

GUI BASED PREDICTION OF E-LEARNING WEBSITE USING NAIVE BAYES APPROACH

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ABSTRACT

Big Data is a large amount of data in which pouring from various data sources and has different formats. Big Data is much more than a collection of datasets with different formats, it is an important asset which can be used to obtain enumerable benefits. In the previous system, there was huge data which are being stored in databases, but because of the varied nature of this Data, the traditional relational database systems are incapable of handling this Data. The focus of our project to use Educational Data Mining (EDM) techniques to conduct a quantitative analysis of student's interaction with an e-learning system through instructor-lead non-graded and graded courses. This project is useful for establishing a guideline for a series of online short courses for them. A group of students' access behavior in an e-learning system was analyzed and they were grouped according to their course access log records. It will create a difference in the learning environments that change the online access behavior of a student group. By this the students have a good technological competency, have moderate competency in interaction with learning content, and lack of interaction skills with their learning community. Here additionally we compare and discuss the performance of comparative study with finding the best accuracy apply in various supervised machine learning techniques from the given dataset with GUI based application by given dataset attributes.

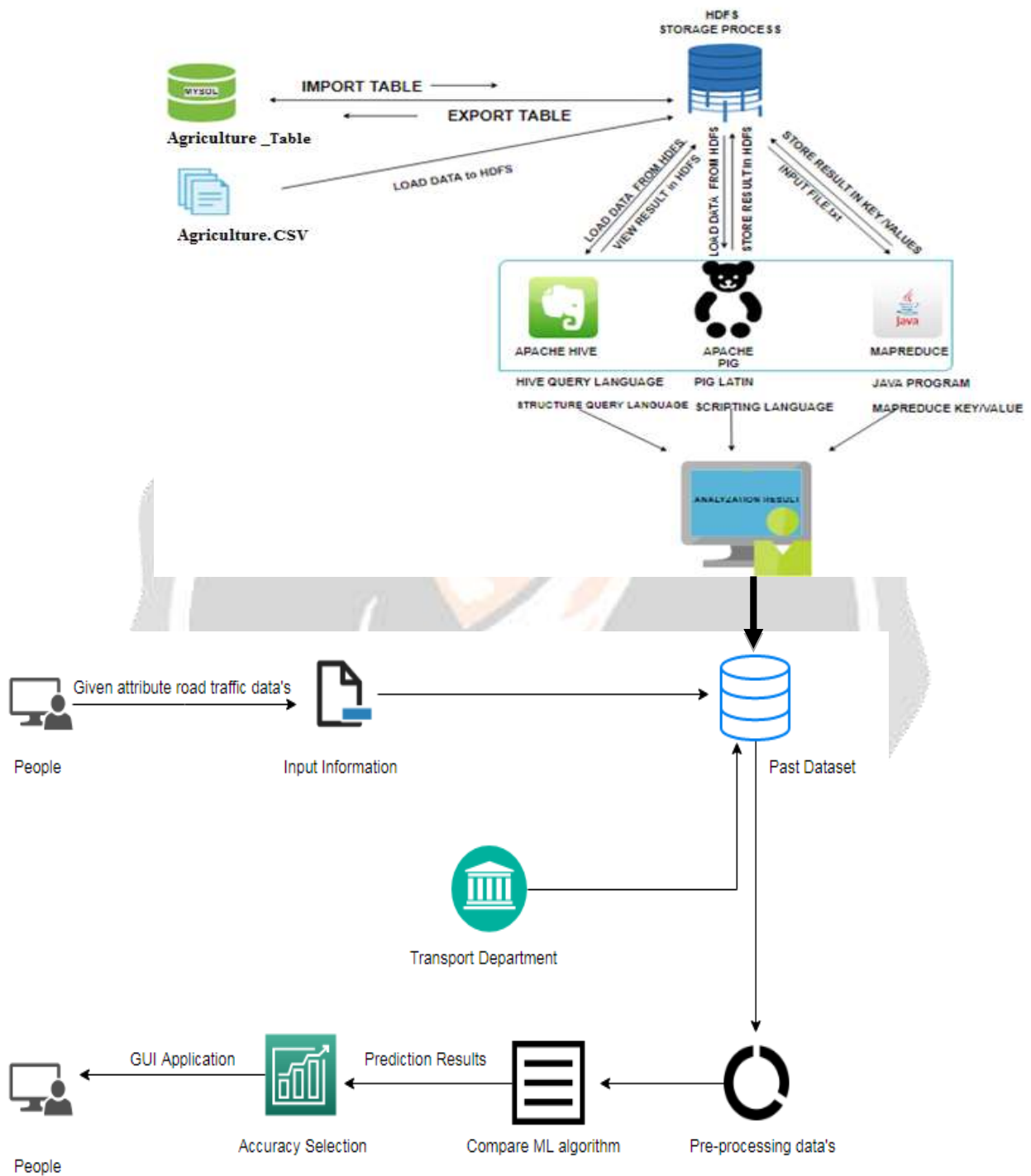
Keywords: Big Data, Datasets, Educational Data Mining (EDM) techniques, Machine Learning, Prediction of Accuracy result.

