

# Performance Based Adaptive Personalized eLearning System



Swati Shekapore, Dipti D. Patil

**Abstract:** Step by step eLearning is developing pattern in industry. To the extent, learning technique is concerned it has been seen that conventional learning strategy, for example, instructor and learner as well as chalk and duster swings too inventive learning. Because of innovation in technology each one started learning by utilizing web. If learner is asking for particular learning material sometimes they are not getting relevant result. So there is need to acquire certain data of learner. This data incorporates their learning style, foundation learning, Knowledge level, learning interest, age and so forth. This proposed system tends to use retrieve, reuse, revise and retain phases of CBR. For construction of customized eLearning there has been identification of various list of features. In light of list of features there has been task of assignment of priorities according to need of it. Before retrieval process standardization of features set process is carried out. Job of K-nearest neighbour strategy to recognize impeccable k factor for better examination. Because of dynamically incremental dataset this work identifies which classification algorithm has more suitable for the dataset. Eventually eLearning saves time, enhance learning experience and provides academic success.

**Index Terms:** Adaptive learning, Case Based Reasoning, K nearest neighbor, Learning Style

## I. INTRODUCTION

First generation of learning was tutor based system [1], which basically class room teaching. In traditional teaching approach teacher's role was to explain concepts to learners. It required equal participation of students and teachers during learning. Whereas this process comprises dependability of each other. Due to the concept of distance learning second generation web-based E-Learning systems [2] comes into existence where these systems used artificial intelligence techniques to support new functions beyond content presentation. In recent years e-learning is an asynchronous or synchronous accomplishment. Everyone can learn by utilizing their time, what is necessary for them to learn and when it is needed for them to know it. It has a global reach. It can be accessed by people around the world.

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For learning, mobile devices [3] and computers can be used, and so online courses are in the hand of the world and can be used at any time.

It is distributed electronically to thousands instead of offering to in-person preparation. Online Learning results in cost reduction of organization which replace their traditional instructor commanded teaching. Online resources maintain consistency and quality in delivering content. The subject of personalization is carefully identified with the move from an instructor focused point of view of educating to a student focused, competency-arranged one. In opposite to regular e-realizing which will in general treat students as a homogeneous substance, customized e-learning perceives students as a heterogeneous blend of people. A few points that ought to be thought about when choosing [4] to customize an eLearning background include,

Customize the student

Make the course "individual" to the student. Catch his/her name as a feature of the enrolment procedure, as opposed to utilizing a nonexclusive "Understudy An." Ask your students to sign on with their name, and after that utilization the name all through the course.

Customize the environment

Give students a chance to figure out what their web based eLearning situations should resemble. Give understudies a chance to pick symbols to speak to either themselves or their "facilitators." Where conceivable, let the students pick voices (male/female) for audio contents.

Customize the content

At whatever point conceivable, consolidate content from students' close to home condition and mirror students' perusing propensities and inclinations -, for example, Blogs, Social Media destinations or other pertinent content sources.

Customize the path

Cultivate "curiosity" by enabling students to investigate different pieces of the contents, regardless of whether they aren't at present or effectively examining/learning it. This will enable enthusiastic students to investigate fragments they find specifically fascinating - simply like they would do in the event that they were perusing a course book

Customize the media

A few students adapt rapidly on the off chance that they watch a short video, others have to peruse a printed PDF record instead of survey a similar report on the web. Giving decisions, for example, "View", "Tune in" or "Print" will take advantage of every student's individual learning styles and inclinations.

## II. LEARNING MANAGEMENT SYSTEM

The expression 'Learning Management System' shows up every now and again in eLearning articles, tip sheets, and learner's advisers. In that capacity, it's imperative to get a decent grip on what a Learning Management System involves and the advantages it brings. The job of a Learning Management System differs relying upon the association's destinations, web based preparing procedure, and wanted results. In any case, the most widely recognized use for LMS [5] is the software design to send and follow web based preparing activities. Commonly, resources are transferred to the Learning Management System, which makes them effectively open for remote students. At times, the LMS may even have worked in eLearning creating mechanisms that enable you to create internet preparing materials without extra outsider software design.

