

Machine Learning Technique used in enhancing Teaching Learning Process in education Sector and review of Machine Learning Tools

DiptiVerma #1, Dr. K. Nirmala#2
MCA Department, SavitribaiPhule Pune University
DYPIMCA, Akurdi, Pune , INDIA
dipti.nashine@gmail.com, ksita_nirmala@rediffmail.com

Abstract: Machine learning is one of the widely used research area in today's world is artificial intelligence and one of the scope full area is Machine Learning (ML). This is study and analysis of some machine learning techniques used in education for particularly increasing the performance in teaching learning process, along with review of some machine learning tools.

Keyword:Machine learning, Teaching Learning, Machine Learning Tools, NLP

I. INTRODUCTION

Machine Learning is a science making system (computers) to understand from the past behavior of data or from historic data to behave smartly in every situation like human beings do. Without having the same type of situation a human can behave or can react to the condition smartly. So with the help of machine learning also an effort is been taken to make and act computer smart getting computers to learn and act like humans do, by serving them data and information in the form of observations and real-world communications. Teaching is an art which needs regular polishing for creating and maintaining interest in minds of learner. We may define good teaching as instruction that leads to effective learning, which in turn means thorough and lasting acquisition of the knowledge, skills, and values the instructor or the institution has set out to impart. The education literature presents a variety of good teaching strategies and research studies that validate them (Campbell and Smith 1997; Johnson et al. 1998; McKeachie 1999). It has been found through

rigorous study that teaching learning process has been changing over the time. The traditional protocol of classroom teaching has been taken to out of box level, where e-learning, m-learning, Flipped Classroom, Design Thinking (Case Method), Gamification, Online Learning, Audio & Video learning, "Real-World" Learning, Brainstorming, Classes Outside the Classroom learning, Role Play technique, TED talk sessions are conducted to provide education beyond text book and syllabus.

II. MACHINE LEARNING PROCESS:

Machine Learning is a science of making system smart. Machine learning we can say has improved the lives of human being in term of their successful implementation and accuracy in predicting results.[11]

Machine learning is a way of making your system think and response smartly as per the situation which has been never arise. Our system can response to those set of new problem based on the data available with the system. The data is divided into training and testing set and a prediction and results are stored, which later are compared, analyzed and new results are generated. Machine learning- an incredible innovation in the field AI.

There are many different types of machine learning algorithms, with hundreds published each day, and they're typically grouped by either learning style (i.e. supervised learning, unsupervised learning, semi-supervised learning) or by similarity in form or function (i.e.

classification, regression, decision tree, clustering, deep learning, etc.)[11].

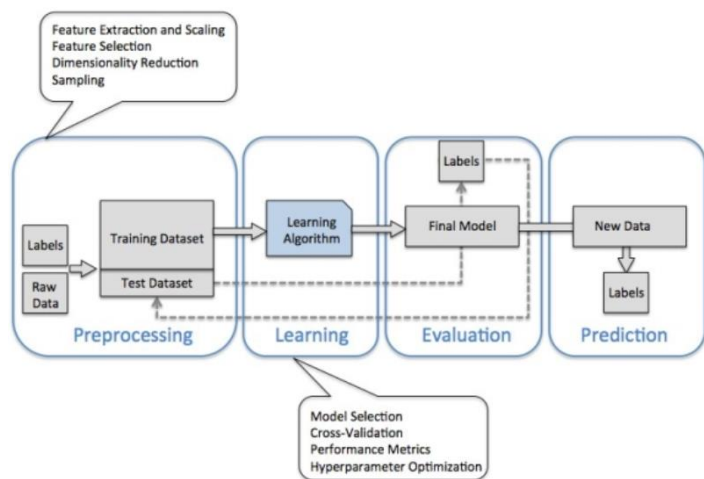


Fig 1: Machine Learning Process[3]

III. SCOPE OF MACHINE LEARNING IN TEACHING LEARNING.

Machine learning can shape the current education system in different and effective way. Scope of Machine Learning is not only restricted to student and teacher it's also increasing the efficiency of teaching learning process.

FedorDuzhin and Anders Gustafsson propose a methodology for educators to constantly improve their teaching by identifying teaching methods, instructional tools, and pedagogies that work best in their own classroom and acting upon findings. Of course, the decision to adopt one or another teaching method should be based on education research and on personal pedagogical expertise, but at the same time, it makes sense to extract meaning from data on students' results that are generated as the courses are taught and augment the decision to make changes in the classroom with data-driven insights. Such a methodology can be called Data-Driven Classroom Tuning[4].

A. Learning Experience customized:

By using machine learning technology in colleges, lecturers will not have to maintain logs, or details of students. Huge amount of time is wasted in maintaining the details of each student. Each student has different capability of understanding and learning the same concept taught in a lecture. Now the concept of delivering lecture has been changed and the objective of a particular student needs not to be identified. The machine will be able to do it on its own.

The idea behind this feature is to help educators see how each and every concept is being "digested" by the students. Thus, instead of simply instructing the ideas to the general public, teachers can see what methods are not working well and specify how exactly they can change the curriculum to make them work better [2].

