

“Study and Analysis of Machine Learning and its support for E-Learning”

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Abstract:

In this research paper, Weka platform is utilized which underpins a few standard methods For pre-processing, classification, regression, clustering, rules of association and visualization of results. It is likewise appropriate for growing new machine learning plans. Weka permits to consequently dissecting a major number of datasets and chooses what data is generally pertinent. This solidified data would then be able to be utilized to assist individuals with settling on decision quicker and all the more precisely. This paper is based on the linkup of two terms “E-learning” and “Machine Learning”.

Keywords: Machine Learning, E-learning, supervised, regression etc.

1.0 Introduction:

E-learning is the employment of electronic technologies to access educational courses outside of customary homeroom. [C. Jennings et.al, 2016]. It refers to a course, project, or degree that's also delivered online. 'E-learning is a way of order to deal with teaching and learning, representing all or part of the educational model applied, which is based on the use of electronic media and devices as instruments for improving access to preparation, correspondence and interaction, and which facilitates the reception of better understanding and interaction approaches developing learning [Dror, I. E. (2011)]. E-Learning has several challenges, for example, lower costs, faster delivery, increased reach, and personalized preparing experience.[Albert Sangr et.al,2012] Furthermore, adjusting a course for learners originating from multiple foundations is the hardest thing

turn around to face guidance. With e-learning, learners can improve at their own pace. [Ayodele, C et.al,2011] Additionally, giving learners more personalized experience, give a chance to incorporate many learning ways with the course. [Clark, R. C et.al,2003] E-learning personalization isn't just limited to tweaking settings and preferences. E-learning gives learners the choice of the manner in which they need to learn without impediment in place and time. Moreover, E-learning usually does not consider the diversity of learners in case of their characteristics and capacity. An exciting and potentially extensive development in contemporary computer science is the invention and utilization of methods of Machine Learning. Professionals have taken inspiration from the human cerebrum in creating a new 'deep learning' method that permits computers to learn about the visual world largely all alone, much as human babies do. Computer scientist qualifies a computer program to naturally analyze a major measure of information and choose what data is generally relevant. This crystallized data would then be able to be used to help people make decision faster and more precisely.

2.0 Related Work:

In order to help conventional education, the rapid development of the Internet and its applications, instructive associations began using information and communication technologies (ICTs). In the e-learning business and in the amount of e-learning associations in a few areas, for example, Asia and Western Europe, there is critical evidence of development.

The advantage of online learning lies in its versatility that allows the understudies to learn from their decision at once and in spot. Within the environment of e-learning, the learner's understanding and perception of engineering are not only influenced by their sex and knowledge of the innovations they use, but also their learning styles based on four steps, Specifically data processing, data interpretation (sensing / intuitive), input mode and comprehension [Davidson, 2010]. This allows space for use of manufactured high-profile projects to improve E-learning system.

Machine learning aids enhance e-learning frameworks by not merely misleadingly cleverly learning projects that have been present, but also by joining the ability to organize learners into these learning frameworks [Mohri, 2012]. Learner activity is

adaptively used to provide specific data to the different learner levels. Machine learning helps make models that can change in accordance with attributes, for example, the learner's level of information and that it is feasible for learners to have the ability to concentrate under both on-and disconnected from the net modes through adjustment [Baldi, 1998].

Machine learning is viewed as "a area of studies that enables PCs to learn without being necessarily programmed." Machine learning investigates the analysis and creation of algorithms through which knowledge can be obtained and predicted. [Samuel, Arthur, 2017] In five simple groups, machine learning algorithms are isolated: supervised learning , unsupervised learning, semi-supervised learning; semi-supervised learning, reinforcement learning, and deep learning.[G. Paliouras, et.el,2001]

2.1.1 Supervised Learning: Supervised learning is a machine learning task in which derived is a capacity from marked training information. [Afshin Rostamizadeh et.el,2012] The training information is made of a gathering of training models, every one of which is a couple $(x; y)$ where x is an information vector and y is the yield esteem. The calculation makes a capacity that can be used for mapping future obscure data sources. A progressively formal numerical definition is given underneath:[C. Donalek. 2011]

Given a lot of M training models $\{(x_1; y_1), \dots \dots , (x_M; y_M)\}$ with the end goal that x_j is the j th model information vector ($x_j = [x_{1j}, x_{2j}, \dots \dots , x_{Nj}]$ where x_{ij} is the i th highlight of the j th model) and y_j is its yield, the supervised learning calculation attempts to discover a capacity that expands some scoring measurement or limits some blunder metric . This capacity is then used to "foresee" the yield of any new approaching contribution as follows: $y_{new} = z(x_{new})$. Supervised learning algorithms parts into two fundamental classes: relapse algorithms (constant yield) or characterization algorithms (discrete yield) [Yi-Fan Chang et.el,2011]. Supervised Learning can be additionally gathered into relapse and grouping issues which will be introduced underneath.

