Project Based Learning (PBL) method Demonstration

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DATA MINING

This Data Mining course is a part of the B.Tech (CSE) IV year I semester of the R16 regulation of the JNTUH. Recently the syllabus was redesigned by the University after removing Data Warehousing concepts thereby ensuring that the course content purely caters to the Data Mining core concepts in detail. The following are the course objectives of the course.

COURSE OBJECTIVES:

- To understand the basic concepts of data mining, preprocessing, Association rules and partition algorithms.
- To apply the concepts of Classification and Clustering to solve problems using various datasets.
- To understand and classify Web mining and text mining concepts.
- To be able to apply the appropriate data mining models for the given case studies.

Unit 3 Classification: Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers, Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

The Unit-3 deals with Classification as highlighted in the Course objective 2, wherein the concepts of Classification were explained and discussed not only with the traditional classroom teaching learning methods, mini-projects, case studies and laboratory work but also with a new innovative concept of Project Based Learning which is self-organized. As a part of PBL students were told to choose topics on which they could develop a self learning model which could be beneficial for their peers. A group of students chose *Bayesian Belief Networks* and started to analyze, design and implement the concept through various development tools.

Project Based Learning (PBL) method

PBL goals include

- Learning by Constructivism
- Critical thinking
- Learning by discovery and inquiry learning
- Enable the students to educate themselves.

The principles of this method are:
a) Hide the details
b) Constructivism
c) Let the students act, experiment, help each other, find their way.

In a constructivist learning environment, knowledge is not directly 'transferred' to the students by lectures.Instead, students construct their own knowledge by solving problems assigned by the teacher; these problems require them to apply already known concepts in order to find the solutions. In this framework, the teacher's role is to serve as a guide or facilitator for the students, assisting them in establishing meaningful relations between the concepts they already know and the new concepts presented in the problems.
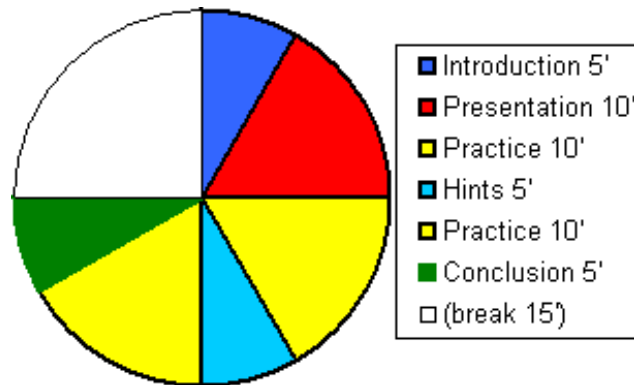

Figure: Applied Constructivism Lecture plan for one academic hour

Project Based Learning in Data Mining for core concepts is of high value for the students, but requires much attention in the organization. In many cases projects ideas suggested by the students turn out to yield exceptional good results. This is probably due to the high level of motivation students tend to have under such circumstances.

Bayesian Belief Networks
- Bayesian belief networks specify joint conditional probability distributions.
- They provide a graphical model of causal relationships, on which learning can be performed.
- Trained Bayesian belief networks can be used for classification.
- A belief network is defined by two components—a *directed acyclic graph and a set of conditional probability tables*.

Bayesian belief networks (also known as **Bayesian networks**, **probabilistic networks**): allow *class conditional independencies* between *subsets* of variables
A (*directed acyclic*) graphical model of causal relationships
- Represents dependency among the variables
- Gives a specification of joint probability distribution

Each arc represents a probabilistic dependence.
If an arc is drawn from a node *Y* to a node *Z, then Y is a **parent or immediate predecessor of Z, and Z is a descendant** of Y.*
Each variable is conditionally independent of its non-descendants in the graph, given its parents.
For example, having lung cancer is influenced by a person's family history of lung cancer, as well as whether or not the person is a smoker.
Note that the variable *PositiveXRay is independent of whether the patient has a family* history of

lung cancer or is a smoker, given that we know the patient has lung cancer. In other words, once we know the outcome of the variable *LungCancer, then the variables FamilyHistory and Smoker do not provide any additional information regarding PositiveXRay.*