B. Prediction of student career:

This is also one of the most important areas which is being focused and analyzed. Based on the student data now prediction can be done that by selecting which career or path student success rates can be higher and that can actually predict how well a student can perform. Repetitive actions of a student based on the performance, the machine learning techniques helps in identifying student's weaknesses and analysis is done to know if possibilities are there for better suggestion for improvement in performance.

Data is been fed to the software in which algorithm analyzes the data and student's performance, then it may give a better suggestion for studying the course material. Existing knowledge is analyzed for the course material. After identification of lacking area students, they receive suggestions regarding materials and further learning methodology [2].

C. Process can be organized in better way:

By using the Machine learning techniques the major algorithms of it has the power of managing

the things in a revised and better way. Similarly the major concern of organizing this is to follow a proper format a way by which organizing the content and curriculums becomes easy and more reliable.

A framework or a model could be designed using Machine Learning algorithms and techniques which could be a great help in increasing the efficiency of education. This will help organization and students grows significantly. It will make the students happy because they get to learn important things in a way that they are comfortable with [2].

D. Automatic Grades calculation without emotional interference:

Machine can now check assignments of students, without being biased. Scores and grades will not be affected by the attitude of educators toward their students but will be based on their performance exclusively. This process isn't so simple this leads to much complexity. Still research is going on for checking and evaluating essay type questions.

E. Performance Rating :

Performance is considered to be the highest level of importance in education sector. By implementing Machine learning student's performance can now not only be judged by the marks/ grades but they can get feedback according to the performance data which will be analyzed and along with their work/ assignment submitted. Once the machine is taught how to analyze the progress a student is making over time as well as how well they understand different concepts the teachers are showing them, it will be able to assess it [2].

This will also help educator/ teacher to know on which area they have to work more to make their student's improve performance. Not only teacher but student will also be able to improve on those lacking areas. This will be a two way benefit for student and Teacher. Both will work for

increasing / enhancing the performance of a student. Among good tools for this matter is Bright Bytes Clarity. It offers a profound research and best practical analysis, and develops a so-called strength gap analysis [2].

F. Machine helps in finding appropriate teacher:

Many times it is required to find appropriate teacher for course. It becomes difficult to do all these assignment manually, It become even difficult to create a personalized schedule for students based on their needs and pace of learning. No pressure at all. Students come as they are and the program adapts to them. That is how learning becomes a pleasure [2].

G. Algorithms could be designed to review learned material:

Learning material is one of the most important and deciding factor for in order to optimize student interest retention. Machine Learning could give an appropriate solution to it. Now machine can be trained and tested for reviewing the material. This will ease the educator to get appropriate solution to many problems especially maintaining track of student. Machine Learning algorithm will do it for us.

H. Personalized learning could be provided by setting priorities

- 1) Every student has different capability; some students are good and quick in learning while others are weak. Based on the learning capability personalized learning could be provided to the needy students. One such application is already developed for giving personalized training to the student weak in particular topic of a subject. And results may shock you that it

actually helps in increasing the performance of the student.

- 2) Based on the practice done by a student on machine learning application or program system based on interests, what's trending, scoring and sorting of most important topics, etc

I. Use of NLP in Teaching Learning

Natural language processing NLP is a major factor associated with the branch of science, which focus on the development and improvement in the process of learning. NLP provides theoretical grounds to assist in the process of developing techniques and effective approaches for providing assistance in the scientific learning by utilizing the effective theories and approaches. NLP can be effectively applied in the education for promoting the language learning and enhancing the academic performance of the students. [5].

The approach in NLP is more focused on developing educational software systems and educational strategies that can assist in utilizing the natural languages for education, for example, e-rater and Text Adaptor [6]

For high spot on important areas and for generating competitive based questions can be framed using Natural language processing. NLP with an effective approach for assisting the progress and improvement in the learning ability of students based on development and implementation of various effective tools, assist writing, learning, and assessment of texts, such as use of search engines, electronic resources and analysis of grammatical construction, syntax, sentence composition, etc. All these are the effective techniques, which can be utilized to develop the structural framework for analysis of texts(Alhawiti, Vol. 5, No. 12, 2014)[5].

IV. MACHINE LEARNING TOOLS

Researchers are working in providing the best machine learning tools for getting best results for the experiment, some of these are

1. Keras - Keras is a high-level neural networks API, written in Python and capable of running on top of TensorFlow, CNTK, or Theano. It was developed with a focus on enabling fast experimentation.
2. IBM Watson – Watson is the commercially available cognitive computing capability, representing a new era in computing. Watson analyzes high volumes of data and processes information more like a human than a computer—by understanding natural language, generating hypotheses based on evidence, and learning as it goes. It is an open-API question answering system that answers questions asked in natural language. It has a collection of tools which can be used by developers and in business.
3. TensorFlow – TensorFlow is an open-source software library for dataflow programming across a range of tasks. It is a symbolic math library, and is also used for machine learning applications such as neural networks.[3] It is used for both research and production at GoogleIt is an open-source software library for machine learning. TensorFlow provides a library of numerical computations along with documentation, tutorials and other resources for support.
4. ai-one – It is a very good tool that provides software development kit for developers to implement artificial intelligence in an application.
5. Caffe – CAFFE (Convolutional Architecture for Fast Feature Embedding) is a deep learning framework, originally developed at UC Berkeley. It is open source, under a BSD license.[4] It is written in C++, with a Python interface.[5]It is a framework for deep learning and is used in various industrial applications in the area of speech, vision and expression.