Think about a Learning Management System as a huge storehouse where you can store and track data. Anybody with a login and secret phrase can get to these web based preparing assets at whatever point and wherever. For self-facilitated Learning Management Systems, clients should likewise have the LMS program design introduced on their hard drive or access to the organization's server. Whatever the establishment choice, the thing to hold up under at the top of the priority list is that LMS clients fall into two classes: First, online students who utilize the Learning Management System to participate in web based instructional classes; second, your eLearning group who depends on the LMS stage to distribute data and update the web based preparing content. For personalized e-learning system, several personalization parameters considered, there were several methods used to provide content as per user preferences to a learner. [6]

## III. ADAPTIVE ELEARING

The term case-based reasoning comprises three words case, experience, and problem. A case is an experience of previously occurred problems which stored in a case based. The representation of cases would do in many ways. A case base is nothing but a collection of represented cases. Stores cases are a primary foundation for reasoning. The reasoning to done in a CBR system is different from an argument in logic and databases. [7] CBR not based on true rulebooks and accurate decisions. Applying CBR is the approximate reasoning. It may happen that the solution in a recorded case was reasonable for its original problem, this would not be the case for a new-fangled problem. This option created on the universal fact that the condition in the noted knowledge may not be accurately the similar as that in the new-fangled problem. The result of reuse of similar case depends on the similarity of previous experience to a new challenge. [8]

Case-based reasoning procedure is as follows:

Retrieve the most analogous case (or cases) by matching the case to the reference library of earlier cases;

Reuse the retrieved case to attempt to resolve the present problem;

Revise and adjust the future solution if needed;

Retain the final explanation as part of a new trial.

For neighborhood formation, case-based reasoning approached used, In general, there are four phases of CBR, retrieve, reuse, revise and retain. We capture student's preferences by firing specific necessary questionnaires, after analyzing it recommend them to view the content. [9]

Learners can use different learning objects for understanding a specific topic. After understanding particular topic learners opt for the test. Whatever test performance and path followed by learner get stored in the case library. This work uses case library data as the training set. Once a new problem exists proposed system follows case-based reasoning steps. We have formulated different cases, and assignment of indexing had done, once new entry exists it get matched by considering similarity vertex and find the nearest case connecting to a new case. [10]

Proposed system works in different steps such as

1. Training dataset and retrieval process
  2. Formation of nearest neighbor and reuse process
  3. Check out test performance for revise process
  4. Simulation of new case for assignment of new index value.
- For above steps there has been loading of dataset in database further splitting of it as per training and testing set. For each record normalized training and testing set values to avoid over-fitting and under-fitting of results. Find nearest neighbor using Euclidean distance measures and predict highest voted value. Based on this highest voted recommendation for learning object provided to learner. [11]

### Retrieval Process

The least difficult calculation is sequential retrieval. It works on records of items and gives a cluster as output. It tends to be seen as a brute force approach for finding the k-nearest neighbors. Below there is a pseudo code representation of the algorithm. For effortlessness assume that closeness estimations of objects are not quite the same as one another.

The information structure is:

```
Types:
Simobj= DBRECORD
Object: object;
Likeness: [0 . . . 1]
END;
SimObjQueue is a COLLECTION [1 ...k] of SimObj;
Factors:
SQ: SimObjQueue
CS: RANGE [1 ...n] of Object
Algorithm:
SQ [1 ...m].similarity:= 0
FOR i: = 1 to n
DO
IF sim(queue, CS[i]) > SQ[m].similarity
THEN insert CS[i] in SQ
RETURN SQ
```

For training dataset different parameters are considered,

Input list = {Problem, Learning style, Knowledge levels, Learning objects, Test performance, Path}

For the calculating total value of the training dataset row, this work consider all the feature values and for the testing dataset and skip feature value want to predict using the algorithm here this work skip

learning object. After this, try to find the nearest neighbour for each test dataset row from the training dataset, after finding the nearest neighbour this work take its feature value and check against the actual feature value of the dataset. [9]