The arcs also show that the variable *LungCancer is conditionally independent* of *Emphysema, given its parents, FamilyHistory and Smoker.*
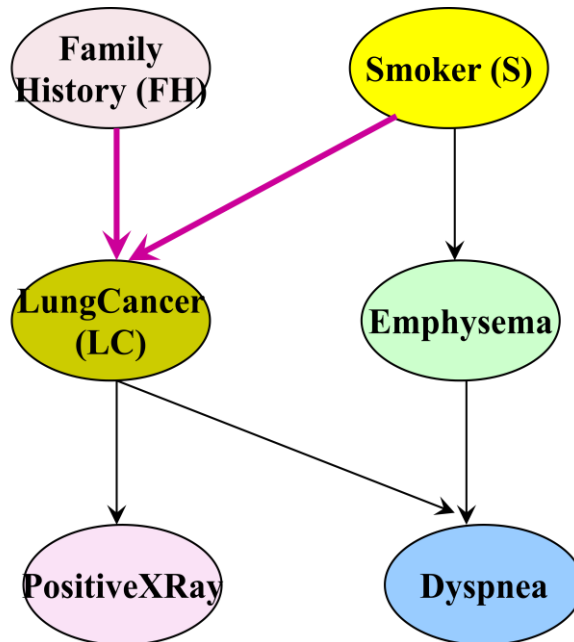
CPT: **Conditional Probability Table** for variable LungCancer shows the conditional probability for each possible combination of its parents

	(FH, S)	(FH, ~S)	(~FH, S)	(~FH, ~S)
LC	0.8	0.5	0.7	0.1
~LC	0.2	0.5	0.3	0.9

The conditional probability table for the values of the variable *LungCancer* (*LC*) showing each possible combination of the values of its parent nodes, *FamilyHistory* (*FH*) and *Smoker* (*S*).

- The conditional probability for each known value of *LungCancer is given for each possible* combination of the values of its parents. For instance, from the upper leftmost and bottom rightmost entries, respectively, we see that
- *P(LungCancer=yes \ FamilyHistory=yes, Smoker = yes) = 0.8*
- *P(LungCancer=no \ FamilyHistory=no, Smoker =no) = 0.9.*

OBJECTIVE

The overall goal of this project is to reduce the rate of smoking among individuals living with this addiction. This goal aligns with the aim of the grant to support projects that focus on improving the competence of healthcare professionals and the performance of healthcare systems so that all smokers can be helped to quit. Our primary objectives are to 1) Help people get rid of the addiction of smoking 2) Motivate them to quit smoking by making them aware of the risks to our health 3) and helping them to lead better lives.

PURPOSE:

The purpose of this document is to build an application which helps the consumers of cigarette to quit smoking and improve their health intended audience and reading.

SUGGESTIONS:

This project is a prototype for the cigarette consumers and it is restricted within the college premises. This has been implemented under the guidance of college professors. This project is useful for the people who are addicted to smoking and desire to quit it.

PROJECT SCOPE:

The purpose of our application is to help people get rid of the addiction of smoking and lead a better and healthier life. We aim to create convenient and easy to use application for the customers. We will have a diary section where the user can write about the moods and emotion she/she experiences during the course. Above all, we hope that our application may be able to help the user quit smoking and lead a safe and healthy life.

WHAT ARE THE HEALTH EFFECTS OF SMOKING?

There's no way around it; smoking is bad for your health. It harms nearly every organ of the body, some that you would not expect. Cigarette smoking causes nearly one in five deaths in the United States. It can also cause many other cancers and health problems. These include:

- Cancers, including lung and oral cancers
- Lung diseases, such as COPD (chronic obstructive pulmonary disease)
- Damage to and thickening of blood vessels, which causes high blood pressure
- Blood clots and stroke

- Vision problems, such as cataracts and macular degeneration (AMD)
- Women who smoke while pregnant have a greater chance of certain pregnancy problems.
- Their babies are also at higher risk of dying of sudden infant death syndrome (SIDS).

Smoking also causes addiction to nicotine, a stimulant drug that is in tobacco. Nicotine addiction makes it much harder for people to quit smoking.

PROPOSED SYSTEM

- In the application, we have developed a facility to the user that he/she can write his/her goal which may motivate them to quit smoking by reminding them of their goals.
- It also shows the number of days in which the goal can be achieved by keeping a check of the money saved.
- We have included motivational quotes which may inspire the user to quit smoking and strengthen his will power.