6. Amazon Web Services – Amazon Web Services (AWS) is a subsidiary of Amazon.com that provides on-demand cloud computing platforms to individuals, companies and governments. Amazon has launched toolkits for developers along with applications which range from image interpretation to facial recognition.
7. OpenNN – OpenNN is a software library which implements neural networks, a main area of machine learning research. OpenNN (Open Neural Networks Library) is a software library written in the C++ programming language which implements neural networks, a main area of deep learning research. The library is open source, licensed under the GNU Lesser General Public License. It has a lot of tutorials and documentation along with an advanced tool known as Neural Designer.
8. Apache Spark – Apache Spark is a unified analytics engine for big data processing, with built-in modules for streaming, SQL, machine learning and graph processing. It is a framework for large-scale processing of data. It also provides a programming tool for deep learning on various machines.
9. Protege – It is a free and open-source framework and editor to build intelligent systems with the concept of ontology. It enables developers to create, upload and share applications.
10. DiffBlue – It is another tool in artificial intelligence whose main objective is to locate bugs, errors and fix weaknesses in the code. All such things are done through automation.
11. Veles – It is another deep learning platform written in C++ language and make use of python language for interaction between the nodes.

V. CONCLUSION

This paper gives an overview about the Machine Learning Techniques used in Education sector and the scope where it can be used more efficiently.

Education is the very important part of every individual and it becomes the responsibility of every educator to maintain the teaching learning process up to the highest standards, where students can get benefits in all aspects. The foremost objective of this paper is to understand the problem being faced in education sector and the possible solution by machine learning techniques. This paper gives outline of some of the most commonly used tools in machine learning.

References:

1. Campbell, W. E., and K.A. Smith (Eds.). 1997. "New paradigms for college teaching". Edina, MN: Interaction Book Company
2. <http://bigdata-madesimple.com/8-ways-machine-learning-will-improve-education> (Nelson, 2017)
3. www.techsparks.co.in
4. FedorDuzhin and Anders Gustafsson "Machine Learning-Based App for Self-Evaluation of Teacher-Specific Instructional Style and Tools"
5. Dr. Khaled M. Alhawiti "Natural Language Processing and its Use in Education" (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 5, No. 12, 2014
6. Nadkarni, P. M., Ohno-Machado, L., & Chapman, W. W. (2011). *Natural language processing: an introduction*. *Journal of the American Medical Informatics Association*, 18(5), 544-551
7. Burstein, J. (2009). *Opportunities for natural language processing research in education*. In *Computational Linguistics and Intelligent Text Processing* (pp. 6-27). Springer Berlin Heidelberg. http://link.springer.com/chapter/10.1007/978-3-642-00382-0_2#page-1
8. Habash, N. Y. (2010). *Introduction to Arabic natural language processing*. *Synthesis Lectures on Human Language Technologies*, 3(1), 1-187. <http://www.morganclaypool.com/doi/abs/10.2200/s00277ed1v01y201008hlt010>
9. Liu, K., Hogan, W. R., & Crowley, R. S. (2011). "Natural language processing methods and systems for biomedical ontology learning" *Journal of biomedical informatics*, 44(1), 163-179.
10. De Vries, M. H., Monaghan, P., Knecht, S., & Zwitterlood, P. (2008). "Syntactic structure and artificial grammar learning: The learnability of embedded hierarchical structures". *Cognition*, 107(2), 763-774. <http://dl.acm.org/citation.cfm?id=1967546>

11. DiptiNashineand KrupaliDhawale(2018)” *Machine Learning Approach: A science to make System Smart – Literature Review*” in Proceedings of International Conference on Advances in Computer Technology and Management (ICACTM) In Association with Novateur Publications IJRPET- ISSN No: 2454-7875 ISBN No. 978-81-921768-9- 5 February, 23rd and 24th, 2018
12. Bresfelean, Vasile Paul. "*Analysis and predictions on students' behavior using decision trees in Weka environment.*" Information Technology Interfaces, 2007. ITI 2007.29th International Conference on.IEEE, 2007.
13. [35] Nghe, Nguyen Thai, Paul Janecek, and Peter Haddawy. "*A comparative analysis of techniques for predicting academic performance.*" Frontiers In Education Conference-Global Engineering: Knowledge Without Borders, Opportunities Without Passports, 2007. FIE'07. 37th Annual.IEEE, 2007.
14. Athanasios S. Drigas1 and Panagiotis Leliopoulos, "*The Use of Big Data in Education*" Institute of Informatics & Telecommunications, Telecoms Lab - Net Media Lab, N.C.S.R. “Demokritos” AgiaParaskevi, Athens, 15310, Greece.

IJSER