I.INTRODUCTION:

The data which is beyond to the storage capacity and beyond to the processing power such a data is called Big Data. Big data means really a big data; it is a collection of large datasets that cannot be processed using traditional computing techniques. Big data is not merely a data; rather it has become a complete subject, which involves various tools, techniques and frameworks. Data which are very large in size is called Big Data. Normally we work on data of size MB(Wordbook ,Excel) or maximum GB(Movies, Codes) but data in Petabytes i.e. 10^{15} byte size is called Big Data. It is stated that almost 90% of today's data has been generated in the past 6 years. Machine learning is to predict the future from past data. Machine learning (ML) is a type of artificial intelligence (AI) that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the development of Computer Programs that can change when exposed to new data and the basics of Machine Learning, implementation of a simple machine learning algorithm using python. Process of training and prediction involves use of specialized algorithms. It feed the training data to an algorithm, and the algorithm uses this training data to give predictions on a new test data.

Machine learning can be roughly separated in to three categories. There are supervised learning, unsupervised learning and reinforcement learning. Supervised learning program is both given the input data and the corresponding labeling to learn data has to be labeled by a human being beforehand. Unsupervised learning is no labels. It provided to the learning algorithm. This algorithm has to figure out the clustering of the input data. Finally, Reinforcement learning dynamically interacts with its environment and it receives positive or negative feedback to improve its performance. Data scientists use many different kinds of machine learning algorithms to discover patterns in python that lead to actionable insights. At a high level, these different algorithms can be classified into two groups based on the way they "learn" about data to make predictions: supervised and unsupervised learning..

II.ARCHITECTURE DIAGRAM



III.IMPLEMENTATION

ANALYSIS:

- 3.1.1. Preprocessing Online learning Database.
- 3.1.2. Storage /Analyze Query.
- 3.1.3. Processing (MapReduce).

PREDICTION:

- 3.2.1. Data validation process and preprocessing.
- 3.2.2. Data Validation/ Cleaning/Preparing Process.
- 3.2.3 Data analysis of visualization process.
- 3.2.4 Exploratory Data Analysis of E-learning website Prediction / Performance of Naive bayes Approach.
- 3.2.5 Comparing Algorithm with prediction in the form of best accuracy result /Prediction result by accuracy.

3.1.1 Preprocessing Online learning Database:

In this analyzing the data with different kinds of fields in Microsoft Excel then it converted into comma delimited format which is said to be csv (comma separator value) file and moved to MySQL backup through Database. Here by getting historical data we have to convert those historical batch processing data from (.xlsx) format to (.csv) format and by taking backup of all those data in MYSQL Database to avoid loss of data.

