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Input Analysis for Accreditation Prediction in Higher Education Sector by Using Gradient Boosting Algorithm

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Abstract— The main objective of this paper is to analyze the input criteria using Gradient Boosting Algorithm to predict the NBA accreditation strategy with generating solutions and suggestions to the institutions on that specific point. The NBA (The National board of accreditation) is formed by the prestigious AICTE (All India Council of Technical Education).The Aim of the council is to evaluate technical institutions periodically and inspecting programs basis according to specified norms and standards as per the council. Now a day's colleges are feeling more prestigious to get the NBA accreditation. In order to get the accreditation college need to pass in various conditions like Overall Infrastructure, Academic Process, Result outcome and etc. These conditions have sub categories with points. The institutions need to meet out the allotted points to get a NBA Accreditation. This paper uses a Machine Learning Algorithm namely Gradient Boosting which can be used for the prediction of the status of the institutions and it considers the Input criteria and only one sub point within it that is the Student Intake Procedure. Before accreditation team's arrival for inspection it checks some specific points in these criteria on a sample data and suggests the weak points and provides solutions for improvement.

Keywords— NBA, NAAC, AICTE, Machine Learning, ANN, Gradient Boosting Algorithm

I. INTRODUCTION

Over recent years, data mining or knowledge discovery has been establishing itself as one of the major disciplines in computer science with growing industrial impact. It has become an indispensable technology for businesses and researchers in many fields.

The National Board of Accreditation (NBA) is one of the two major bodies responsible for authorization of higher education institutions in India, along with the National Assessment and Accreditation Councill (NAAC). NBA manages and authorises technical programmes, like all engineering and management programmes, while NAAC accredits general colleges and universities. NBA is a full member of the Washington Accord.

NBA was established by the All India Council Of Technical Education (AICTE) in 1994 and operated as an autonomous body since 2010. In 2014 it was sanctioned a full membership status in the Washington Accord. The NBA enrolls programmes and not institutes.

These include undergraduate and postgraduate programs. NBA Accredits not only disciplines like engineering & technology, management, computer applications, hospitality and tourism management, But also pharmacy, architecture, applied arts and crafts to its credits. Fig 1 shows the flowchart of the process of Accreditation.

This paper is structured as follows: part 1 Introduce and depicts the official procedure of Accreditation; Literature review is described in part 2, part 3 enumerates the working process for the procedure.; part 4 describes how to apply the algorithm; part 5 presents the experimental observations and Part 6 concludes and identifies the limitations of this study.

II. LITERATURE REVIEW

Indian higher education is the third-largest educational system in the world after the United States and China, and has a great potential to compete with global universities (Rienda et al., 2011; Times of India, 2014). Higher education is the most fundamental constituent, and it requires careful attention and evaluation to foresee prospective outcomes in a given country. It is indeed a reward for citizens, gives knowledge and respect, makes an individual self-assured, and provides a career.