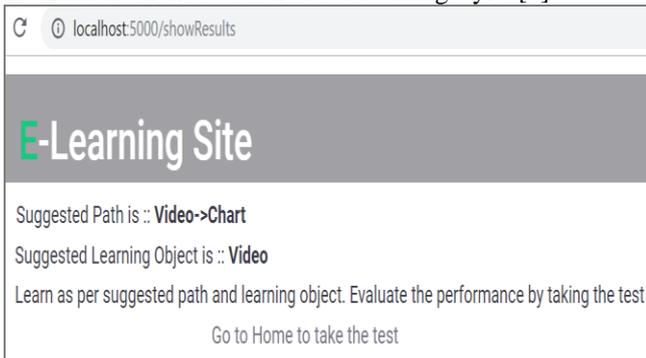
**IV. RESULT**

Proposed system provides suggestion to learner as per learner learning style [12]. For finding learning style of entire class surveyed of around 100 students has done. Table 1 shows that the percentage of the visual learner in class is 55%, Percentage of the auditory learner in a class is 30%, and the percentage of the kinesthetic learner is 15%. So as per the analysis percentage of the kinesthetic learner are more than others. [13]

**TABLE 1: ENTIRE CLASS RESPONSE**

Visual Style	Auditory style	Kinesthetic style
55%	30%	15%

Based on learning style, Knowledge level and problem suggestions has to be provided to learner. Fig 1 Shows recommendation based on visual learning style. [9]



**FIG 1: RECOMMENDATION OF LEARNING OBJECT AND PATH TO LEARNER.**

From table 2, it has been observed that for classification and prediction of KNN takes least time. For 200 records KNN performance is linear but still in increasing order. For 300 records KNN results is somewhat linear as well as stable and for more records like 375 KNN takes less time [15] and performance is stable. So overall performance of KNN is indicates that it takes least time as well satiability in prediction.

**TABLE 2: TIME IN MILLISECOND FOR KNN**

Sr. no	200 Records	300 Records	375 Records
1	6.2	4.6	5.23
2	4.6	4.36	5.8
3	5.13	5.53	7.6
4	5.7	4.9	5.6
5	4.8	4.5	5.76
6	5.13	4.7	5.1
7	5.16	4.7	5.23
8	4.8	5.1	5.53
9	5.1	4.46	4.8
10	4.9	4.46	5.53
11	5.46	5.36	4.53

12	5.83	5.3	5.06
13	6.1	5.06	5.2
14	7.76	6.33	4.7
15	6.46	4.96	4.86
16	7.16	5.3	8.1
17	5.9	5.26	6.1
18	5.9	5.03	4.9
19	6.63	5.63	5.46
20	4.63	4.8	4.83
Average	5.6675ms	5.017ms	5.49ms

Further accuracy of KNN generated based on predicted and actual values. Fig 3 shows result of KNN algorithm for finding learning object. Accuracy is dependent on splitting of training set and testing set.

Accuracy=Correctly Predicted Value\*100/Total Test Dataset



**Fig 3. KNN Accuracy For Predicting Decision**

To check the performance of the system, calculation of attainment level of around 500 students has been done on conventional learning strategy. For doing that, this work calculates how many number of students secured 40%, 50% and 60% marks in a given test. Assessment tools used for calculation are internal and external assessment. Below table 3 summarizes the average performance of students for internal and external assessment.

**TABLE 3: AVERAGE PERFORMANCE OF**

Target	Internal Marks	External Marks
40 % Marks	85.60	91.20
50 % Marks	79.25	70.70
60 % Marks	66.46	39.06

So, from observations, conventional strategy achieved only 74.97 % user scored above or equal to 50 % marks. Proposed system targeted 50% marks to 100% students and categorized test performance of learner as beginner, intermediate and expert. For evaluating revise and retained phases of CBR, students should cover at least 50 % percent marks in the given test.

## V. CONCLUSION

In view of student's education to develop students' learning interest and improve performance, a case based personalized eLearning system must know how a different learners learns best. This paper focuses on the current technology of internet e-learning. This methodology is appropriate for applications in e-learning such as to enhance the website to the personalized facility. Generation of the weblog is dynamic activity so each time our approach generates unambiguous results that is key behind this work to focus on learner's interest as well as their performance. This is Adaptive personalized e-learning system because whatever path used by learner's for specific topic get stored in dataset with new index value. So new user able to check different learning objects and impact of it on performance. Because of this learners way of learning and time automatically hold back for understanding theories. It will definitely beneficial to new generation particularly teenagers where they are in position to acquire knowledge in least time with more understanding approach.

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## ABBREVIATIONS

1. KNN: K-Nearest Neighbour
2. CBR: Case Based Reasoning

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