PROPOSED SYSTEM ADVANTAGES

- User friendly
- Consists of a health tracker
- Accurate record
- Motivational quotes
- Diary for the user to write their emotions
- More secure
- Goal progress tracker

TECHNOLOGIES USED

**Android Studio** is the official integrated development environment (IDE) for Google's Android operating system.

- **Front end** : Xml
- **Back end** : Java

Snapshot is nothing but every moment of the application while running. It gives the clear elaborated view of application. It will be useful for the new user to understand for the future steps.

INTRODUCTION PAGE

The first page of the application welcomes the user and congratulates him/her for deciding to quit smoking and trying to lead their life in a better way. It shows the features of the application to the user.
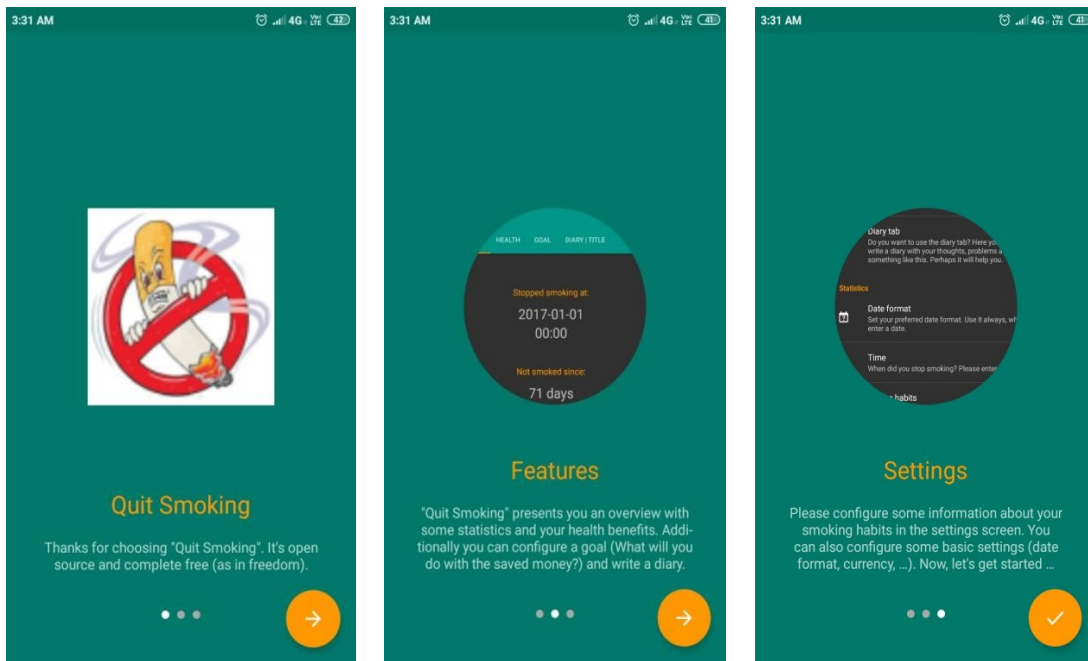
The **copyright page** shows the details of the copyright of the application. It shows the version, developer details, contributors and used resources in the application.
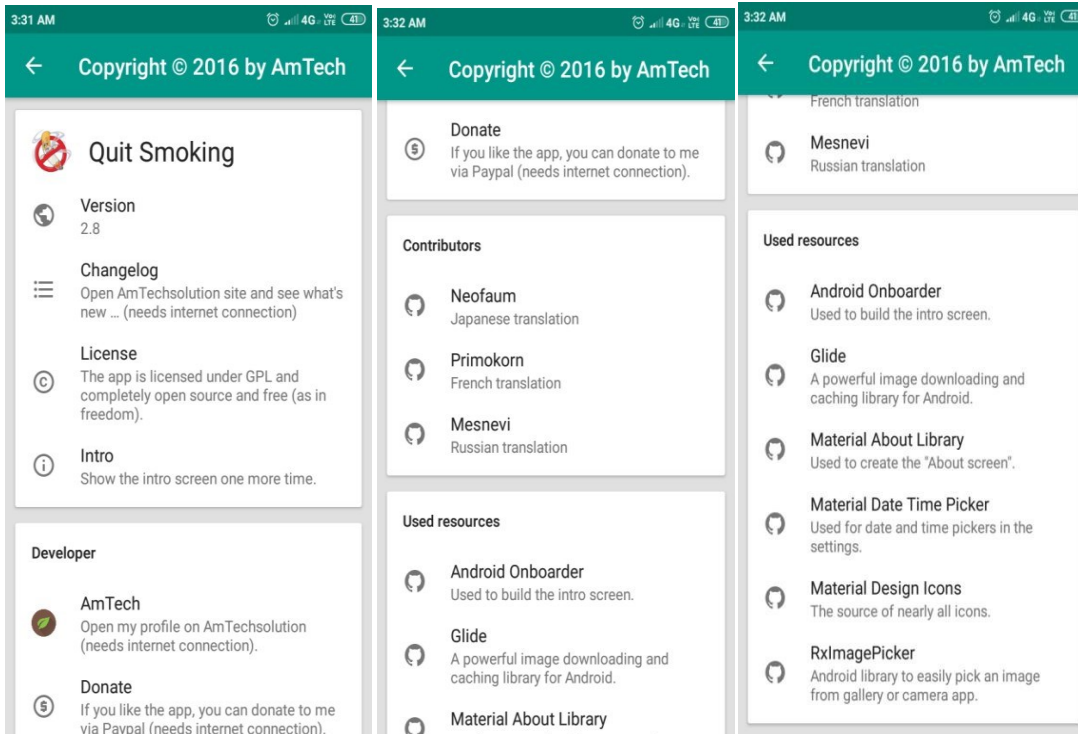
SETTINGS

