MOOCs Platform : A Student Centric approach through algorithm

Abstract
Massive Open Online Courses (MOOCs) have the famous educational system after the COVID epidemic. And, it will be a crucial component of any education system in the coming year. This study examined Edx, Coursera, Udacity, and Course Builder parameters, where two parameters, learner and institutional perspective has been analyzed with its various sub-parameters after a tree algorithm has been executed to achieve the student-centric MOOCs platform. According to the results of the study, the proposed algorithm is providing the estimated values depending on different parameters. It took account of every question relating to each parameter. And it provided a final assessment according to the user preference of the parameters. The author has implemented the decision tree algorithm on the four important student centric core parameters which are .Moreover the author also suggested the best platform with respect to above mentioned student centric parameters through ID3 algorithm.

1. Introduction

E-learning is a useful method for delivering online courses. Nowadays, when technology is developing day by day, and people wants more knowledge to develop his skill. Over here, the e-learning platforms help to achieve it without physically attending any academic institutes. One of the most popular is e-learning methods is MOOCs. **M**assive (enrolment numbers) **O**pen (no mandatory qualifications) **O**nline (fully) **C**ourse (structured) is an online web-based learning platform aimed at unlimited participation and open access. The basic philosophy of MOOCs is 3A's i.e., Anytime, Anyone, Anywhere.

The stakeholders are as follows:

Stakeholders	Privileges / Functions
Learner	Register, View Course, View Units, Local Assessments, Final Assessment, View Result
Course Creator	Create Course, Add Units, Add Assessments, View student's Progress & Score
Admin	Post multiple course on site, Authenticate and authorize users as per the roles, Run course on development server

Popular MOOCs Platforms

- **edx**
  edX is a non-profit organization, and it is open source which provides online courses across different subject domain like management humanities technology and many more. MIT and Harvard University has owned and funded EDX.

- **Coursera**
  Coursera is very well famous MOOCs Provider that the main focuses are on more courses, and it is based on profit educational technology. Andrew Ng and Daphene Koller initiated

it in April 2012. It is a proprietary provider on which content provided by participating universities is hosted.

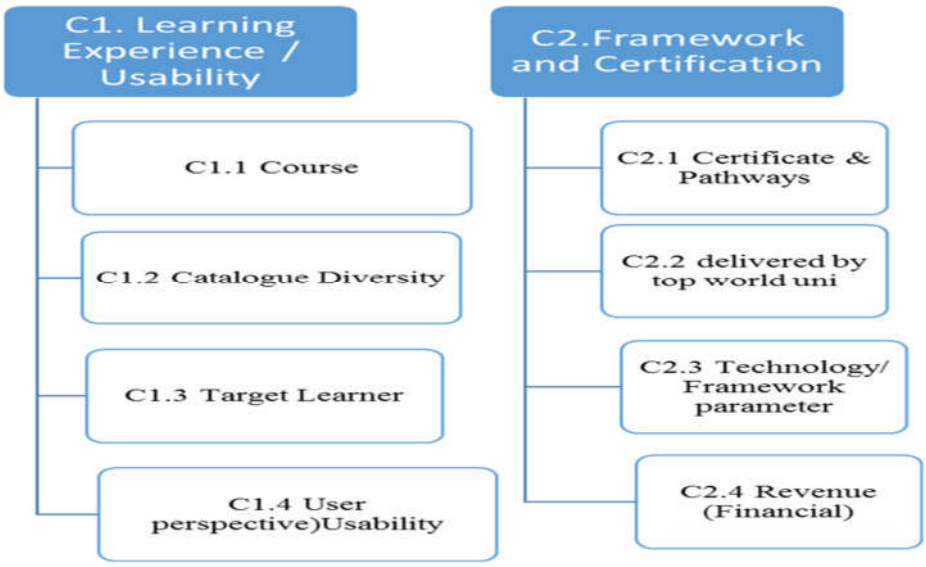
- **UDACITY**
  Udacity was developed by Stanford University experiment in which Sebastian Thrun and Peter Norvig both of them had offered their "Introduction to Artificial Intelligence" course online to anyone, for free. More than 160 000 students from more than 190 countries enrolled.