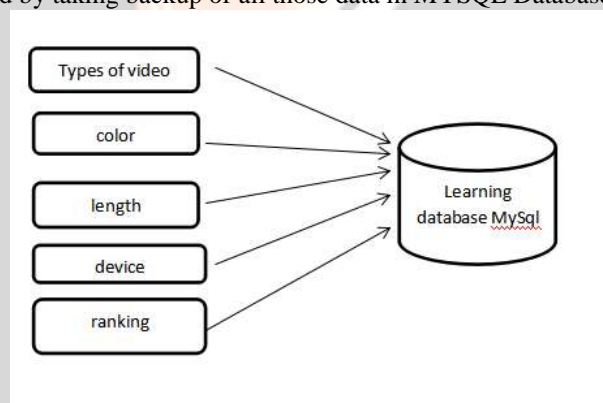


Fig .3.1.1 Preprocessing Database

3.1.2 Storage /Analyze Query:

In this all those backup data which we have stored in MYSQL and importing all those data by use of sqoop commands to HDFS(Hadoop Distributed File System).now all the data are stored in HDFS were it is ready to get processed by use of hive. We are getting all those data from HDFS to HIVE by use of sqoop import command where hive is ready to analyze. Here in HIVE we can process only structured data to analyze. By extracting only the meaningful data and neglecting unclenched data we can analyze the data in more effective manner by use of hive.

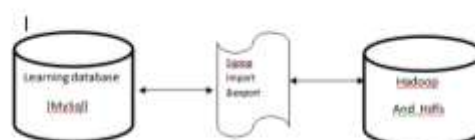
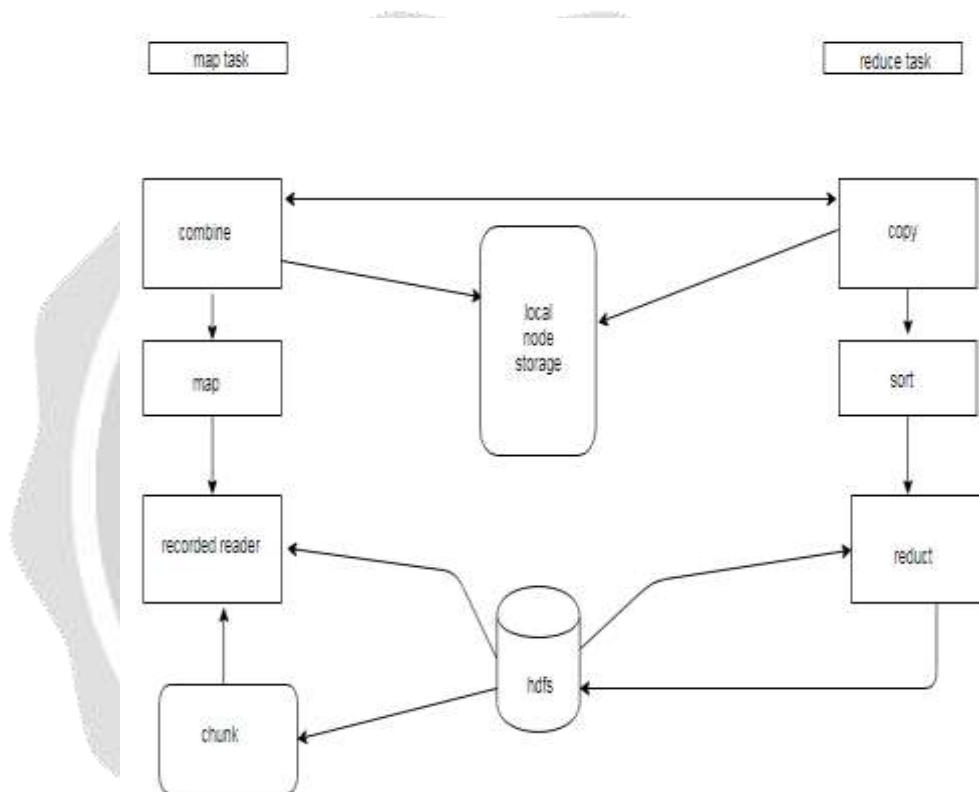