The settings part of the application consists of all the settings or changes that the user can change according to his or her wish. The user can set the desired date format, timing when he/she has stopped smoking. The smoke habits i.e number of cigarettes smoked per day and the time required to smoke one cigarette are also entered here. The preferred currency can also be set according to the place where the user lives. The cost of one cigarette is also entered so that the application can keep a check of the amount saved. The personal goal of the user is also entered here and we can also set the next goal.

The application info can also be viewed here.
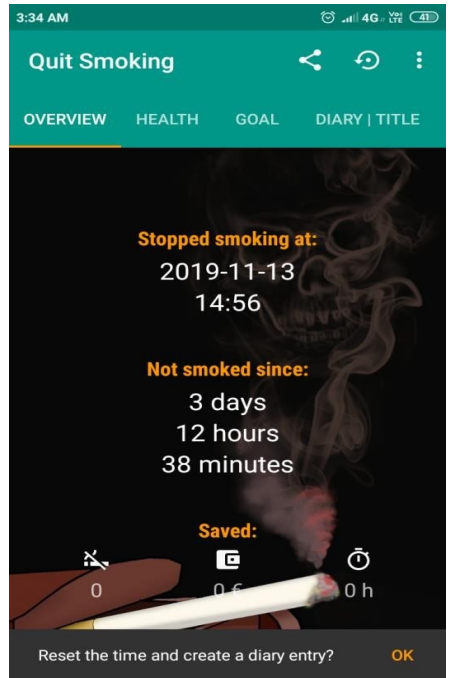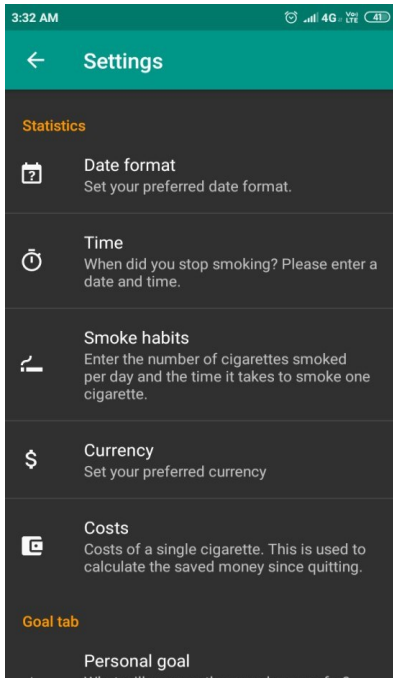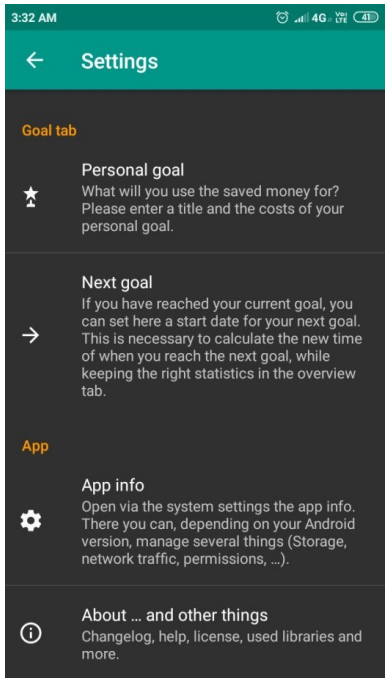
The first fragment i.e overview displays the details of the user. It shows the day when the user has stopped smoking and the updated details of the user every day.

