

Predictive Model of Learning Analytics for On-Ground Verses Online Assessment

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Abstract:

Educating the young generation is one of the noble and significant profession for the society's future betterment. After COVID-19 Pandemic lock down release it will be very important and essential for every human being in the world especially in India to follow some of the rules which are instructed by the Government and health ministry. In this scenario, maximum number of institutions have opted the method of online teaching and online assessments. Many of the educators were not prepared for such situation in many parts of the globe especially those are in developing countries. In order to handle the situation many Institutions offered Online training to their faculties. In which educators have been given a glance of experience and shown the method in which they can proceed with the process of online teaching. In this paper we will see the how the process started and what are the problems, faced by the educators and learners. To overcome the problems how the Machine Learning Model, that is Linear Regression predictive Model is helpful for the creation of Learning environment in future. The teaching-learning exercise was focussed on the learner's centric approach for the Engineering Mathematics especially calculus concept acquisition.

Keywords: Spoken Tutorial style, Collaborative PPTs, Online assessment tool-Google Forms, Clearance of doubts through WhatsApp, Regression.

Article History: Submitted: 28th May, 2020, Revised: 22nd June, 2020, Accepted: 26th June, 2020,
Published: 30th June, 2020.

I. INTRODUCTION AND LITERATURE REVIEW

Necessity of In-service training For the Educators

In this Automation world the importance of In-service training to the educators is inevitable. Knowledge, skills and Human work force energy all are important factors for the upliftment of the society. Especially for the developing countries with heavy population distinguish Mathematical model of development should be adapted and implemented for the enhanced-lifestyle of every unit of the population. Per-millennium and millennium generation people have contributed lot for the existing touch-technology side of the development in almost every part of the Globe. To handle the well-equipped generation of learners, the educators should possess special type of skills. To impart those skills among educators In-service training programs are essential. Such kind of In-service trainings for the educators of every level of education will be helpful to gain knowledge about the changing Technology based Learning processes and Blended Teaching Learning aspects. The reflection of these kinds of trainings and workshops can be seen in the professional development of educators [1].

India's Online Teaching Learning Process and it's Growth

The development in every aspects of the life of Human beings is increasing, our students' skill maturing is very much essential. By introducing the digital India concept, ICT mode of teaching learning is rapidly increasing in India. With the

initiative of IITs and IISc's, every student is getting the chance to acquire knowledge in free mode [2]. Through this many young researchers are getting exposure with new research problems from the society. Solutions of those research problems exhilarate our country men's life to some extent.

Importance of Quiz in the Online-Teaching learning process

In the online stream of learning, Educational videos are taking very important role. Means the topic in which we are going to plan for instructional video, that should be planned first, secondly what are the learning outcomes should be addressed clearly, content of the video should be written and instructed properly. Thirdly main aspect is recapturing the process and managing the conceptual information flow should be executed properly, Fourth and final stage of online learning is evaluation of the Teaching Learning process, that is we have to assess the concept acquisition level of learners by posting simple questions. [3] In the paper, Paul Rice et.al discussed very clearly all the aspects. Especially, the learners' behaviour towards the watching videos, approaching the Quiz which were embedded in the continuous flow of information within the video. For the same instructional videos, after completing the respective modules of the subject the feedback also had been taken and analysed in which, the learners were in support of embedded quiz within videos along minimal intrusion, as for as rating is concerned there

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were no difference for videos with quiz and without quiz. While preparing the Educational videos Multi-media coherence rules should be followed that also discussed in the paper [3]. For the future research purpose, the papers [5], [6], [7] have been read by the researcher.

Research findings and Discussion of the Activities Especially about Online Assessment

All in a sudden the entire world got disruption due to COVID-19. The impact of this disruption is very high in the educational activities. The Teaching-Learning process completely moved to the virtual environment. Many of the educators in India have done the teaching first time virtually. In this scenario, First the learners have been educated with "Collaborative Power point Presentations". Secondly the classes were taken by "Spoken Tutorial style". Through this style of teaching, the educators have done lot of preparation to make the learning blended. But the subjects like Mathematics has taken its own adversity level in the knowledge acquisition for the learners. The educators are also not able to perceive the learners' behaviour towards the problem-solving approach. The learners were asking the doubts through "WhatsApp". The proper guidelines and the solutions of the sums were given to the learners. To test the concept understanding, the learners underwent the Evaluation process the training tests, which have been taken through "Google Forms". In the continuation revision lectures were also taken for the learners from the previous modules.

