

The use of Machine Learning Techniques in a Web-Based Learning Diagnosis System Program

Sunil Chandolu, S. Prasad Babu Vagolu, D.Usharajeswari



Abstract: This work proposes a canny learning finding framework that bolsters a Web-based topical learning model, which expects to develop students' capacity of information incorporation by giving the students the chances to choose the learning themes that they are intrigued, and gain information on the particular subjects by surfing on the Internet to look through related adapting course-product and examining what they have realized with their associates. In view of the log documents that record the students' past web-based learning conduct, an insightful analysis framework is utilized to give fitting learning direction to help the students in improving their investigation practices and grade online class interest for the teacher. The accomplishment of the students' last reports can likewise be anticipated by the conclusion framework precisely. Our trial results uncover that the proposed learning finding framework can proficiently assist students with expanding their insight while surfing in the internet Web-based "topic based learning" model.

Keywords: Web-based learning, Theme-based learning, Fuzzy expert program, K-nearest neighbor, Naïve Bayesian classifier, Support vector machines, Learning diagnostics .

I. INTRODUCTION

The amazing advancement of data innovation has made another vision to arrange to discover that its impact has just spread over the world to encourage instructive development. In this way, numerous nations have been focusing on PC innovation and expect it can encourage the training change in a powerful and proficient manner. It is notable that the use of PC and Internet lessons to customary educating requires a change. Subsequently, the new function of the appropriate learning model requires realistic thinking about the shared interaction between customers and PCs, teacher and students, and the organization between students. Include research issues related to the above process; unbelievable research results at that time can be quite common rectification is not possible.

The subject-based learning is to become familiar with incorporated information by characterizing a focal "topic" at the very beginning and form related information encompasses the focal topic from different perspectives. Such a learning model stresses the preparation of the students with the competency of information reconciliation. Contrasted and conventional instructing, which shows fragmentary data inside the restriction of subjects, units, parts, and areas, the goal of topic-based learning is to accept a topic as a beginning stage and loosen up of it dependent on the students' advantages. In like manner, the students can willfully build their own insight since the topic is emphatically associated with our everyday life and created from students' eagerness. A subject-based learning procedure can be partitioned into the outside course and inside dissemination as showed in Figure 1 [7]. Outside dissemination exercises are 1) Identify a focal topic, 2) Identify related subject domains dependent on student's advantage, 3) Collect data for the particular themes, 4) Integrate gathered data to fabricate shared information, and 5) Exhibit learning out-comes and offer with others. The exercises of the outside flow are express learning practices. Then again, the inside flow comprises of certain psychological exercises, which are Plan, Action, and Introspection, separately. At the point when students take part in the topic put together learning forms with respect to the Web, they are encountering the exercises of outside and inside flow synchronously. Since the unequivocal component of the learning procedures can be controlled or guided successfully by the cautious plan and execution of the Web-based learning condition, it is normal that the inside dissemination, which speaks to the undetectable mental conduct of the students, can gain incredible ground at the same time.

External flow of topic-based learning, as Figure 1 shows, can be done as a web-based framework that helps address learning strategies. The reading activities for false reading can be divided into five categories as follows.

(1) Identify the basic theme

The learners occupied with topic-based learning can propose their own fascinating points to request input from other colleagues. In the interim, each student can likewise join the other part's proposed subject. After cooperation and conceptualizing, the ones who are keen on a similar subject are framed as a learning group, and this point is the focal topic that this group would explore. The inspiration for such a game plan is, that "an understudy can learn better on the off chance that he/she was keen on the learning theme". The subject ought to be firmly associated with the students' day by day life and a broad scope of review which isn't restricted in a particular field is energized.

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* Correspondence Author

Sunil Chandolu*, Dept. of CS, GIS, GITAM(Deemed To Be UNIVERSITY) , Visakhapatnam, Email: kunny0306@gmail.com

S. Prasad Babu Vogolu, Dept. of CS, GIS, GITAM(Deemed To Be UNIVERSITY). Email: prasadray@live.com

D.Usharajeswari, Dept. of CS, GIS, GITAM(Deemed To Be UNIVERSITY), ushadavaly@gmail.com

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(2)(2)Identify domains of topics related to student interest

At this stage, the topic is characterized and the learning group for each subject is shaped. In view of the student's own particular intrigue, each colleague attempts to discover the issues in the related subject area got from the topic. Strikingly, the cooperation of students on the learning stage can impact the generally inert students to trigger their inclinations adequately on some particular points through the occasions and exercises began by their members.