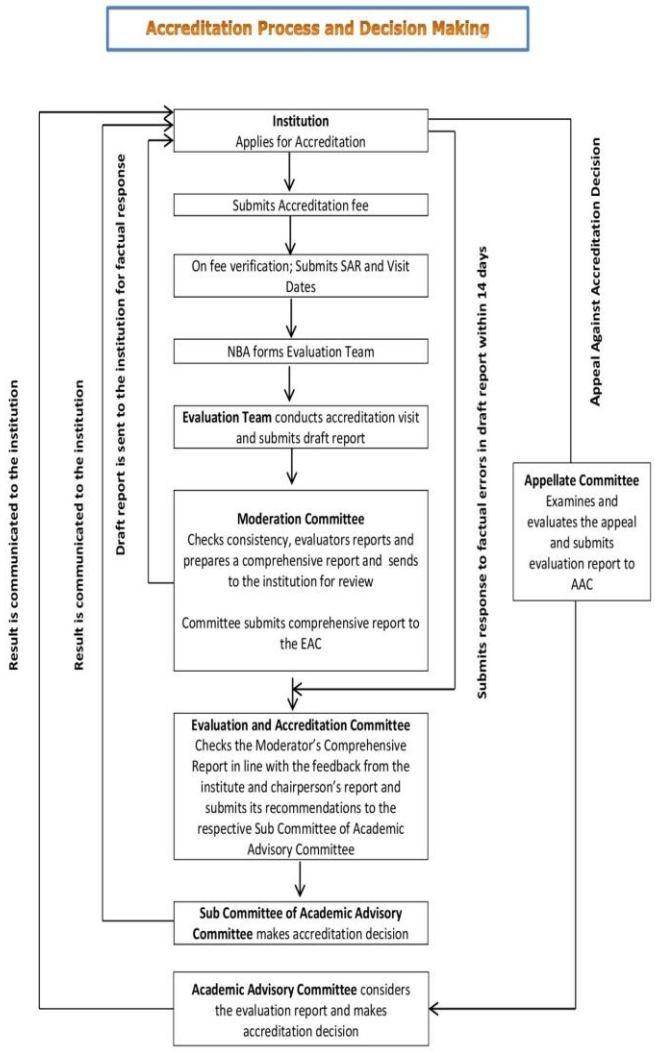

Figure 1. Flowchart of the process of Accreditation

For human capital theory, higher education is an effective tool to develop science and technological capabilities that are required for a standard of living in a global knowledge economy (e.g. Ding and Zeng, 2015)[1]..Technology is making abrupt changes in higher education. Technology has been strategically introduced into higher education to enhance different processes like teaching learning. When it is aligned with educational objectives and standards the impact is profound. The dynamics of higher education is changing and emphasizes the need to adapt rapidly. Higher education is under scrutiny from accrediting agencies, government and other stake holders to explore new means for improving and monitoring student success and other institutional policies.[2]. Future education is more often connected with new technologies like omnipresent [2] computing devices, flexible class room design .But the most appropriation aspect which is overlooked and which would revolutionize the field is "data". Higher education is a field where tremendous amounts of data are available. Analyzing this data would lead to realization of benefits of greater bound. Many institutions fail to make efficient use of the huge amount of data available.[3]. Gradient boosting is a method that is specifically applied to decision trees.Gradient boosting is a boosting approach that resamples the data set several times to generate results that form a weighted average of the resampled data set.[4]. The goal of supervised learning is to build a crisp model of the distribution of class labels in terms of predictor features.[5]. Standard queuing-theoretic approaches uses explicit system performance model which is fundamentally differs from Reinforcement Learning (RL) and RL present a talented new approach to systems performance management. RL can automatically learn high-quality management policies without an explicit performance model or traffic model and with little or no built-in system specific knowledge. [6].

III. WORKING PROCESS

Here the NBA having a decision making structure which follows many norms and conditions to be satisfied. In the accreditation process the major phases are :

- Input Analysis
- Academic Process Verification
- Outcome.

According to the survey NBA follows decision tree algorithm and data driven methods to analyze an institution. Here a self evaluation has been proposed by algorithm to predict the NBA accreditation process before the inspection. This paper will suggest the up and downs, Current point calculation, Need to improve points, Need to concentrate areas, Result and Suggestions on the criteria Input(Enablers).This algorithm works under various test conditions and works with various dataset. The basic norms and in depth process will be trained to the tool in advanced. The criteria that comes under Input Analysis and the total marks allotted for each criteria is shown in the table.

Table 1 Input(Enablers): Total Marks : 360

Criteria	Total Marks
Students	35
Faculty	50
Physical Infra Structure	40
IT Infra structure	50
Library	55
Global Input	35
Quality Assurance Policy	40
Finance	55

IV. IN TECHNICAL

This research paper comes under Machine learning approach with supervised learning model. For initial data training

process ANN (Artificial Neural Network) has been used. ANN will feed the dataset for analyze process. The given input will be processed with the below given proposed algorithms. This paper pointing out only one point within Enablers.

Gradient Boosting Algorithm – For Prediction

For the proposed method GBA is a boosting algorithm used when we deal with plenty of data to make a prediction with high prediction power. A learning algorithm that combines the prediction of numerous base estimator in order to improve robustness over a single estimator is Gradient Boosting. In order to construct a strong forecaster the algorithm merges several feeble or common predictors. These boosting algorithms always work well in data science competitions. These algorithms are used to predict the status of institution before inspection team arrives. In this study it is mentioning about a single point that is Input(Enablers) and only one sub point in it that is Student

The sub points coming under Students section include

a) Transparency in selection process for students
b) The ratio of intake capacity to the number of students admitted
c) Quality of students enrolled
d) Congruence between the announced admission processes and the actual practices.
e) Getting consent for the guiding principle for admission and recognition of the proficient authority.
f) Relationship between quality of admission and final results.