- **Course Builder (NPTEL (National Program on Technology Enabled Learning))**
  NPTEL, a project is funded by the Ministry of Human Resource Development (MHRD), and it is developed in Google Course builder that is an open-source platform. It provides e-learning through online Web and Video courses in different domains like Engineering, Sciences, Technology, Management and Humanities. And it is a National Program on Technology Enhanced Learning.

2. Identification of MOOCs parameters

One of the major important factor for the implementation of MOOCs is its parameters i.e. what are the important parameters are available in MOOCs platform with respect to teacher, learners and institutions. There are two broader category of parameters are identified.

- **Learner Prospective:** Learning experience with respect to course, content, delivery of course, platform, graphical user interface, etc. treated as core parameters for learners.
- **Institutional prospective:** Like learners, it is also very important to choose platform from institute prospective i.e. platform should be feasible in terms of operational, financial, technical, etc.



The parameter and sub-parameters of each broader category is as follow:

Learning Experience / Usability	Technology/Framework parameter
Course Element • Course type (Pace, Schedule) • Vide transcript (Transcript required), Translation services • Resource (Short video lecture, Downloadable, Pre-recorder videos, Reading material ,Learn more) • Connection with social network • Interactive quiz • Assessment Tools(Type of Assessment) • One –One Coaching / online • Discussion groups, Peer connect **User perspective) Usability** • Site navigation and structure • Site visibility and organization(User's satisfaction) • Site effectiveness & User's satisfaction: • Site content	• Course Language support • Website Language support • Technology /(lowest index of failure) • Responsive Website • Openness of technology • Mobile-app (mobility/ubiquity) • Use of Multimedia • Subscription Required • verification identity **Financial/Revenue** • Verified Assessment • Employment guarantee(Facilitate student recruitment) • Corporate Training • Tuition Fees • Application screening • Course Hosting **Target Learner/Audience** Academic, Professional Skill-Worker, Postgraduate, Undergraduate School, Certificate, Diploma

3. Implementation of MOOCs Platform (Student Centric)

Decision Tree Algorithm has been executed to achieve the student centric MOOCs platform.

- **Proposed Algorithm Implementation**

- **Step 1:** classify the collected data and trend dataset of the MOOCs parameters. Establish classification attribute data that Is Table R. (H: High, M: Medium, L: Low, Y-Yes, N-No)

Pace	Target Learner	Multimedia Resource	Coarse Language support	Pathway	Search Filters	N of course (Strength)(Max Class Size)	Usability(Usage)	Assement evaluation	Platform
Self-paced	Academic	H	M	Xseries	H	M	M	H	edX
schedule	Profesional	H	M	Xseries	H	M	M	H	edX
Schedule	Academic	H	M	Micro master	H	M	M	H	edX
self-paced	Professional	H	M	Micro master	H	M	M	H	edX
Schedule	Academic	H	M	Professional	H	M	M	H	edX
self-paced	Professional	H	M	Professional	H	M	M	H	edX
self-paced	Academic	M	H	Specializations	L	H	H	M	Coursera
schedule	Professional	M	H	Specializations	L	H	H	M	Coursera
Schedule	Academic	M	H	Specializations	L	H	H	M	Coursera
self-paced	Professional	M	H	Specializations	L	H	H	M	Coursera
self-paced	Academic	L	M	N	M	L	L	L	Course builder
schedule	Professional	L	M	N	M	L	L	L	Course builder
Schedule	Academic	L	M	N	M	L	L	L	Course builder
self-paced	Professional	L	M	N	M	L	L	L	Course builder
self-paced	Professional	L	L	Nanodegrees	M	L	M	M	Udacity
self-paced	Profesional	L	L	NaNdegrees	M	L	M	M	Udacity

Table R

- **Step 2:** classification Entropy has been calculated.

$$H(X) = -\sum_{i=1}^{n} p(x_i) \log_b p(x_i)$$

Platform is output attribute = P (6/16, 4/16, 4/16, 2/16)
HP(r)= -(6/16log(6/16) +4/16log(4/16) +4/16log (4/16) +2/16log(2/16) =0.5736