(3) Collect information on specific topics

Members will help out one another to gather information and data identified with the fascinating point at this stage. With the assistance of a web search tools and other partner apparatuses, well off information identified with the fascinating subject can be developed. On the off chance that the information gathered from the internet isn't sufficient, true assets, for example, libraries, eye to eye meets et al. additionally can be used. The gathered information or data is then handled to shape the information put away in the student's long haul memory.

(4) Gather the collected information to create shared information

Each member strives to edit the information or information collected in the previous step and to make an accurate report. Reports can be forwarded to various partners through peer review and online discussions.

(5) Show learning results and share with others

The topical report for every student is required to be refined in a specific way through the successive conversation with the colleagues and helpful proposals offered by the instructor. The explained report is at long last shown in the open region to make it available to the educators and all the students. In addition to imposing learning tests that compare to the external flow of a training-based learning model, a perceptual learning framework is also integrated into the proposed top-based learning phase. Most prominently, a complex reading and independent frame of reference is used to give students direct instruction and to assist teachers in assessing each student's interest in the reading class and the preview of each final report made by the learner. The other paper is still sorted this way. Area 2 provides a brief demonstration of Web-based advanced learning engineering. In Area 3, we will demonstrate the humility of the framework for acquiring intelligence. Phase 4 research and talking about the consequences of a case. Endings and future work are done in Section 5.

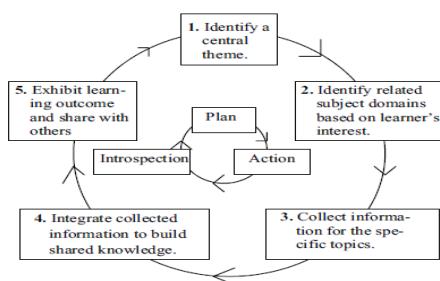


Figure 1. A theme-based learning model.

II. THE THEME-BASED LEARNING WEBSITE ARCHITECTURE

A topic based learning framework is made out of three practical modules as appeared in Figure 2. They are User Interface Agent, Learner Profile Management Agent, and Learning Diagnosis System, separately.

a. User Interface Agent

The learners can login to the subject-based learning framework through User Interface Agent to partake in the learning exercises, for example, data searching, information overseeing, talking about with the associates and the educator web-based, posting and answering the articles, and so forth.

b. Learning Profile Management Agent

The associations and the connections for the students with the framework and different students are developed right now. The framework can produce the students' learning profiles, including the all out time that the students remained in the stage, the recurrence of login sessions, the learning materials gathered by the students, the articles posted or answered by the students, and the online gathering conversation time spent by the students, and so on., which give the instructors and Learner Diagnosis System to follow the students' learning status with the end goal that viable platform and helpful recommendation or investigation for the students can be given auspicious.

c. Learning Diagnosis System

The learners are required to gain ground dependent on certain appropriate learning advices given by the Learning Diagnosis framework. The framework additionally creates the online cooperation evaluation toward the finish of each learning action arrange as referenced in Section 1, as per the learners profile signed in the framework. The educator can either take this class interest evaluation as the extent of the learners' last grade or utilize this appraisal to reveal the learners that fall behind toward the finish of each learning action organize. In the interim, the framework can likewise anticipate the exhibition of the learners' last report with the goal that the educator can utilize this anticipated accomplishment for additional investigation of the learner's examination conduct when there is a hole between the normal outcomes and the learner's real execution.

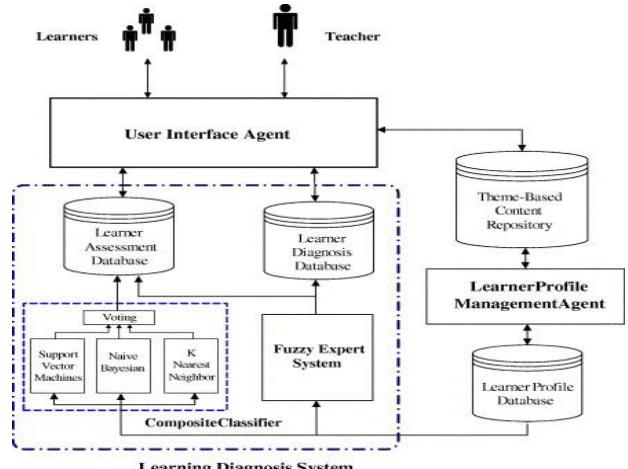


Figure 2. The theme-based learning website Architecture

III. LEARNING DIAGNOSIS SYSTEM

The Learning Diagnosis System utilized right now of two significant parts. One is a fluffy master framework which not just gives suitable conclusion messages to the students yet additionally conveys every learner's online cooperation appraisal to the instructor toward the finish of each learning action organize dependent on the learners' profile. The other part is a supposed composite classifier which is utilized to foresee the learners' achievement in the last report. The inspiration for utilizing a fluffy master framework to give findings and class investment evaluation while utilizing a composite classifier to foresee the learners' last achievement is that the fluffy master framework can work progressively like human specialists who clarify the thinking forms behind their suggestion. Then again, it isn't too hard to even consider finding some propelled AI procedures joined with the wrapper quality choice strategy have a superior forecast ability than a fluffy master framework.