2.1.1.1 Regression:

Regression algorithms endeavor to locate the best fit function for the training information accessible. Two fundamental algorithms are examined beneath: linear regression and polynomial regression. [M. Young,1989]

Linear Regression:

One of the most usually utilized algorithms in machine learning regression is the linear regression calculation. This calculation attempts to locate the best fit line/hyperplane for the accessible training information. The general thought of the calculation is to discover the estimation of the ideal coefficient vector. The linear regression model is:

$$z_{\theta_{opt}}(x) = \theta_0 + \theta_1 x_1 + \dots + \theta_N x_N$$

This function is used to obtain $y^{new} = z_{\theta_{opt}}(x^{new})$ as follows:

$$y^{new} = \theta_0 + \theta_1 x_1^{new} + \dots + \theta_N x_N^{new}$$

The squared error cost function is defined to be:

$$J_{regression}(\theta) = \frac{1}{2M} \sum_{j=1}^M (z_{\theta}(x^j) - y^j)^2$$

2.1.1.2 Polynomial Regression:

Another regular regression algorithm utilized is the polynomial regression algorithm. This algorithm attempts to locate the best fit polynomial for the accessible preparing information. The objective of the algorithm is to discover the estimation of the coefficient vector with the end goal that the prescient capacity has the accompanying

$z_{\theta_{opt}}(x) = \theta_0 + \theta_1 x_1 + \dots + \theta_N x_N + \theta_{N+1} x_1^2 + \dots + \theta_{2N} x_N^2 + \theta_{(k-1)N+1} x_1^k + \dots + \theta_{kN} x_N^k$
structure (polynomial of request k):

Like the linear regression case, the coefficient vector θ_{opt} can be determined utilizing the iterative strategy dependent on slope plummet (the technique likewise objectives to limit the squared mistake cost work) or the non-iterative strategy dependent on the normal equation.[Zhang, D., et.el,2005]

3.0 Experiment & results:

Dataset Description:

- 100 Candidates
- 6 graded components
- 4 Assignments: each assignment is worth 15% (total=60%)
- 1 Sessional Exam: 20%
- 1 Final Exam: 20%
- Subject marks is a numbered grade

The results are shown in Table 1, for the linear regression model. Table 1 shows the correlation coefficient on the training set, and the root mean squared error. Furthermore, using five different parameters: training set, cross validation=10, cross validation=100, percentage split=50, and percentage split=66. Cross Validation is a method of estimating expected error in prediction. It helps to identify the one that best suits. Fold support also to ensure that the layout is not overfit. Having 10 folds means that in each fold test 90 percent of the complete data is used for training and 10 percent for study. In linear regression, cross validation basically measures the predictive performance of the statistical model and guesstimates how accurately a predictive model will perform in practice. Cross Validation's key point is to divide results, once or multiple times, to estimate the risk of each algorithm. Cross-validation is also used to eliminate the problems of overfitting. [Arlot and.el,2017]. Root means squared error representing the standard sample deviation between the predicted values and the observed values. The coefficient of correlation is to calculate the intensity and direction of a linear relationship between two variables. Below is a table for the effects of the linear regression algorithm using five different parameters.

Training set, Cross validation (10, 100) and percentage split (50, 66).

<u>Linear Regression Model</u>	Correlation Coefficient	Root Mean Squared Error
Training Set	0.9601	6.2099
Cross Validation 10	0.9522	6.7865
Cross Validation 100	0.9536	6.6906
Percentage Split 50	0.9444	7.2412
Percentage Split 66	0.911	8.5165

Table 1: Results.

Linear regression works by assessing coefficients for a line or hyperplane that best fits the training data. At the point when we utilized the little cross validation for instance 10 to test the data, we got the correlation coefficient =0.9522, while we got 0.9536 which around 0.0014 diverse in exactness. Subsequently, while the cross validation was expanded the correlation coefficient was expanded also. Then again, as the cross-validation builds, RMSE diminishes. This implies the precision is higher when the cross validation equivalent 100.

A typical report structure in the linear regression is to part the example into a training set and a free test set, where the previous is utilized to build up the classifier and the last to assess its presentation. This will separate the data into a training set and a test set as a means of evaluating characterization precision. As we decline the split rate, the correlation coefficient increment and become increasingly precise. With 50 rate split we found that the correlation coefficient =0.9444, and Root mean squared error =7.2412, while with 66 rate split correlation coefficient = 0.911 and Root mean squared error = 8.5165. Thus, the precision is higher when we test the data with 100 cross validation.

4.0 Conclusion:

The use of electronic devices and internet technologies is increasing with time. E-learning makes a ton of things possible especially for learners to learn anytime and anywhere online all alone. In this research paper, author has performed machine learning information in Weka. Moreover, there are different types of machine learning calculations that can be used to learn from and make predictions on information.

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