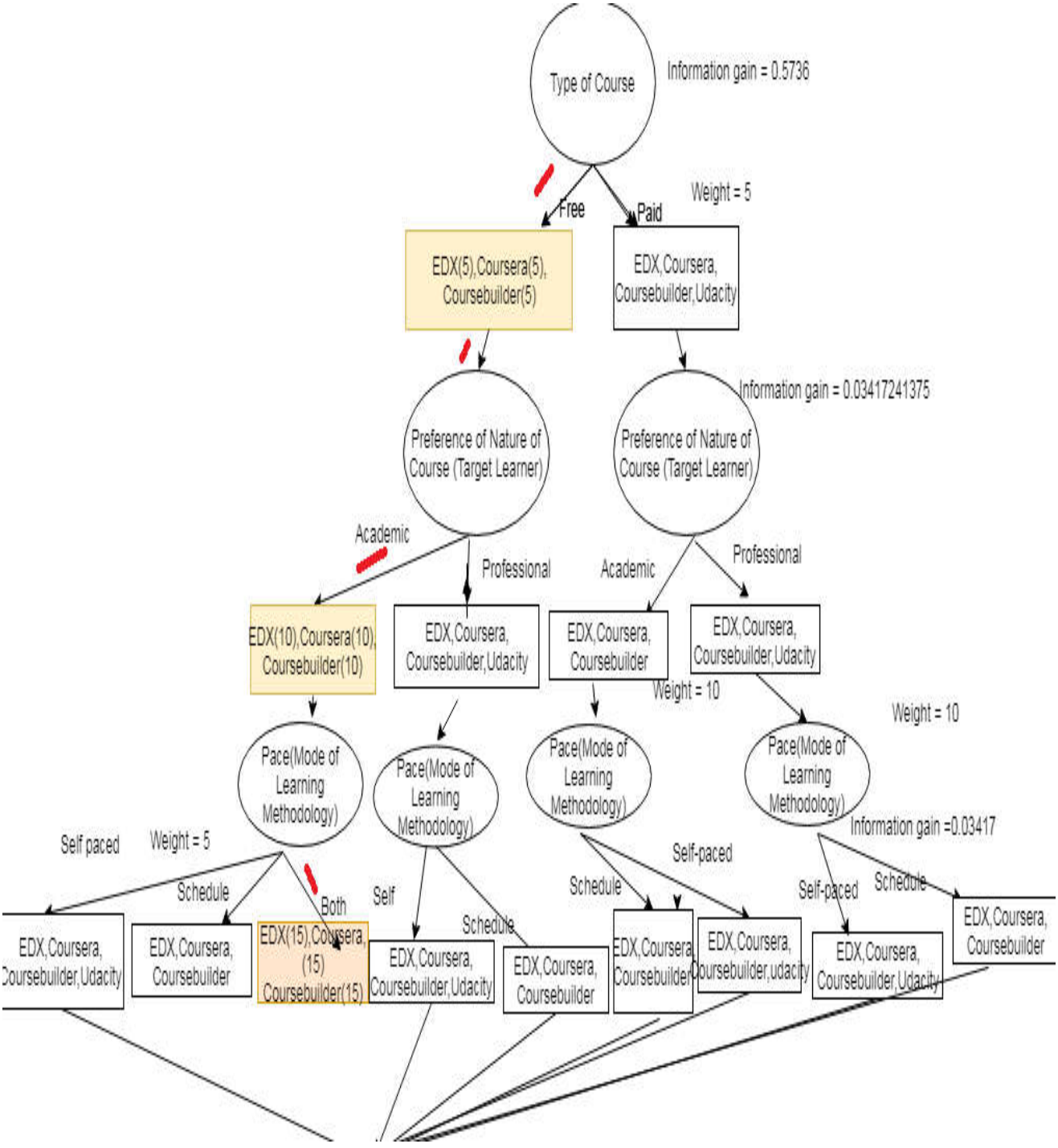
- **Step 3:** Information gain has been calculated For each attribute in R (Trend dataset),
H (Target learner) = (7/16) H (Academic), (9/16) H (T Professional)