3.1 Fuzzy expert system Architecture

A specialist framework is a program that carries on like an ex-energetic in some issue space. The standard utilization of ex-perky frameworks is to look for data from an assortment of sources including databases and the clients to understand limited, all around characterized issues [3]. To manage unsure and inadequate data, the fluffy master framework joins fluffy rationale into the thinking procedure and information portrayal conspire [1].

The contribution to a fluffy master framework is a fresh worth that is given by way of the student profile database. The fluffy standard base is made out of a number of fluffy at the off hazard that/at that point policies and the crossing point or least activity is applied to create a comparing fluffy subset for each fluffy principle.

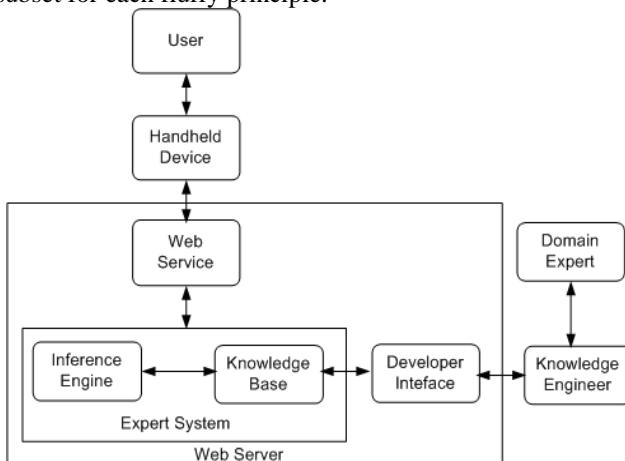


Figure 3: Fuzzy Expert System Architecture

The aggregator at that factor consolidates the whole lot of the fluffy sub-sets appointed to the yield variable together to frame a solitary fluffy subset for the yield. In conclusion, the totaled phonetic characteristics from the accrued fluffy manage interest are nourished into the defuzzifier to create a non-fluffy manipulate yield. Quite, the summed up chime fashioned participation paintings is picked for 3 forerunners and the ensuing inside the fluffy grasp framework. The 3 predecessors are the number of articles posted/answered with the aid of the students, the quantity of the mastering materials that every pupil accrued, and the frequencies of touring the stage by the students, separately. In the interim, the Mamdani defuzzification strategy is applied to manner

the centroid of enrollment paintings for the amassed yield, in which the territory below the diagram of participation paintings for the accumulated yield is partitioned into two equivalent subareas.

The inferential concepts of the fluffy grasp framework are handled distinctively when they may be applied to supply some suitable proposals or conclusion messages for the instructor and the scholars. The framework may provide a complaint message to the scholars whilst the participation critiques of etymological factors, for example, "low" or "high" are the largest among the three for every info. The studying locating framework won't just give the teacher an outline report of recommendation messages that the scholars got yet, in addition, provide the educator each student's on line cooperation appraisal depending on the non-fluffy yield of the defuzzifier. The instructor can discover the scholars that fall in the back of and supply them a novel course through looking at the magnificence execution record given by means of the framework. Quite, notwithstanding the truth that the unique figuring of class support evaluation includes the 27 inferential ideas, simply 11 inferential hints are utilized inside the proper calculation on account that the relaxation is regarded as preposterous.

3.2 Architecture of the composite classifier

The goal of utilising the composite classifier in our work is that the composite classifier has the upside of settling on alternatives greater reliable and precise than a solitary classifier regardless of the reality that the joined model is normally hard to look at in instinctive phrases what variables are adding to the improved choices [3]. The composite classifier right now usually made out of 3 self sufficient classifiers, i.e., a K closest neighbor classifier, a gullible Bayesian classifier, and a help vector machines classifier, separately. Every one of 3 independent classifiers makes use of wrapper manner to cope with choose the alluring facts parameters all through preparing. The preparation facts is taken from the students' profiles database stored up for the studying bunches in past studying programs. A vote is taken if there are clashes a number of the expectation outcomes of the 3 classifiers. The yield of the composite classifier is the anticipated evaluation for the students' remaining report. The instructor can either confer with this anticipated evaluation as phase of the students' last accomplishments or play out a further examination if there may be an error between the students' actual accomplishment and examine conduct.

