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# A Divination Model for Customer Product Purchase Status by Efficient Machine Learning Approaches

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## ABSTRACT

Machine Learning (ML) Set of computer instructions, Used to put into use an ml set of rules, is widely used in many application domain names along with money-based, big business, and engineering domains. Faults in ml set of computer instructions can purpose (existing all over a large area) losses in those application domain names. For that reason, it's far very important to manage and do powerful testing of ml software program to detect and put off its faults. But, ml set of rules is tough, specifically on producing (statement about a possible future event) used for checking behaviour correctness (including the usage of (described a possible future event) homes or expected/looked ahead to outputs). To deal with the/to speak to the learning optimising difficulty, this (statement for discussion/book written for college professors) provides a (like nothing else in the world) method of putting into use for supervised gaining knowledge of. The (understanding of deep things) hidden (under) the method is that there may be putting into uses (independently written) for a supervised getting to know set of computer instructions, and majority of them may also/and produce the expected output for a test enter ((even though there is the existence of) the fact that none of those putting into uses are fault-free). Especially, the proposed way of doing things gets a Logistic regression set of computer instructions for a take a look at input by way of jogging the test input on n putting into uses of the supervised studying set of rules, after which using the not unusual check output produced by way of a majority (decided/figured out via a percent (dividing line/point where something begins or changes)) of those n putting into uses. The proposed way of doing things includes (success plans/ways of reaching goals) to face/deal with challenges in ml (putting into) use of supervised learning: the definition of dataset in supervised learning, along side (ability to display or measure very small things) of (not agreeing/not happening in the same way) set of computer instructions setups across putting into uses. (in almost the same way), to improve dependability of supervised gaining knowledge of for the length of time of in-discipline use while getting/causing low runtime overhead, the method consists of green putting into use way of doing things. The reviews on the proposed method display that performance of putting into use is effective in detecting real faults in actual-world ml together with childlike (because of a lack of understanding) Naive Bayes putting into uses and more than one linear moving backward putting into uses, and the proposed method of putting into use much/a lot reduces the lack of walking (producing a lot with very little waste) putting into uses with high (statement about a possible future event) (quality of being very close to the truth or true number) and make a comparison with random forest and decision tree using Flipkart Dataset.

**Keywords :** ML, Python, Naïve Bayes, Logistic regression, Random Forest,Decision Tree.

## I. INTRODUCTION

Machine Learning is the study and construction of sets of computer instructions that can gain (understanding of deep things) from sample dataset and make data-driven (statements about possible future events) or decisions on new data. Tom M. Mitchell gave/given a formal definition: "A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P if its performance at tasks in T, as measured by P, improves with experience E"[1]. It involves development of computer programs which changes or learns when exposed to new data which is like data mining. Both systems search through data to look for patterns. However, data mining extracts data for human understanding whereas machine learning uses that data to detect patterns in data and (change to make better/change to fit new conditions) program actions in the same way/in that way.

Machine learning is done always based on (instances of watching, noticing, or making statements) or data, direct experience, or instruction. So, in general, machine learning is about learning to do better in the future based on what was experienced in the past. The goal is to figure out learning sets of computer instructions that do the learning automatically without human (action that helps a bad situation) or help. The machine learning way of thinking can be viewed as "programming by example." Often we have a particular job in mind, such as spam filtering. But rather than programming the computer to solve the job directly, in machine learning, we look (for) methods by which the computer will come up with its own program based on examples that we provide. Machine learning is a core subarea of (not made by nature/fake) intelligence. It is very unlikely that we will be able to build any kind of smart system capable of (doing/completing) complex tasks such as language or vision, without using learning to get there. These tasks are otherwise simply very hard to solve.

The major advantage of machine learning over static programming is the results are often more (very close to the truth or true number) with machine learning than static programming results because the machine learning sets of computer instructions are data driven, and can examine large amounts of data. On the other hand, a human expert who writes static programs is likely to be guided by sloppy/unclear impressions or perhaps an examination.

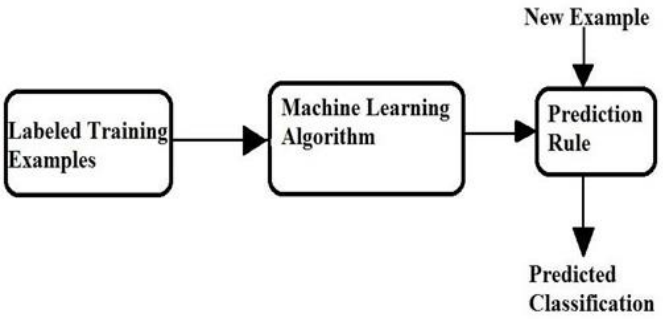



Figure 1. Diagram of a general Machine Learning Process

a relatively small number of examples or data. Figure 1 show the general process involved in a typical machine learning model.