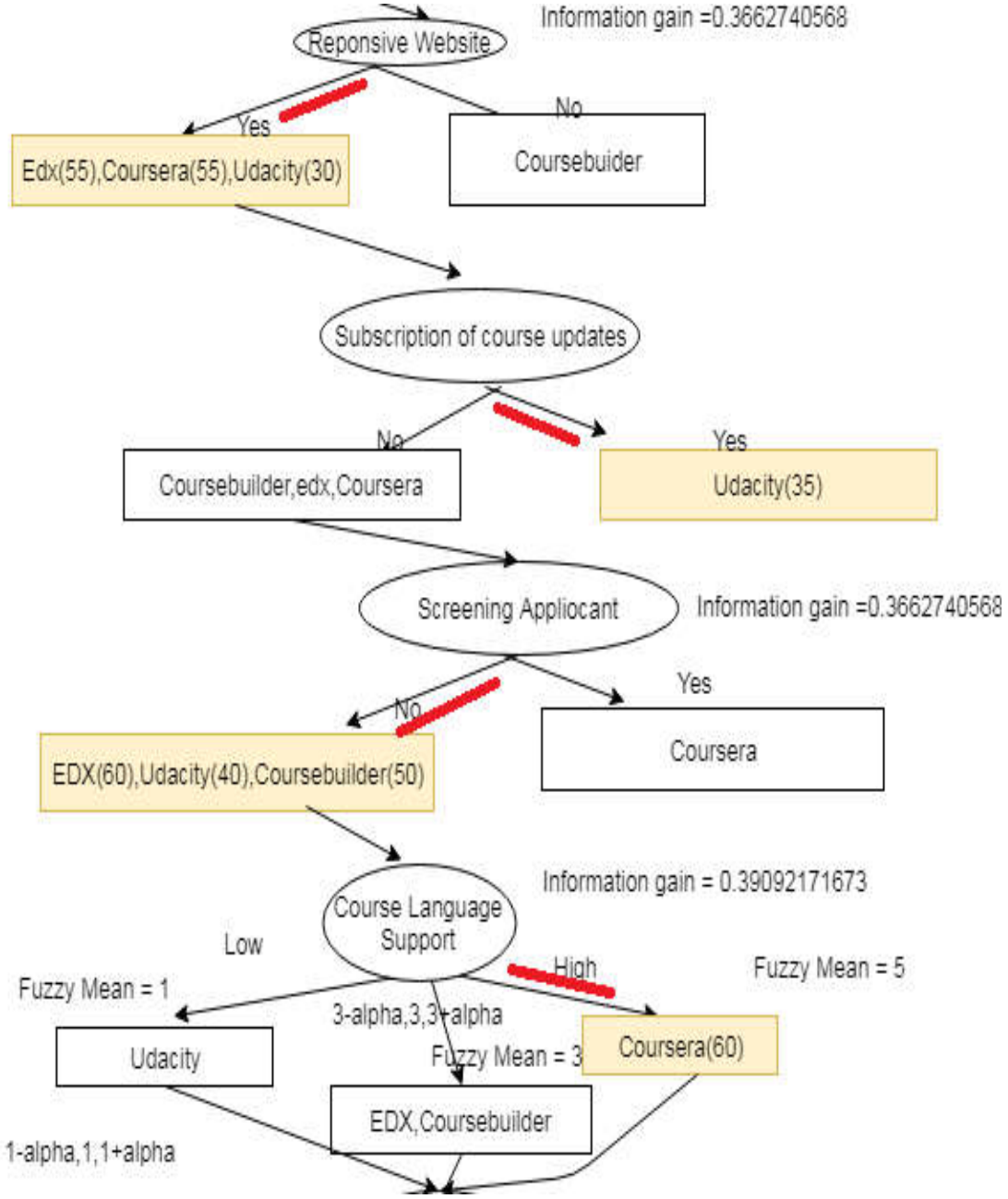
= 7/16(-(3/7 log(3/7) +2/7 log(2/7) + 2/7 log(2/7)))+9/16(-(3/log(3/9)+2/9log(2/9)+2/9log(2/9) +2/9log(2/9))) = **0.53942758625**