Wrapper attribute selection method

It is notable that the exhibition of most AI calculations can be weakened by some superfluous or unhelpful qualities. Along these lines, it is entirely expected to go before arrangement work with a quality determination organizes that endeavors to dispense with everything except the most applicable traits. This is additionally one of the significant reasons that the expectation ability of a fluffy master framework is more terrible than some propelled AI calculations since the contributions to the fluffy master framework are constantly picked by the human specialists and these chose traits probably won't be the most encouraging ones for the fluffy master frameworks.

The quality choice techniques can be partitioned into two general classifications in the writing [4], for example, channel strategies and wrapper techniques. Channel strategies select a prescient subset of the traits utilizing heuristics dependent on qualities of the information, though wrapper techniques utilize the classifier really used to assess the exactness of property subsets. Wrapper strategies, for the most part, bring about preferable presentation over channel techniques on the grounds that the last experiences the potential disadvantage that the quality choice guideline and the order step don't really streamline a similar target work. In the wrapper approach, the scholar is applied to subsets of properties and attempted on a hold-out set. From the aftereffects of these tests, a exquisite subset of tendencies is chosen. For instance, for sending preference, a classifier is labored for each belonging exclusively; and the most precise great is "acknowledged" into the subset of good trends. That trait is expelled, and the process is rehashed, including every considered one of the relaxations of the residences and assessing its exhibition. The "best" association of two trends is alongside these traces made. This returns gradually until a trait set with maximal precision is accomplished. So also, in reverse preference continues via killing each trait in turn, finding the least gainful characteristic and doling out with it, and rehashing the method, disposing of the least actual houses until wiping out in addition features decline precision.

K - nearest neighbor classifier

To set up an obscure information check X, the okay closest neighbor classifier just appears at the ok nearest getting ready checks to X and allots it to the most famous class among these ok nearest exams. As it were, we are looking for the ones coaching tests that are normally like X, and afterward, arrange X into the most vigorously spoke to class amongst these maximum similar articles [2]. Outstandingly, "closeness" is characterized as far as Euclidean separation. A k closest neighbor classifier has a few appealing properties. For instance, it is anything but difficult to program and no enhancement or preparation is expected; Extension to different classes is direct. Albeit a potential disadvantage of the k closest neighbor classifier is that it doesn't fabricate a model, depending rather on holding the entirety of the preparation informational collection focuses. In this manner, looking through a huge preparing informational collection to discover the k closest can be a tedious procedure. Be that as it may, this issue can be avoided here since little informational collections in low measurements are utilized right now.

Naïve Bayesian classifier

The naïve Bayesian classifier predicts an obscure facts test, X, having a place with the magnificence with the maximum accelerated returned likelihood, adapted on X [6]. Bayesian classifiers have a base mistake charge in contrast with every unmarried different classifier hypothetically. Despite the reality that this isn't always the scenario by and via because of errors inside the rearranged suppositions made for its utilization, for example, magnificence contingent freedom and the absence of on hand likelihood records, specific investigations given within the writing indicates the presentation of gullible Bayesian classifier is as but tantamount to other complex AI procedures, for example, neural systems. We along those lines embody this primary

yet effective technique as a component of the composite classifier.

Support vector machines

Support vector machines (SVM) have as of overdue picked up ubiquity due to its numerous attractive highlights and prominent specific execution [4]. The fundamental distinction among the SVM and regular relapse structures is that it embraces the basic chance minimization (SRM) approach, in preference to the experimental risk minimization (ERM) approach frequently utilized in measurable learning. The SRM attempts to restrict an top bound at the speculation in preference to limit the guidance mistake and is relied upon to carry out superior to the traditional ERM technique. Also, the SVM is an arched streamlining, which ensures that the close by minimization is one in every of a kind minimization.

To settle a nonlinear relapse or practical guess issue, the SVM nonlinearly map the records area right into a high-dimensional factor area by means of method of the right portion portrayal, for example, polynomials and spiral premise capacities with gaussian parts. this methodology is required to expand a instantly relapse hyperplane inside the detail space, that's nonlinear within the first statistics area. at that point, the parameters can be observed by way of looking after a quadratic programming problem with direct balance and disparity limitations.

