.10

[4] Bendi Venkata Ramana, Prof. M.Surendra Prasad Babu2, Prof. N. B. Venkateswarlu," A Critical Study of Selected Classification Algorithms for Liver Disease Diagnosis", 2011, International Journal of Database Management Systems (IJDMS), Vol.3, No.2

[5] Andrew Secker, Matthew N. Davies, Alex A. Freitas, Jon Timmis, Miguel Mendao, Darren R. Flower," An Experimental Comparison of Classification Algorithms for theHierarchical Prediction of Protein Function", 2010, IEEE

[6] Koliastasis C and D.K. Despotis," Rules for Comparing Predictive Data Mining Algorithms by Error Rate", 2004, OPSEARCH, VOL. 41, No. 3, Operational Research Society of India

[7] Matthew N. Anyanwu, Sajjan G. Shiva," Comparative Analysis of Serial Decision Tree Classification Algorithms", 2012, International Journal of Computer Science and Security, (IJCSS) Volume (3): Issue (3) page number 230

[8] Mrs.P.Nancy, R. Geetha Ramani and Shomona Gracia Jacob," A Comparison on Performance of Data Mining Algorithms in Classification of Social Network Data", 2011, International Journal of Computer Applications (0975 – 8887) Volume 32– No.8

[9] P. Bhargavi 1, Dr. S. Jyothi," Soil Classification Using Data Mining Techniques: A Comparative Study", 2011, International Journal of Engineering Trends and Technology- Issue

[10] Aman Kumar Sharma Suruchi Sahni," Comparative Study of Classification Algorithms for Spam Email Data Analysis", 2011, International Journal on Computer Science and Engineering (IJCSE) ISSN:0975-3397 Vol. 3 No. 5, 1890-1895

[11] Thair Nu Phyu," Survey of Classification Techniques in Data Mining", 2009, Proceedings of the International Multi Conference of Engineers and Computer Scientists, Vol IIMECS 2009, March 18 - 20, Hong Kong

[12] Muskan Kukreja, Stephen Albert Johnston and Phillip Stafford," Comparative study of classification algorithms for immunosignaturing data", 2012, BMC Bioinformatics, 13:139

[13] Mahendra Tiwari, Manu Bhai Jha, OmPrakash Yadav," Performance analysis of Data Mining algorithms in Weka", 2012, IOSR Journal of Computer Engineering (IOSRJCE) ISSN: 2278-0661, ISBN: 2278-8727 Volume 6, Issue 3, PP 32-41

[14] A. Miller, "Distributed Agile Development at Microsoft patterns & practices", 2008, Microsoft Patterns & Practices. Redmond, WA, USA

[15] B. Boehm, and R. Turner, "Balancing Agility and Discipline: A Guide for the Perplexed", 2003, Addison-Wesley Professional. Boston, MA, USA,

[16] B. Bruegge, and A. H. Dutoit, "Object-Oriented Software Engineering: using UML", 2009, Pattern, and Java, Pearson Education, Inc. Upper Saddle River, NJ, USA

[17] K. Schwaber, "The Enterprise and Serum," 2007, Microsoft Press, Redmond, Washington, USA

[18] K. Beck, "Tools for Agility white paper," 2008, Three Rivers Institute

[19] K. Schwabe, "Agile Project Management with Serum (Microsoft Professional)", 2004, Seattle: Microsoft Press, USA

[20] Janakova, M.," Errors in E-learning: The key is global approach for optimal education", 2014 International Conference on Education Technologies and Computers, ICETC 2014, 61–66

[21] Valentin, E., Carvalho, H., & Barreto, R.," Rapid Improvement of Students ' Soft-skills Based on an Agile-process Approach.", 2015, IEEE

[22] Rodriguez, G., Soria, A., & Campo, M.," Measuring the Impact of Agile Coaching on Students' Performance", (2016) IEEE Transactions on Education, 1–8

[23] Hossain, E., Babar, M. A., & Paik, H.," Using Scrum in Global Software Development: A Systematic Literature Review", Global Software Engineering. ICGSE 2009, Fourth IEEE International Conference on, 175–184

[24] Vallon, R., Strobl, S., Bernhart, M., & Grechenig, T.," Inter-organizational Co-development with Scrum : Experiences and Lessons Learned from a Distributed Corporate Development Environment", 2013, Agile Processes in Software Engineering and Extreme Programming, 150–164.

[25] Hanschke, S., Ernsting, J., Kuchen, H., S., H., J., E., & H., K.," Integrating Agile Software Development and Enterprise Architecture Management", Proceedings of the Annual Hawaii International Conference on System Sciences, 2015-March, 4099–4108

[26] Gangjun Yang, Suihuai Yu, Guoding Chen, lianjie Chu, "Agile industrial design management based on Serum", 2010, IEEE

[27] Julio Ariel Hurtado Alegrıa, Maria Cecilia Bastarrica, Alexandre Bergel," Analyzing the Scrum Process Model with AVISPA", 2010, IEEE International Conference of the Chilean Computer Science Society

[28] Hycinta Andrat, Shree Jaswal, "An Alternative Approach for Risk Assessment in Scrum", 2015 Intl. Conference on Computing and Network Communications (CoCoNet)

[29] Zulkarnain Azham, Imran Ghani, Norafida Ithnin, "Security Backlog in Scrum Security Practices", 2011 5th Malaysian Conference in Software Engineering (MySEC)

[30] Tomohiro Hayata, Jianchao Han, "A Hybrid Model for IT Project with Scrum", 2011, IEEE

[31] Sven Overhage, Sebastian Schlauderer, “Investigating the Long-Term Acceptance of Agile Methodologies: An Empirical Study of Developer Perceptions in Scrum Projects”, 2012 45th Hawaii International Conference on System Sciences

[32] Damian A. Tamburri, Ivan S. Razo-Zapata, Hector Fernandez, Cedric Tedeschi, “Simulating Awareness in Global Software Engineering: A Comparative Analysis of Scrum and Agile Service Networks”, 2012, IEEE

[33] Merem Elallaoui, Khalid Nafil, Raja Touahni, “Automatic generation of UML sequence diagrams from user stories in Scrum process”, 2015, IEEE

[34] Jeff Sutherland, Anton Viktorov, Jack Blount, Nikolai Puntikov, “Distributed Scrum: Agile Project Management with Outsourced Development Teams”, 2007, 40th Hawaii International Conference on System Sciences

[35] M. Mahalakshmi, Dr.M.Sundararajan, “Tracking the Student’s Performance in Web-Based Education Using Scrum Methodology”,

[36] Geir K. Hanssen, Børge Haugset, Tor Stålhane, Thor Myklebust, Ingar Kulbrandstad, “Quality Assurance in Scrum Applied to Safety Critical Software”, 2016, LNBIP 251, pp. 92–103

[37] Edgar Caballero, Jose A. Calvo-Manzano, and Tomás San Feliu, “Introducing Scrum in a Very Small Enterprise: A Productivity and Quality Analysis”, 2011, EuroSPI 2011, CCIS 172, pp. 215–224

[38] Thais Cristina, Sampaio Machado, Plácido Rogério Pinheiro, Marcelo Marcony Leal de Lima, and Henrique Farias Landim, “Towards a Verbal Decision Analysis on the Selecting Practices of Framework SCRUM”, 2011, ICICA 2011, LNCS 7030, pp. 585–594

[39] Yuan Jia, Marta Kristin Larusdottir, and Asa Cajander, “The Usage of Usability Techniques in Scrum Projects”, 2012, HCSE, LNCS 7623, pp. 331–341

.