The **health fragment** shows the health details of the user. This keeps a check of the blood pressure, carbon monoxide, heart attack, sense of smell etc. The details get updated as the number of days that the user has not smoked changes.
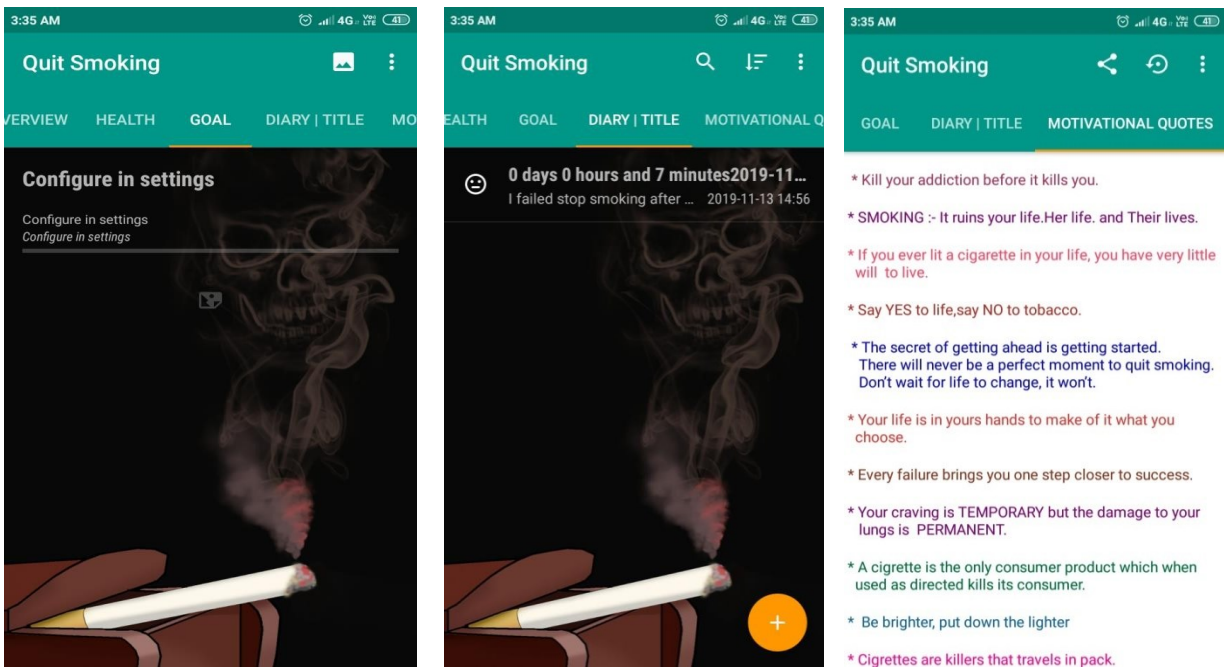
Here the **goals** of the user are set. The user can set more than one goal and the next goal follows up after the completion of the first goal. This also shows the number of days in which the user can achieve his/her goal by keeping a check of the amount of days in which the goal can be completed.

In the **diary fragment** the user can enter the emotions which he/she experiences during the course. This helps the user to see the difference in his/her moods as the course progresses.