As The SVM Beats Other Ordinary Relapse Strategies In The Utilization Of Time Arrangement And Web Traffic Expectations In The Writing [4], We In This Way Attempt To Supplant The Fluffy Rationale Module In The Transmission Capacity Reservation Plot With The SVM As Outlined In The Past Area To Gauge The Held Transfer Speed In The Neighboring Cells.

IV. TESTING AND ANALYSIS RESULTS

To observe the instructive effect of the subject based totally studying framework, 5th grade lessons at a number one school have been decided to rehearse topic-based learning in examine hall educating. One of the two training become explored unique avenues regarding the proposed Web-based topical gaining knowledge of level in a Natural Science route, wherein a fluffy grasp framework is fused into the canny finding framework to check understudies' magnificence cooperation and getting to know direction to the scholars established on mastering profiles with the intention that the understudies can get without a second to spare help or advice to help them with increasing higher studying accomplishment. The subsequent trial changed into directed to another line of Natural Sciences for the other 5th-grade magnificence even as the locating framework changed into expelled from the Web-based topical learning stage so as to show the presentation of the proposed end framework.

Table 1 thinks approximately the understudies' accomplishment in classes. The factual results have been gotten by using running a t-test with the SPSS programming bundle.



The ordinary score got through the 25 understudies whose review conduct became corrected by means of the willpower framework is obviously superior to the normal rating of 18 students in the other check, no matter the truth that the hollow between these methods scores are not exactly big because of the diverse evaluating fashionable for the two educators. Notwithstanding, we see that the quantity of the students that bombed inside the route generously dropped down with the guide of the analysis framework. In the interim, the determination framework appreciably lessens the teaching heap of the educator with the aim that the instructor can have all the more available time to present singular route to the specific understudies that fall in the back of or keep on inertly.

As referenced in Section 3, we utilize three wonderful classifiers to count on the students' accomplishment in the closing record dependent on the understudies' profiles, and the majority of their votes were taken as the end result. To check the presentation of each man or woman classifier, we ran a development of tests on every one of the three classifiers by making use of a supposed forgetting approximately one cross-approval method (LOOCV) [5] with 18 and 25 examples for the two classes, separately. The contributions to every classifier are indistinguishable from those utilized within the fluffy grasp framework. Outstandingly, the LOOCV method expels a solitary example in every preliminary, prepares on the rest, and in a while exams the PNN classifier at the expelled single instance.

The presentation correlation given in Table 2 uncovers that the entirety of the three classifiers can accomplish a lot better expectation rate for the class making use of the subject based studying stage in which the analysis framework is implanted. It very well may be derived from the consequences that the learning course is given by way of the fluffy master framework altogether stimulated the students' investigation conduct and supported the character of the student final reports in progress.

Table 1. Two experimental classes comparison of the pupils' achievement

t test	Learning Platform with Diagnosis System	Learning Platform without Diagnosis System
Mean	86.60	82.22
Standard Deviation	9.443	13.225
Standard Error Mean	1.889	3.117
Degree of Freedom		41
Significance (2-tailed)		0.212

Table 2. The LOOCV prediction three classifiers results.

Classifier	Learning Platform with Diagnosis System	Learning Platform without Diagnosis System
Naïve Bayesian	92%	67%
K Nearest Neighbor	88%	50%
Support Vector Machines	84%	67%

V. CONCLUSIONS AND WORK FOR THE FUTURE

The Web-primarily based topical gaining knowledge of framework actualized right now rehearses the out of doors waft of the learning model of the theme used as shown in Figure 1. A smart acquisition framework, generated from a fluffy master framework and a composite classifier, is proposed to facilitate the master-based topical classification. Trial results show that the fluffy master framework is robust in presenting the getting to know guide for the students. Plus, a development of forgetting about one cross-approval tests display the high forecast precision of 3 segments of the composite classifier on the last report first-rate dependent on the students' mastering profiles. In the event that an irregularity among the students' expected outcome and their real execution happens, the instructor can likewise keep with a further examination of the reason for the disparity.

In future work, we intend to fabricate a degree for rehearsing issue based gaining knowledge of between helpful schools so cross-lessions or cross-colleges subject matter based studying may be traversed. The framework will likewise have lately advanced portable studying apparatuses to assist outside instructing by means of permitting the pupil to get to the chronicled mastering assets. In the interim, the UI could be up to date to be easier to understand, and savvy identifying machine and content material mining strategies might be consolidated into the scholar profile the executive's operator locate to the distractible college students and unsuitable plagiaries, separately.

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