In the experiment of the revision classes for the previous modules and testing and the learners were asked to give Online Test in the previous modules in which the learners have already performed On-ground.

In the experiment of online teaching and learning process, the following questions had come for the research purpose.

1. Is there any significance in the On-ground assessment method and On-line assessment method?
2. Whether the students are able to get the concepts can the perform better in the online test?
3. Can we create a Machine-Learning Model for the assessment scores of On-ground and Online Assessments?
4. Whether the model enhance the motivation of learner?

II. DISCUSSION FOR THE FIRST QUESTION

Null Hypothesis: Statistically no significance in the On-ground, Online assessments.

Alternative Hypothesis: There is a Statistical significance in the On-ground, Online assessments.

Table 1 F-Distribution value P-value

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	37.38331535	37.38331535	8.829463971	0.003913294
Residual	80	338.7142456	4.23392807		
Total	81	376.097561			

From the Table 1 we can see F-factor (8.82946971) is greater than the tabular value of (F-Table) 3.9607.

And the p-value is 0.003913294 which is less than level of significance 0.05.

From the above analysis we can conclude the scores between On-ground and Online are significance.

Means Alternative Hypothesis is accepted.

III. DISCUSSION FOR THE SECOND QUESTION

The class average has gone down in the Online test.

The correlation coefficient is also 0.315.

IV. DISCUSSION FOR THE THIRD QUESTION

By the above discussion the two sets of data are not having any relation. Even if we can build a predictive Machine Learning model. The model can be regression Model. Artificial Intelligence (AI) is taking over the all the human tasks. Machine learning Domain is the sub-set of AI. In which linear regression model is useful in prediction like climate, market trend and in medical image processing tasks in many areas. Through the Machine learning software now a days it is easy to get and test the Models. For the above data, through Scilab Open source software we could get the predictive model.

The scatter data of the dataset we can find through this graph with respect to its Probability Density function.

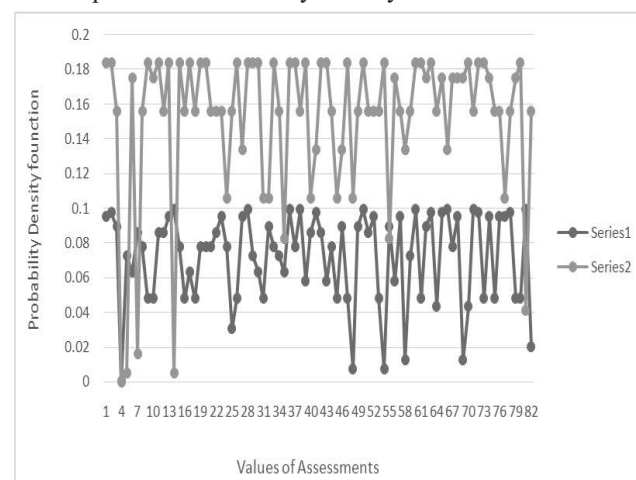


Fig.1 Comparison Curves of On-ground and Online Assessment values Series1-On-Ground Values, Series2 – Online Values

V. THE PREDICTIVE MODEL

Machine learning models are three types, (i) Supervised Machine Learning, (ii) Unsupervised Learning, (iii) Reinforcement Learning. In which the first case the entire input-output data will be feed into the model based on that prediction can be done for the new data. Under this Logistic regression and Linear regression predictive models will come. In the second case the data will not be labelled, through the patterns the Machines will learn. The third case hit and try or trial and error type of learning, agent will have many experiences with the environment in order to get rewards

example for this type of learning will take place in virtual games [4]. But the data which we are having, will fall into the category of supervised Learning. With help of Scilab we could find the following predictive model. The model we got it through the machine learning Algorithm it predicts almost 97 percent correctly for the given data set.