In the **motivational fragment** the user can read the motivational quotes which may inspire the user to quit smoking and strengthen his / her will power.
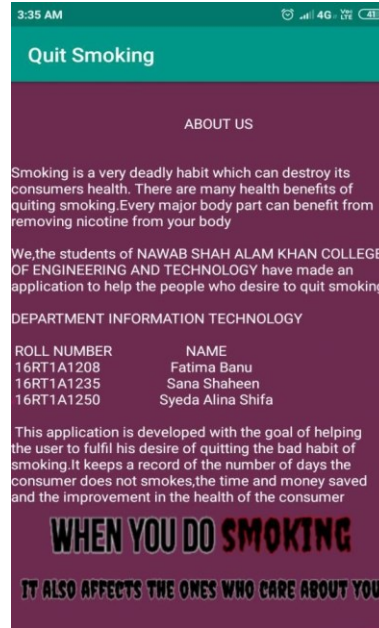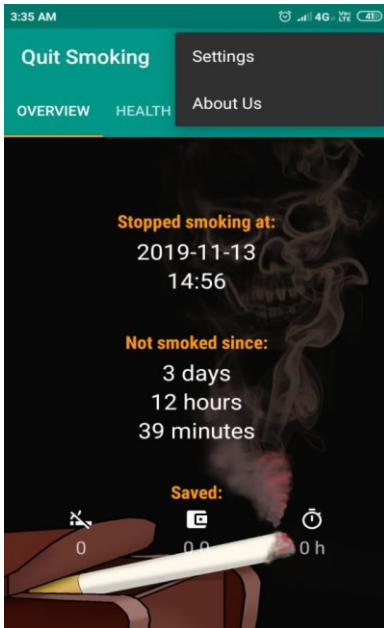
OVERVIEW

The date format for the day when the user has stopped smoking can also be set to international or German style.

Here the user enters his/her smoke details. The details include the number of cigarettesthat the user smokes per day and the time he/she takes to smoke one cigarette.
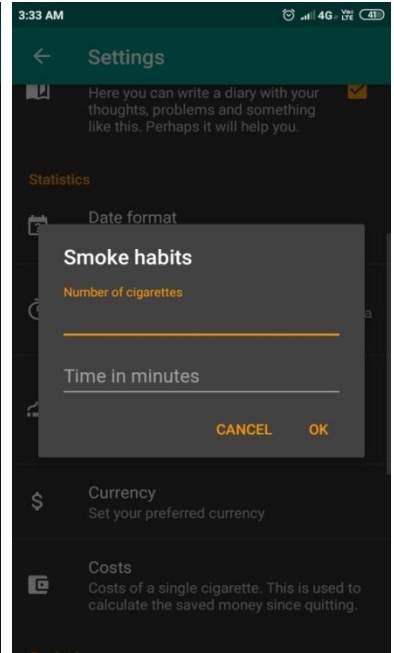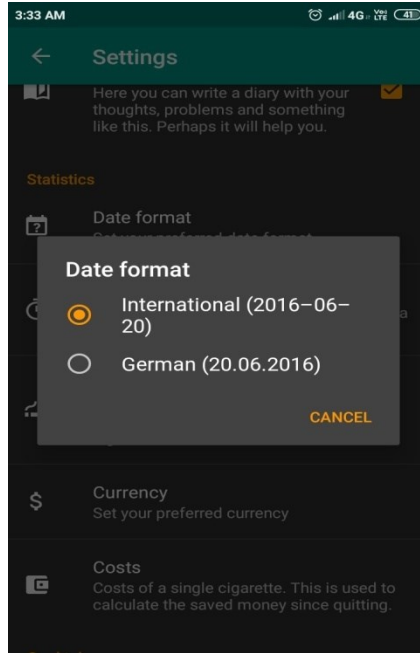
Click on settings

ABOUT US

B. **The works must be available for peer review and critique**
A meeting was conducted with the Departmental Advisory committee (DAC) and staff members for the awareness purpose and as well as for review and critique.

S.No	Name of the Faculty	Designation	Suggestions/Review/Remark	Signature

C. **The work must be reproducible and developed further by other scholars**
This Project based Learning demonstration was helpful for students to gain insight into the subject and it was further carried out **by Mr. Abdul Rawoof to teach DM Lab.**

D. Statement of clear goals, use of appropriate methods, significance of results, effective presentation and reflective critique

Goals:
A Goal of teaching with Project based Learning is that the students are actively engaged in figuring out the principles by abstracting from the examples. This develops their skills in:
- Learning by Constructivism
- Critical thinking
- Learning by discovery and inquiry learning
- Enable the students to educate themselves.