fig .3.1.2 Storage /Analyze Query

3.1.3 Processing (MapReduce):

MapReduce is a framework using which we can write applications to process huge amounts of data in parallel, on large clusters of commodity hardware in a reliable manner. MapReduce is a processing technique and a program model for distributed computing based on java. The Map Reduce algorithm contains two important tasks, namely Map and Reduce. MapReduce program executes in three stages, namely map stage, shuffle stage, and reduce stage. The map or mapper's job is to process the input data. Generally the input data is in the form of file or directory and is stored in the Hadoop file system (HDFS). The input file is passed to the mapper function line by line. The mapper processes the data and creates several small chunks of data. This stage is the combination of the Shuffle stage and the Reduce stage. The Reducer's job is to process the data that comes from the mapper. After processing, it produces a new set of output, which will be stored in the HDFS.



3.1.1 Mapreduce diagram.

3.2.1 Data validation process and pre-processing:

Validation techniques in machine learning are used to get the error rate of the Machine Learning (ML) model, which can be considered as close to the true error rate of the dataset. To finding the missing value, duplicate value and description of data type whether it is float variable or integer. Data collection, data analysis, and the process of addressing data content, quality, and structure can add up to a time-consuming to-do list. During the process of data identification, it helps to understand data and its properties; this knowledge will help to choose which algorithm to use to build model.

LID	LTUTORIAL	LENGTH	VIDEO	GENDER	IP_ADDRESS	DEVICES	DATE	REVIEWS	POPULAR	COLOUR	MODELLING	RANKI
0	U001	INDUSTRY	13:55	MP4	MALE	10.255.0.0-10.255.255.255	PC	12/4/2016	NICE	ENTERPRENEUR	G	LOW
1	U002	COURSERA	22:25	AVI	MALE	129.215.0.0-129.215.255.255	LAPTOP	1/30/2015	VERY NICE	EDUCATION	R	MEDIUM
2	U003	LSMAG	6:10	AVI	MALE	129.215.0.0-129.215.0.255	MOBILE	11/15/2016	EXCELLENT	LEARNING	Y	LOW
3	U004	INFOGRAPHICS	15:20	AVI	MALE	129.215.0.4-129.215.0.7	IPAD	4/11/2015	WORST	TECHNOLOGY	B	MEDIUM
4	U005	GUILD	12:35	AVI	MALE	129.215.0.8-129.215.0.15	TAB	3/31/2016	SUPERB	CURRENCY	O	LOW

Fig.3.2.1 Data validation process and pre-processing

3.2.2 Data Validation/ Cleaning/Preparing Process:

A validation dataset is a sample of data held back from training model that is used to give an estimate of model skill while tuning model's and procedures that can be used to make the best use of validation and test datasets when evaluating models. Data cleaning / preparing by rename the given dataset and drop the column etc. to analyze the uni-variate, bi-variate and multi-variate process. The primary goal of data cleaning is to detect and remove errors and anomalies to increase the value of data in analytics and decision making.

3.2.3 Data analysis of visualization process:

Data visualization is an important skill in applied statistics and machine learning. Data visualization provides an important suite of tools for gaining a qualitative understanding. This can be helpful when exploring and getting to know a dataset and can help with identifying patterns, corrupt data, outliers, and much more. With a little domain knowledge, data visualizations can be used to express and demonstrate key relationships in plots and charts that are more visceral and stakeholders than measures of association or significance. Outliers in input data can skew and mislead the training process of machine learning algorithms resulting in longer training times, less accurate models and ultimately poorer results. Even before predictive models are prepared on training data, outliers can result in misleading representations and in turn misleading interpretations of collected data. Outliers can skew the summary distribution of attribute values in descriptive statistics like mean and standard deviation and in plots such as histograms and scatterplots, compressing the body of the data. Cross-validation is a technique in which we train our model using the subset of the data-set and then evaluate using the complementary subset of the data-set.