V. EXPERIMENTAL OBSERVATIONS

The paper analyze this criteria by taking a BSchool under Calicut University in Kerala and observed several factors by applying this algorithm on the specified data on 3 consecutive academic years.

A) Transparency in selection process for students

The Bschool is affiliated to Calicut University and adopts admission procedures as prescribed by University.

- Candidates shall have obtained CMAT or any other approved management entrance examination score card and based on the score , the candidates shall be short listed for Group Discussion and personal Interview.
- Out of the total seats, 50% will be merit quota and 50% will be management quota.
- After collecting options from Candidates University itself make allotment to different institutes on the basis of merit and according to the choice of candidates.
- The management quota seats shall be filled up after preparing a rank list based on the CMAT/CUMAT score.
- Based on students performance in Group Discussion, interview and the Entrance examination score , merit list is prepared for admission.
- A detailed Egogram is also conducted and evaluated to know the psychological behaviour of the students.

The following table illustrates the admission statistics in Bschool for the three years

Table 2: Admission Statistics

Year	Number of candidates Applied	Candidates called for interview	Number of candidates selected
2010-2011	128	90	60
2011-2012	125	90	60
2012-2013	185	160	120

The intake capacity of school has increased to 120 seats by university form 2012 onwards.

B) The ratio of intake capacity to the number of students admitted

The Bschool has enviable status of full admission so far. In takes are as per the sanctioned numbers after verification by the university. The admission statistics is illustrated below.

Table3: Admission Percentage

Year	Sanctioned Intake	Number Of Students Admitted	%Admission
2010-2011	60	60	100
2011-2012	60	60	100
2012-2013	120	120	100

C) Quality of students enrolled

Quality of students admitted are also given in the following table.

Table4: Quality of students

Year	>=75%	>=60% & <75%	>=45% & < 60%
2010-2011	9	26	16
2011-2012	11	43	3
2012-2013	32	61	21

D) Congruence between the announced admission processes and the actual practices.

The prospectus along with university guidelines is strictly followed by the school for admission. It also details about the standards what school expects to deliver to the students. Various activities undertaken by the Bschool are also spelled out clearly. The Bschool follows a student selection process including management seats and other seats at par with other B-Schools.

E) Getting consent for the guiding principle for admission and recognition of the proficient authority.

The rules and criteria for the selection of students for the course are as per the Calicut University guidelines and norms updated from time to time. On important matters of change and improvement , members of other Bschools within and outside the state are consulted. The eminent industry professionals are also included in the Governing Body and Advisory Committee of this BSchool.

F) Relationship between quality of admission and final results.

1) Skill set as determined by the market demand determines the type of MAT test to be administered. Every year, all students who have applied for admission need to undergo the screening Mat test.
2) As a universal practice, students undergo group discussion and interview before the admission. Their performance in the above are considered for the preparation of the merit lists of admission.
3) The Interview panel consists of the Director, a Senior Professor and an industrialist for an unbiased selection process.
4) The quality of students admitted will ensure high percentage of graduate students from the programme.

Table 5 :Pass percentage

Year	% of students Graduating
2010-11	78
2011-12	66.67
2012-13	62.75
2013-14	90

As classification is one of the most active decision making tasks of human, in our education situation, this classification might help the institution to mentor the staff and students and improve their performance by proper attention and training. Similarly, this helps students to know about their lack of domain and can improve in that skill which will benefit both institution and students.

The drawback of this algorithm include

- Low speed and lesser efficiency
- Greater memory usage
- Poor accuracy
- Capable of handling only small--scale data.

VI. FINDINGS & CONCLUSION

This paper considered the Gradient Boosting Algorithm for prediction of status and investigated its properties in the Student criteria of a sample taken from Bschool during the admission period. The points analysed by the algorithm includes

1. Even though students from diverse backgrounds and from various states are usually admitted but there is no international admission so far. The NBA enforces student exchange program or Global input and that is not satisfied by this Bschool.
2. Algorithm also discovered that after collecting filled in Egogram proper analysis and monitoring of students based on their mental growth is not happening.

Thus it suggests the organization to improve on these areas before inspection. The limitations of this study can be mentioned as it covered only single sub point from the huge set criteria and that is not at all enough for a complete prediction. Its scope is very vast algorithm has to analyse each and every sub point in more detail to discover problems and suggestions.

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