Appropriate Methods: ICT, PPTs Presentation (Seminars), Android Studio, XML.
Significance of Result:
The main objective in mind when teaching this course is to make Classification in Data mining more interesting to students who do not view it so, assuming that greater student interest would lead to better performance in class and deeper understanding and appreciation of the subject.
Introductory project based learning often imparts such basic concepts that it is difficult to design, data mining tasks become simple, challenging and interesting. We feel that our teaching methodology provides all three aspects.
Our interactions in the classroom, along with the average performance of the students in the course, provide encouraging evidence that our approach worked well in these aspects.
Students were able to get good results both in practical and theory

	Practical Exam	Theory semester end Exam
Pass percentage	100%	81%

Effective presentation and Reflective critique:
The objective of the course is providing a core data mining concepts and understanding Classification algorithms which the students can apply to their discipline of study.
Our goal is to involve student actively in using classification concepts in their discipline and seek a unified approach to teach various non-majors.

To evaluate the effectiveness of our approach, during the course we interacted with student personally and took the response about various aspects regarding the course.

Feedback and Result Analysis
A survey was conducted in which students and faculties were asked certain questions.
Questionnaire / Feedback from Students

S.No.	Question No	Questions
1.	Q1	The Project based Learning increased your knowledge and skills in the subject matter.
2.	Q2	The course gave you the confidence to do more advanced work in the subject
3.	Q3	Do you believe that what you are being asked to learn in this course is important
4.	Q4	Overall, this course met your expectations for the quality of the course
5.	Q5	The course was helpful in progress toward my degree
6.	Q6	The instructor's teaching methods were effective.
7.	Q7	The instructor encouraged student participation in class.

Distribution of students' answers (numbers and percentage) provided for the survey's questions

Question No	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q1	1	2	20	15	12
Q2	1	1	25	13	10
Q3	2	2	13	18	15
Q4	1	1	20	15	13
Q5	2	1	25	14	8
Q6	1	2	18	20	9
Q7	1	1	20	15	13

Feedback Analysis
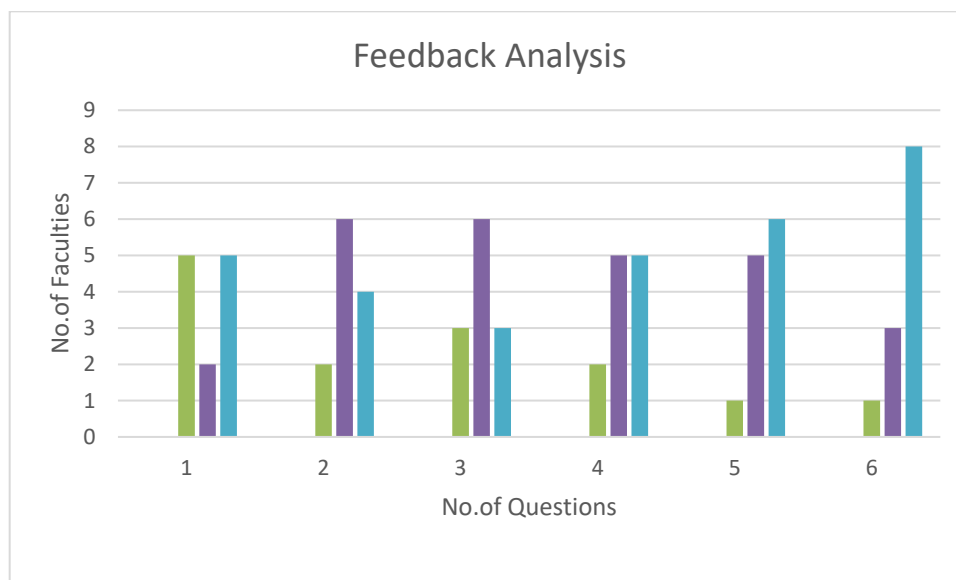
Questionnaire/Feedback from Faculty / Peer Review

S.No	Question No	Questions
1.	Q1	The instructor effectively explained and illustrated the purpose and importance of the course concepts
2.	Q2	The instructor communicated clearly and was easy to understand i.e., teaching methods were effective.
3.	Q3	The instructor effectively organized and facilitated well-run learning activities and was well-prepared for class/discussion sections.
4.	Q4	Did this Innovative practice helped to improve and increase the abilities of students.
5.	Q5	The instructor cared about the students, their progress, and successful course completion.
6.	Q6	I would highly recommend this instructor to other students as it encouraged student participation in class.

Distribution of faculties' answers (numbers and percentage) provided for the survey's questions

Question No	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q1	0	0	5	2	5
Q2	0	0	2	6	4
Q3	0	0	3	6	3
Q4	0	0	2	5	5
Q5	0	0	1	5	6
Q6	0	0	1	3	8