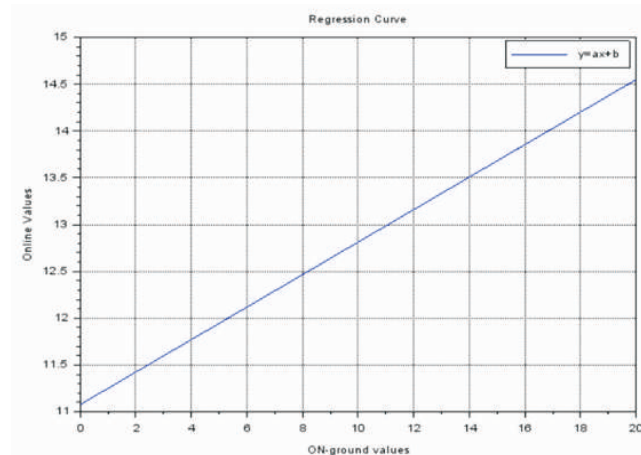


Fig.2 Predictive Model

VI. DISCUSSION FOR THE FOURTH QUESTION

This (Fig.2) model predicts the values according to our expectations. The results are in favour of learners, the students who got very less marks in the ground truth, the model gives reasonable high score, which will be very much favourable for future achievements of the learners. This model will help the educator to assess the learner's capability and potential. In that education, the educator can help the learners in their performance, by making some change in the instructional design, not only for the current subjects but also for backlog subjects, and also for future subjects.

VII. FEEDBACK INSIGHTS

Through the online teaching and learning process the students were asked to give the feedback about the online activities. Overall feedback's insights given below. But in the feedback which was taken along with quiz, the learners have discussed about the continuous engagement with the electronic gadgets during online lectures, in which they were facing problems. The learners are used to give tests on paper, they were facing some inconvenience in giving the test online.

How will you rate the revision lectures and quizzes with respect to,

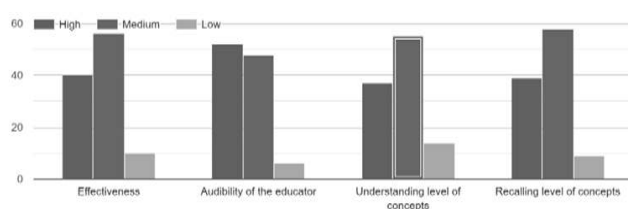


Fig.3 Learners' responses for the feedback of Online lectures and Assessment

Table No.2 Online feedback values of Online lectures and Assessment

	How will you rate the revision lectures and quizzes with respect to			
	Effective-ness	Audibility of the educator	Understanding level of concepts	Recalling level of concepts
High	37%	51%	34%	37%
Medium	53%	44%	54%	55%
Low	10%	5%	12%	8%
Average on the scale of 3	2.4	2.6	2.3	2.4

VIII. CONCLUSION

In future, the Online Education will be playing import role in the education sector. Mainly, maximum higher education part will be converted to online especially masters and higher level of education. During that time Learning analytics will play significant role. Moreover in channalising the expertises of learners, the predictive models will help them to choose the path for their career. With the help of this predictive model, I am planning to create a comfortable Learning environment, for the slow learners. In the machine learning language, the slow learners are good performers. The slow learners need unique way of training technically. The same thing is applicable for the real-life problems also. In the education field slow learners need innovative approach towards the teaching learning process from the learners side, to achieve their goal. In the future plan, the needy learners will be provided with comfortable learning environment with the self-assessment tools like embedded quiz, in order the observe their improvement in learning. For the future study slow learners will be provided with instructional videos in which small quizzes embedded within it. Then the performance of the learners will be observed. We can create more effective Predictive models. Through this iteration we can improve our won analytical way of approaching the system (Teaching-Learning System). The above Predictive model can be changed in the other way also. So, the blended learning should to be adopted to minimise the failure rate for the slow learners in the formative and summative examinations.

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