	LTUTORIAL	GENDER	DEVICES	POPULAR	MODELLING	class
0	INDUSTRY	MALE	PC	ENTERPRENEUR	LOW	1
1	COURSERA	MALE	LAPTOP	EDUCATION	MEDIUM	0
2	LSMAG	MALE	MOBILE	LEARNING	LOW	0
3	INFOGRAPHICS	MALE	IPAD	TECHNOLOGY	MEDIUM	1
4	GUILD	MALE	TAB	CURRENCY	LOW	0

Fig.3.2.3 Data analysis of visualization process

3.2.4 Exploratory Data Analysis of E-learning website Prediction / Performance of Naive Bayes approach:

The Naive Bayes algorithm is an intuitive method that uses the probabilities of each attribute belonging to each class to make a prediction. . Naive bayes simplifies the calculation of probabilities by assuming that the probability of each attribute belonging to a given class value is independent of all other

attributes. To make a prediction we can calculate probabilities of the instance belonging to each class and select the class value with the highest probability. Naive Bayes classifiers have high accuracy and speed on large datasets.

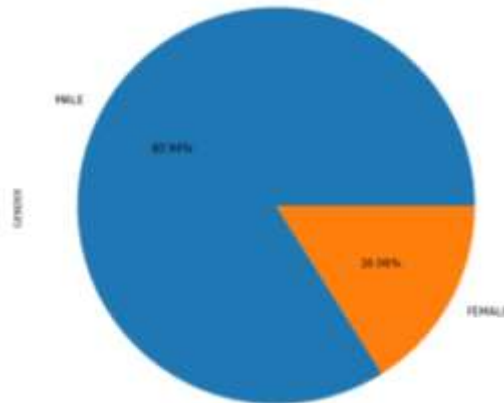


Fig. Data Analysis of E-learning website Prediction

3.2.5 Comparing Algorithm with prediction in the form of best accuracy result /Prediction result by accuracy:

It is important to compare the performance of multiple different machine learning algorithms consistently and it will discover to create a test harness to compare multiple different machine learning algorithms in Python with scikit-learn. Using resampling methods like cross validation, you can get an estimate for how accurate each model may be on unseen data. A way to do this is to use different visualization methods to show the average accuracy, variance and other properties of the distribution of model accuracy.

The predicted value can be anywhere between negative infinity to positive infinity. We need the output of the algorithm to be classified variable data. This process is iterated throughout the whole k folds.

True Positive Rate(TPR) = TP / (TP + FN)

False Positive rate(FPR) = FP / (FP + TN)

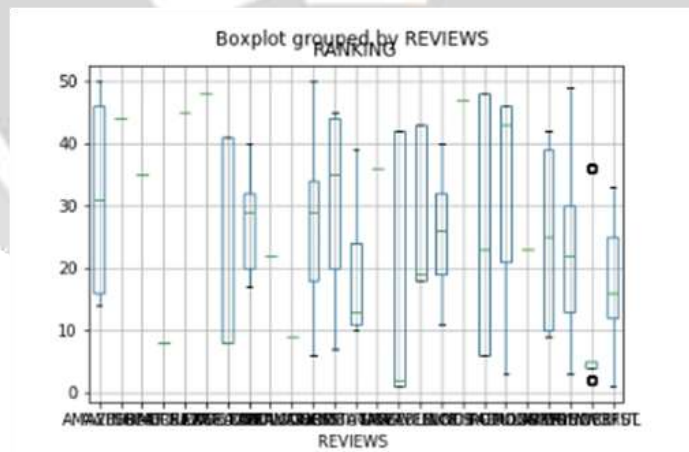


Fig.3.2.5 Prediction result Diagram

4.1 Advantages:

- No data loss problem and efficient data processing. It uses the same technology to go over students defections towards competitor websites. It consumes a humongous amount of data, thoroughly goes over all the related trends and activities, and finally provides concise and precise forecasts with real-time data.