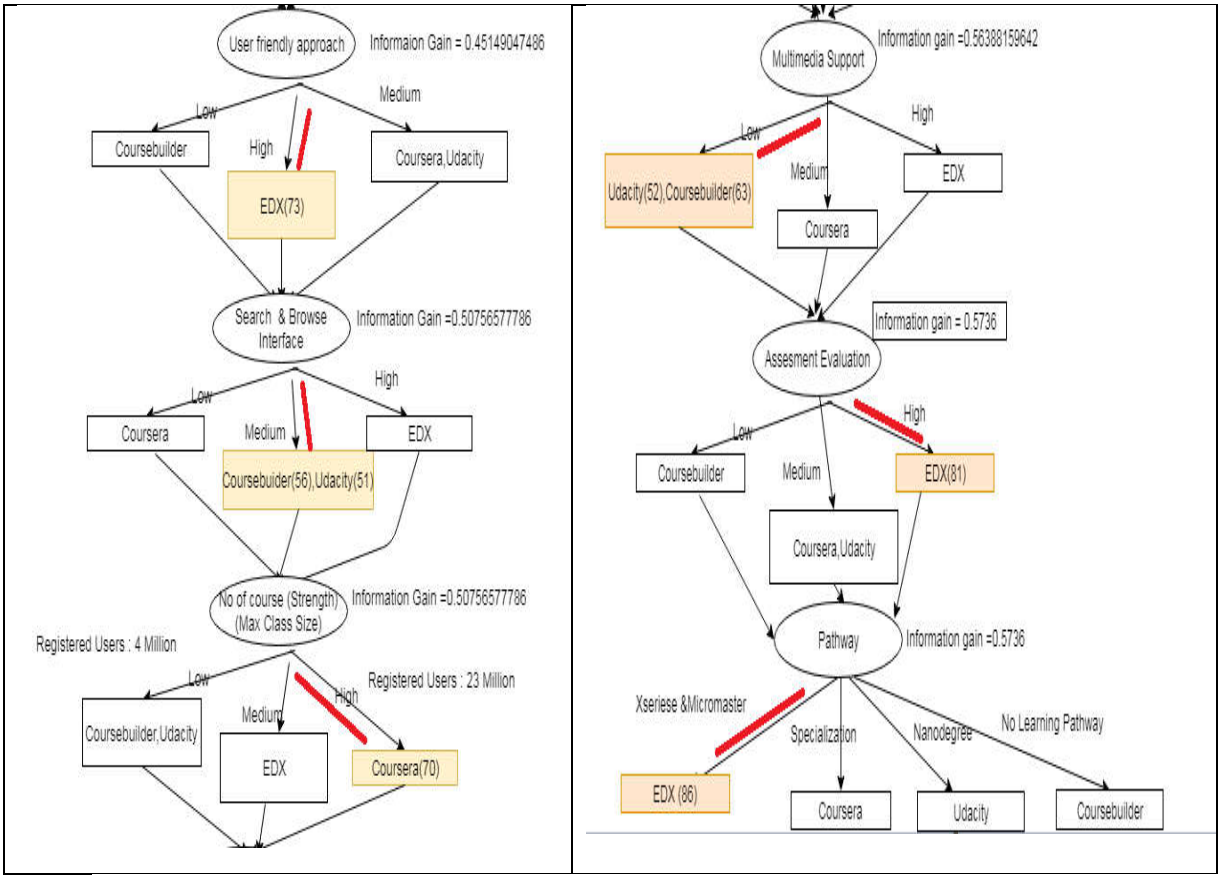
$$Gain(T, A) = Entropy(T) - \sum_{v \in Values(A)} \frac{|T_v|}{|T|} Entropy(T_v)$$

Information gain = H(T)-H(X, T) gain (course, T)
0.5736-0.5395 = **0.03417241375**

Main entropy	0.5736	
Parameters	**Entropy**	**Information gain**
Course	0.5736	0
Pace	0.539427586	0.034172414
Target Learner	0.539427586	0.034172414
Multimedia Resource	0.009718404	0.563881596
Mobile App	0.130313959	0.443286041
Self-hosted	0.235042608	0.338557392
Course Language support	0.182678283	0.390921717
Website language support	0.182678283	0.390921717
Tuition Fees	0.247467641	0.326132359
Course categories	0.056443124	0.517156876
Search Filters	0.066034222	0.507565778
No of course (Strength)(Max Class Size)	0.066034222	0.507565778
Usability(Usage)	0.122109525	0.451490475
Assessment evaluation	0	0.5736