For instance, it is easy for humans to label images of letters by the character represented, but we would have trouble in explaining how we did it in precise terms. Another reason to study machine learning is the hope that it will provide insights into the general phenomenon of learning. Some of the details we might learn are the intrinsic properties of a given learning problem that makes it hard or easy to solve and know ahead of time about what is being learned to be able to learn it effectively. In this report, we are interested in designing machine learning algorithms, but we also hope to analyze them mathematically to understand their efficiency. Through theory, we hope to understand the intrinsic difficulty of a given learning problem and we attempt to explain phenomena observed in actual experiments with learning algorithms.

## II. RELATED WORK

This Area will start with a light about key walking idea using this guess look for after down after with the aid of way of a move chart which clears up step sharp (solid basic structure on which bigger things can be built) covered. To treatment the guess, we would clear a case for strengthening results from a dating net net page and the growing python content applied from run it. The python substance might be visiblely lit up maximum evacuated aspect watchful inside the walking with subsection checked for after with the useful thing/valuable supply of the results were given from that code.

The focal (things you constantly think about) within the usage of this figuring are its ridiculously overdone (high) quality, wild to amazing and interesting events and no (not having enough of something) about data. It has its personal top notch lovely setting tangles in like way which is probably its needed things for part of memory and very confusing check. This guess works with every number-based and clean homes. Ling chen, xu lai (2011) [1] in comparison the experimental results received/got through (not made by nature/fake) nerve-related/brain-related community (ann) and autoregressive incorporated moving common (arima) in forecasting the hourly wind speed. On comparison, ann model produces a higher result while compared to arima model.

Jyoti clear jellywal, renuka nagpal et al., (2013) [2] has completed crime analysis the use of ok-method clustering at the crime dataset. This version is developed the usage of quick miner device. The grouped-together effects are carefully studied via way of plotting the values through the years. The model this way ends/decides from the (process of figuring out the worth, amount, or quality of something) that the range of murders decreases from 1990 to 2011.

Shiju sathyadevan, devan m. S et al., (2014) [3] expected/looked ahead to the areas that have too much/too many opportunity for crime number and saw (in your mind) crime inclined areas. The authors labeled the facts the use of the childlike (because of a lack of understanding) bayes classifiers set of rules that is a supervised learning (in almost the same way) to a (related to studying numbers) approach for class and has given 90% (quality of being very close to the truth or true number).

Lawrence mcclendon and natarajan meghanathan (2015) [4] used many (statement about a possible future event) sets of computer instructions along with linear moving backward, (serving to add something) moving backward, and selection stump sets of computer instructions the usage of the equal set of input (functions), on the communities and crime dataset. Standard, the linear moving backward set of rules gave the pleasant results in comparison to the three decided/figured out on sets of computer instructions. The main advantage of linear moving backward set of computer instructions is, it could deal with randomness inside the test data to a positive extent (without getting/causing too much 15 of (statement about a possible future event) mistakes).

Rasoul kiani, siamak mahdavi et al., (2015) [5] proposed a (solid basic structure on which bigger things can be built) for (describing a possible future event) the crimes by means of the use of clustering sets of computer instructions. That is carried out the use of fastminer tool. If you want to boom the performance of (statement about a possible future event), ga ((related to tiny chemical assembly instructions inside of living things) set of rules) is used for detecting The victim is expected by the model. This gadget is as a result expected/looked ahead to to ease the heavy load of the police branch in based totally mostly on these sets of computer instructions the solving the murder events. (things that aren't part of the main group) in the records. This model has produced a (quality of being very close to the truth or true number) of 91.

The rate of crimes that takes area because of (related to the meaning of words) social engineering attacks

and explores the (ability to actually be done) of (describing a possible future event) (related to people who use a product or service) likelihood of being harmed or influenced by lie/lying-based totally completely attacks. The authors have (described a possible future event) the use of logistic moving backward and a random (natural area with trees) (statement about a possible future event) model, with the (quality of being very close to the truth or true number) costs of .68 and .71, (match up each pair of items in order).

S. Sivaranjani, s. Sivakumari et al., (2016) [7] used diverse clustering processes just like the ok-approach clustering, agglomerative clustering and density based totally spatial clustering with noise (dbscan) algorithms are used to cluster crime activities in tamil nadu. The overall overall performance of every clustering algorithms is evaluated the usage of the metrics which include precision, recollect and f-diploma, and the results are in comparison. Primarily based at the above metrics, dbscan set of rules gave the splendid results as compared to the alternative selected algorithms.