4.2 Application:

- As with any other website, application or product, compatibility is always a delicate matter. We need to **always be sure that the material we post for learners to use is compatible** with all the possible web

browsers or platforms being used. To avoid discouraging learners, keeping it simple is preferable to overextending ourselves and possibly hitting an incompatibility roadblock.

- All of these key elements have the ability to foster a supportive, effective e-learning environment. When all of these essential components are in place, online learning establishments have the ability to not only provide students with the skill sets and knowledge base that they are looking for, but a virtual education platform that helps contribute to the future success of (and serves as a model of excellence for) the e-learning industry.

V. ALGORITHM AND TECHNIQUES

5.1 Algorithm Explanation

MapReduce is a processing technique and a program model for distributed computing based on java. The MapReduce algorithm contains two important tasks, namely Map and Reduce. Map takes a set of data and converts it into another set of data, where individual elements are broken down into tuples (key/value pairs). Secondly, reduce task, which takes the output from a map as an input and combines those data tuples into a smaller set of tuples. As the sequence of the name MapReduce implies, the reduce task is always performed after the map job. The major advantage of MapReduce is that it is easy to scale data processing over multiple computing nodes. Under the MapReduce model, the data processing primitives are called mappers and reducers. Decomposing a data processing application into mappers and reducers is sometimes nontrivial. But, once we write an application in the MapReduce form, scaling the application to run over hundreds, thousands, or even tens of thousands of machines in a cluster is merely a configuration change. This simple scalability is what has attracted many programmers to use the MapReduce mode.

5.2 ALGORITHM:

- Generally MapReduce paradigm is based on sending the computer to where the data resides!
- Map-Reduce program executes in three stages, namely map stage, shuffle stage, and reduce stage.
 - **Map stage** : The map or mapper's job is to process the input data. Generally the input data is in the form of file or directory and is stored in the Hadoop file system (HDFS). The input file is passed to the mapper function line by line. The mapper processes the data and creates several small chunks of data.
 - **Reduce stage** : This stage is the combination of the **Shuffle** stage and the **Reduce** stage. The Reducer's job is to process the data that comes from the mapper. After processing, it produces a new set of output, which will be stored in the HDFS.

5.3. Software Description

Anaconda Navigator is a desktop graphical user interface (GUI) included in Anaconda distribution that allows users to launch applications and manage conda packages, environments and channels without using command-line commands. . **The Jupyter Notebook** :The Jupyter Notebook is an open-source web application that allows to create and share documents that contain live code, equations, visualizations and narrative text. Uses include: data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more.

Used Python Packages:

5.3.1 sklearn:

- In python, sklearn is a machine learning package which include a lot of ML algorithms.
- Here, we are using some of its modules like train_test_split, DecisionTreeClassifier or Logistic Regression and accuracy_score.

5.3.2 NumPy:

- It is a numeric python module which provides fast math functions for calculations.

- It is used to read data in numpy arrays and for manipulation purpose.

5.3.3 Pandas:

- Used to read and write different files.
- Data manipulation can be done easily with data frames.

5.3.4 Matplotlib:

- Data visualization is a useful way to help with identify the patterns from given dataset.

5.4 NAIVE BAYES ALGORITHM:

Naive Bayes algorithm is an intuitive method that uses the probabilities of each attribute belonging to each class to make a prediction. It is the supervised learning approach would come up with the model as a predictive modeling problem probabilistically. Naive bayes simplifies the calculation of probabilities by assuming that the probability of each attribute belonging to a given class value is independent of all other attributes. Naive Bayes is a statistical classification technique based on Bayes Theorem. It is one of the simplest supervised learning algorithms. Naive Bayes classifier is the fast, accurate and reliable algorithm. Naive Bayes classifiers have high accuracy and speed on large datasets..