Type of Course
Information gain = 0.5736
Free
Paid
Weight = 5
EDX(5),Coursera(5), Coursebuilder(5)
EDX,Coursera, Coursebuilder,Udacity
Information gain = 0.03417241375
Preference of Nature of Course (Target Learner)
Preference of Nature of Course (Target Learner)
Academic
Professional
Academic
Professional
EDX(10),Coursera(10), Coursebuilder(10)
EDX,Coursera, Coursebuilder,Udacity
EDX,Coursera, Coursebuilder
EDX,Coursera, Coursebuilder,Udacity
Weight = 10
Weight = 10
Pace(Mode of Learning Methodology)
Pace(Mode of Learning Methodology)
Pace(Mode of Learning Methodology)
Pace(Mode of Learning Methodology)
Information gain =0.03417
Self paced
Weight = 5
Schedule
Both
Self
Schedule
Schedule
Self-paced
Self-paced
Schedule
EDX,Coursera, Coursebuilder,Udacity
EDX,Coursera, Coursebuilder
EDX(15),Coursera, (15) Coursebuilder(15)
EDX,Coursera, Coursebuilder,Udacity
EDX,Coursera, Coursebuilder
EDX,Coursera, Coursebuilder
EDX,Coursera, Coursebuilder,udacity
EDX,Coursera, Coursebuilder,Udacity
EDX,Coursera, Coursebuilder


Information gain =0.3662740568
Reponsive Website
Yes
No
Edx(55),Coursera(55),Udacity(30)
Coursebuider
Subscription of course updates
No
Yes
Coursebuilder,edx,Coursera
Udacity(35)
Screening Appliocant
Information gain =0.3662740568
Yes
No
EDX(60),Udacity(40),Coursebuilder(50)
Coursera
Information gain = 0.39092171673
Course Language Support
Low
High
Fuzzy Mean = 1
Fuzzy Mean = 5
3-alpha,3,3+alpha
Udacity
Fuzzy Mean = 3
Coursera(60)
EDX,Coursebuilder
1-alpha,1,1+alpha



- **Step 4:** Split the set attributes into subsets using in which resulting entropy is minimum or information gain is maximum/minimum.
    - Repeat steps for all attributes.
- **Step 5:** Quantitative Scale for Ordinal Attributes

Fuzzy Mean Group (Alpha =0.5)	Weight W(T)
High: 5-alpha, 5, 5+alpha	5
Medium: 3-alpha, 3, 3+alpha	3
Low: 1-alpha, 1, 1+alpha	1

Quantitative Scale for Nominal Attributes. W (F) =5 Pt
Quantitative Scale for Binary Attributes. W (F) =Yes: 5Pt, No: 0 Pt

- Convert Weight in to Percentage with Formula

F(X) = Weight(X) *100/Total Weight of Questions
Where Maximum weight factor for each question W (F) = 5

4. Conclusion

In this research paper we have website responsive, multimedia support is an important aspect. If among this platform if we see the paid course then they have to select Udacity.and free courses is provided by edx,courser ,coursebuilder and udacity.Academic courses that is available to

Reference

- Sanz-Martínez, L., Er, E., Dimitriadis, Y., Martínez-Monés, A., & Bote-Lorenzo, M. L. (2018). Supporting teachers in the design and implementation of group formation policies in MOOCs: A case study. *Journal of Universal Computer Science*, 24(8), 1110-1130.

- Kashyap, A., & Nayak, A. (2018). Different Machine Learning Models to Predict Dropouts in MOOCs. 2018 International Conference on Advances in Computing, Communications and Informatics, ICACCI 2018, 80–85. https://doi.org/10.1109/ICACCI.2018.8554547

- Kumar, A., & Brahmbhatt, S. N. (2018). Massive Open Online Courses (MOOCs), Features and Platforms. In Library and Information Science in the Age of MOOCs (pp. 83–99). IGI Global. https://doi.org/10.4018/978-1-5225-5146-1.ch005

- Kumar, A., Mittal, P., & Brahmbhatt, S. N. (2018). MOOCs Parameters: A Way Forward to Identify Best MOOCs Platform. In Library and Information Science in the Age of MOOCs (pp. 132–145). IGI Global. https://doi.org/10.4018/978-1-5225-5146-1.ch008

- Laveti, R. N., Kuppili, S., Ch, J., Pal, S. N., & Babu, N. S. C. (2017). Implementation of learning analytics framework for MOOCs using state-of-the-art in-memory computing. 2017 5th National Conference on E-Learning & E-Learning Technologies (ELELTECH), 1–6. https://doi.org/10.1109/ELELTECH.2017.8074997

- Najafi, H., Rolheiser, C., & Harrison, L. (2017). Variations in pedagogical design of massive open online courses (MOOCs) across disciplines. Teaching and Learning Inquiry, 5(2), 47–64. https://doi.org/10.20343/teachlearninqu.5.2.5