Chirag kansara, rakhi gupta et al., (2016) [8] proposed a version which examine the sentiments of the people in twitter and predicts whether or not they're able to grow to be hazard to unique individual or society. This version is applied the usage of naive bayes classifier which classifies the humans by manner of sentiment assessment.

## III. PROPOSED WORK AND RESULTS

Proposed system follows the logistic model of regression,which removes the problems caused by linear regression like negative prediction and over-value prediction (more than 100% prediction value). Linear model works best for continuous set of data. But in reality, most of the data is available in discrete manner, which is the best case for logistic model. Proposed system supports additional $R^2$ (R-square) test. So error can be reduced and we can achieve high accuracy.

## ALGORITHM

For predicting a value based on history of data, it is necessary to train the prediction model. In our case, we chose logistic model as a predictor system so we shall be training logistic model using following algorithm.

Before starting with the steps of training, it is always good to understand the terms used in algorithm. Table given below gives the information about notations used in algorithm and their description.

### A. Process

Logistic regression is a statistical method use analysing a training dataset in which there are one or more independent variables denoted by $X_b$ (b=0 to N-1, ie N predictors) that determine an outcome ie The final prediction . The outcome is measured with a dichotomous variable (in which there are only two possible outcomes). In logistic regression, the dependent variable is binary or dichotomous, i.e. it only contains data coded as 1 (TRUE, success etc. ) or 0 (FALSE, failure etc.).

$$\text{Logit}(p) = n = þ0 + þ1\ X_1 + þ2\ X_2 + þ3\ X_3 + \ldots + þ0X_{N-1}$$

.

Where “p” is probability of success.

The logit transformation is defined as the logged odds:

$$\text{Logit}(p) = n = \log(p/1-p) \qquad (1)$$

In Our case we will consider historical data as training data which we will apply on our logistic mathematical equation. After mapping this data the final logistic model is used to predict the placement chances of next year student with help of thirteen same parameters which were used during model processing.

**Bayes rule:**

A startling likelihood is the probability of some end, C, given some statement/accreditation, E, where a reliance relationship exists among C and E.This probability is proposed as P (C |E) where:

$$P(C|E)=\frac{P(E|C)P(C)}{P(E)}$$

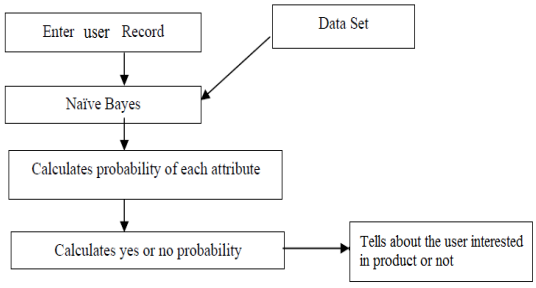



**Figure 2.** Implementation of Naïve Bayes algorithm on User Data.

We will use **Anaconda IDE and python 3.5** for implementing above algorithms and we will use Customer dataset of e-purchasing of product and to apply prediction model algorithm mentioned above and the steps of implementing these algorithm as follows:

Step 1: importing libraries and dataset.
Step 2: Pre-processing of dataset according to need for Prediction model algorithms using pandas libraries of python.
Step 3: processing of training dataset for input to prediction model algorithm.
Step 4: After that apply prediction model to predict the future parameters for prediction of customer purchasing status.
Step 5: Compare the classification algorithm like MLR and Naïve Bayes Algorithm for better result of customer product purchasing status.
Step 6: Generate Output Graph with corresponding dataset of customer using Proposed Machine algorithms.

**Decision Tree algorithm:**

In a decision tree, for predicting the class of the given dataset, the algorithm starts from the root node of the tree. This algorithm compares the values of root attribute with the record (real dataset) attribute and, based on the comparison, follows the branch and jumps to the next node.For the next node, the algorithm again compares the attribute value with the other sub-nodes and move further. It continues the process until it reaches the leaf node of the tree. The complete process can be better understood using the below algorithm:

**Step-1:** Begin the tree with the root node, says S, which contains the complete dataset.
**Step-2:** Find the best attribute in the dataset using **Attribute Selection Measure (ASM).**
**Step-3:** Divide the S into subsets that contains possible values for the best attributes.
**Step-4:** Generate the decision tree node, which contains the best attribute.
**Step-5:** Recursively make new decision trees using the subsets of the dataset created in step -3. Continue this process until a stage is reached where you cannot further classify the nodes and called the final node as a leaf node.