VI.RESULT

We are using Hadoop to Store and analyze the datasets of the Online learning data and the student access behavior in Hadoop ecosystem using Big Data Technology.. It can be inferred from this model that, area analysis and use of machine learning technique is useful in developing prediction models that can help a e-learners reduce the long process of searching .

6.1 MySql dataset

```
mysql> desc website;
```

Field	Type	Null	Key	Default	Extra
Id	varchar(45)	NO	PRI	NULL	
Website	varchar(45)	NO		NULL	
Length	varchar(45)	NO		NULL	
Format	varchar(45)	NO		NULL	
Gender	varchar(45)	NO		NULL	
Ip_addr	varchar(45)	NO		NULL	
Devices	varchar(45)	NO		NULL	
Date	varchar(45)	NO		NULL	
Reviews	varchar(45)	NO		NULL	
Popular	varchar(45)	NO		NULL	
Colour	varchar(45)	NO		NULL	
Modelling	varchar(45)	NO		NULL	
Ranking	int(10) unsigned	NO		NULL	

13 rows in set (8.00 sec)

6.2 Dataset

INDUSTRY	ENTREPRENEUR	G	LOW	19
COURSERA	EDUCATION	R	MEDIUM	34
LSHMAG	LEARNING	Y	LOW	41
INFOGRAPHICS	TECHNOLOGY	B	MEDIUM	1
GUILD	CURRENCY	O	LOW	42
LYNDA	EDUCATION	P	HIGH	2
TEACHERTUBE	LEARNING	V	MEDIUM	43
REDDIT	PROGRAMMING	M	HIGH	20
GOOGLENEWS	NEWS FEED	G	HIGH	44
PENN	TEACHING	R	HIGH	35
MEMRISE	LEARNING	Y	MEDIUM	3
PLURALSIGHT	PROGRAMMING	B	MEDIUM	45
FUTURELEARN	PROGRAMMING	O	MEDIUM	21
BOUNDLESS	LEARNING	P	MEDIUM	46
BIGTHINK	LEARNING	V	LOW	36
OPENCULTURE	LANGUAGE	M	LOW	4
ADOBE	LEARNING	O	LOW	22
TEDED	CALCULUS	P	LOW	47
K5LEARNING	LEARNING	V	LOW	5
UDEMY	LEARNING	M	HIGH	23
KHANACADEMY	PROGRAMMING	G	HIGH	48
EDXBLOG	SOFTWARE	R	HIGH	6
BUSSU	LANGUAGE	Y	HIGH	37
ARTTCHHATE	LEARNING	R	HIGH	7

Done

6.3 CSV Dataset

```

_ID,LTUTORIAL,LENGTH,VIDEO ,GENDER ,IP_ADDRESS,DEVICES,DATE ,REVIEWS ,POPULAR,COLOUR,MODELLING,RANKING
J001,INDUSTRY,13:55,MP4,MALE,129.215.0.0 - 10.255.255.255,PC,12/4/2016,NICE ,ENTREPRENEUR,G,LOW ,19
J002,COURSERA,22:25,AVI,MALE,129.215.0.0 - 129.215.255.255,LAPTOP,1/30/2015,VERY NICE,EDUCATION,R,MEDIUM ,34
J003,LSMAG,6:10,AVI,MALE,129.215.0.0 - 129.215.0.255,MOBILE,11/15/2016,EXCELLENT ,LEARNING,Y,LOW ,41
J004,INFOGRAPHICS,15:20,AVI,MALE,129.215.0.4 - 129.215.0.7,IPAD,4/11/2015,WORST,TECHNOLOGY,B,MEDIUM ,1
J005,GUILD,12:35,AVI,MALE,129.215.0.8 - 129.215.0.15,TAB,3/31/2016,SUPERB,CURRENCY,D,LOW ,42
J006,LYNDA,15:40,AVI,MALE,129.215.0.16 - 129.215.0.19,PC,2/20/2017,WONDERFUL,EDUCATION,P,HIGH,2
J007,TEACHERTUBE,23:30,MP4,MALE,129.215.0.20 - 129.215.0.23,LAPTOP,3/1/2017,MARVELLOUS,LEARNING,V,MEDIUM ,43
J008,REDDIT,21:22,MKV,MALE,129.215.0.24 - 129.215.0.27,MOBILE,8/25/2016,EXTRAORDINARY,PROGRAMMING,M,HIGH,20
J009,GOOGLENEWS,12:15,AVI,MALE,129.215.0.28 - 129.215.0.31,IPAD,2/6/2016,AWESOME,NEWS FEED,G,HIGH,44
J010,PENN,8:50,MPG,MALE,129.215.0.32 - 129.215.0.63,TAB,5/11/2017,BAD,TEACHING,R,HIGH,35
J011,MEMRISE,17:30,3GP,MALE,129.215.0.64 - 129.215.0.67,PC,8/7/2016,POPULAR,LEARNING,Y,MEDIUM ,3
J012,PLURALSIGHT,1:07,WMV,MALE,129.215.0.68 - 129.215.0.71,LAPTOP,1/26/2016,CRAZY,PROGRAMMING,B,MEDIUM ,45
J013,FUTURELEARN,17:52,MOV,MALE,129.215.0.72 - 129.215.0.75,MOBILE,5/14/2016,NOT GOOD,PROGRAMMING,O,MEDIUM ,21
J014,BOUNDLESS,20:50,MPEG,MALE,129.215.0.76 - 129.215.0.79,IPAD,6/11/2016,AMAZING,LEARNING,P,MEDIUM ,46
J015,BIGTHINK,5:30,GIF,MALE,129.215.0.80 - 129.215.0.87,TAB,5/15/2015,LIKE,LEARNING,V,LOW ,36
J016,OPENCULTURE,23:15,WMV,MALE,129.215.0.88 - 129.215.0.91,PC,5/24/2017,LOVABLE,LANGUAGE,M,LOW ,4
J017,ADOBE,19:25,WMV,MALE,129.215.0.92 - 129.215.0.95,LAPTOP,9/5/2016,FABULOUS,LEARNING,O,LOW ,22
J018,TEDED,10:51,WMV,MALE,129.215.0.96 - 129.215.0.103,MOBILE,12/19/2015,NOT BAD,CALCULUS,P,LOW ,47
J019,KSLEARNING,15:05,WMV,MALE,129.215.0.104 - 129.215.0.107,IPAD,1/21/2015,WONDERFUL,LEARNING,V,LOW ,5
J020,UDEMY,13:20,WMV,MALE,129.215.0.108 - 129.215.0.111,TAB,12/9/2017,RUMOUR ONLY,LEARNING,M,HIGH,23
name:
    
```

OUTPUT:

Online learning which can handle huge amount of datasets of videos and documents developed for the students. By using Hadoop to Store and analyze the datasets of the Online learning data and the student access behavior in Hadoop ecosystem using Big Data Technology.



VII . CONCLUSION

The analytical process started from data cleaning and processing, missing value, exploratory analysis and finally model building and evaluation. We presented a study on Online learning which can handle huge amount of datasets of videos and documents developed for the students. We are using Hadoop to Store and analyze the datasets of the Online learning data and the student access behavior in Hadoop ecosystem using Big Data Technology.. It can be inferred from this model that, area analysis and use of machine learning technique is useful in developing prediction models that can help a e-learners reduce the long process of searching . To compare and discuss the performance of comparative study with finding the best accuracy apply in various supervised machine learning technique from the given dataset with GUI based application by given dataset attributes.

VIII.FUTURE WORK

Apache Spark is an open source processing engine built around speed, ease of use, and analytics. If you have large amounts of data that requires low latency processing that a typical Map Reduce program cannot provide, Spark is the alternative. Spark provides in-memory cluster computing for lightning fast speed and supports Java, Scala, and Python APIs for ease of development.

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