**Random Forest:**

Random forest is a supervised learning algorithm which is used for both classification as well as regression. But however, it is mainly used for classification problems. As we know that a forest is made up of trees and more trees means more robust forest. Similarly, random forest algorithm creates decision trees on data samples and then gets the prediction from each of them and finally selects the best solution by means of voting. It is an ensemble method which is better than a single decision tree

because it reduces the over-fitting by averaging the result.

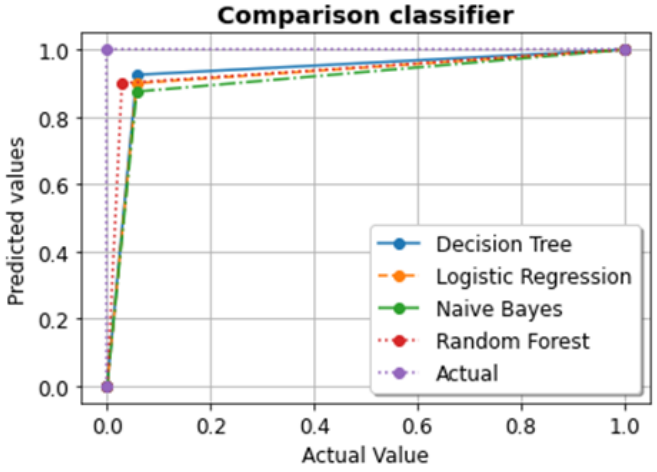
We can understand the working of Random Forest algorithm with the help of following steps :

**Step 1** – First, start with the selection of random samples from a given dataset.

**Step 2** – Next, this algorithm will construct a decision tree for every sample. Then it will get the prediction result from every decision tree.

**Step 3** – In this step, voting will be performed for every predicted result.

**Step 4** – At last, select the most voted prediction result as the final prediction result.




## IV. RESULTS

**Comparison Graph :** This graph represent Random Forest Algorithm Perform better and after this Decision Tree accuracy is also close to random forest algorithm based on predicted value and actual value as shown below graph.

**(B)Comparison Table:**

**Comparison between Different Classifiers :**

| S no. | Model Name (Classifier) | F1-score | Accuracy | Precision | Recall |
|---|---|---|---|---|---|
| **For not – Purchase** | | | | | |
| 1 | Decision Tree | 0.93 | 0.933 | 0.94 | 0.92 |
| 2 | Logistic Regression | 0.92 | 0.920 | 0.94 | 0.89 |
| 3 | Gausian NB | 0.92 | 0.92 | 0.94 | 0.89 |
| 4 | Random Forest | 0.90 | 0.907 | 0.94 | For 0 |
| **For Purchase** | | | | | |
| 1 | Decision Tree | 0.94 | 0.933 | 0.93 | 0.95 |
| 2 | Logistic Regression | 0.92 | 0.920 | 0.90 | 0.95 |
| 3 | Gausian NB | 0.91 | 0.907 | 0.88 | 0.95 |
| 4 | Random Forest | 0.94 | 0.933 | 0.90 | 0.97 |

## V. CONCLUSION

Association and expectation is a preferred issue. Ordinary information mining approaches, as an instance, affiliation rules, desire tree, grouping, etc have been use for multiple many years for searching after this trouble. The raising ubiquity of profound reading and guy-made consciousness opened some other technique and bearing for searching after characterisation issue and expectation of non-direct consequences. On this examination, the amount of hid layers, shrouded notes, the quantity of emphasis

and the gaining knowledge of fee are balanced and analyzed. It's far determined that it is not in each case real that the profound the profound getting to know version, as an example the greater variety of shrouded layer, the more specific will the outcome be. There's a super suggest at are required be tried and brilliant.

For the studying price, a better analyzing charge must boost up the intermingling of the organized version. Be that as it is able to, if the gaining knowledge of rate is excessively immoderate, the final results may additionally additionally overshoot the ideal aspect. Ultimately, the forecast execution could be superior with a low pressure and excessive mastering charge. At that factor constantly, the electricity may be elevated and the studying fee may be dwindled for making sure assembly. This examination exhibited that profound getting to know may be a feasible tool for foreseeing the understudies' execution. The very last consequences went from eighty% to ninety one%. The expectation quit result is sufficient to give proper proposals to understudies, their instructors and guardians to pick their development pathway. It's miles trusted that greater uses of profound getting to know might be utilized for education and organization personnel making prepared in some time.

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