A SURVEY ON MACHINE LEARNING ALGORITHMS

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ABSTRACT

Machine Learning (ML) has unfurl from Artificial Intelligence, a field of software engineering. Machine Learning (ML) is a multidisciplinary field, a mix of insights and software engineering algorithms that are generally utilized in prescient investigations and classification. The algorithms which are actualized on the machines and which are additionally used to make machines smart are called as machine learning algorithms, likewise, they can make sense of how to perform significant tasks by summing up from models. This paper focus on clarifying the idea and advancement of Machine Learning, a portion of the well known Machine Learning algorithms and attempts to think about five most mainstream algorithms dependent on some fundamental thoughts.

Keywords: Machine Learning, K-Nearest Neighbors Algorithm, Support Vector Machine (SVM), Naive Bayes, Artificial Neural Network (ANN) Algorithms, Decision tree.

INTRODUCTION

Machine learning is a worldview that may allude to learning from past understanding (which for this situation is past data) to improve future execution. Over past years a colossal number of ML algorithms was presented. There are three ML algorithms, for instance, unsupervised learning and reinforcement learning, supervised learning alludes to change or improvement of algorithm dependent on past "encounters" naturally with no outside help from a human. Machine learning systems auto-takes in the projects from data and data bolstered to the system. This is regularly an appealing option, in contrast, to physically building them, and over the most recent couple of years, the utilization of machine learning has expanded quickly all through the fields of artificial knowledge, software engineering and past. Machine learning and algorithms are utilized in Web search, spam channels, decision support systems, recommender systems, advertisement positions, credit scoring, extortion recognition, and numerous different

applications. In any case, a great part of the "folk knowledge" that is expected to effectively create machine learning applications isn't promptly accessible in them. Therefore, many machine learning ventures take any longer than should be expected or end up delivering not exactly perfect outcomes. However, quite a bit of this folk knowledge is genuinely simple to convey. This examination paper accentuates and centers around various kinds of machine learning algorithms and their most effective use to make decisions progressively productive and complete the task in more streamlined or insignificant structure. Diverse algorithm gives machine a distinctive learning experience and adjusting different things from nature. In view of these algorithms the machine takes the decision and plays out the specific tasks. So it is significant for the algorithms to be upgraded and multifaceted nature ought to be diminished in light of the fact that more the productive algorithm progressively effective decisions will the machine makes. Machine Learning algorithms don't absolutely reliant on nature's abundance for both motivation and systems.

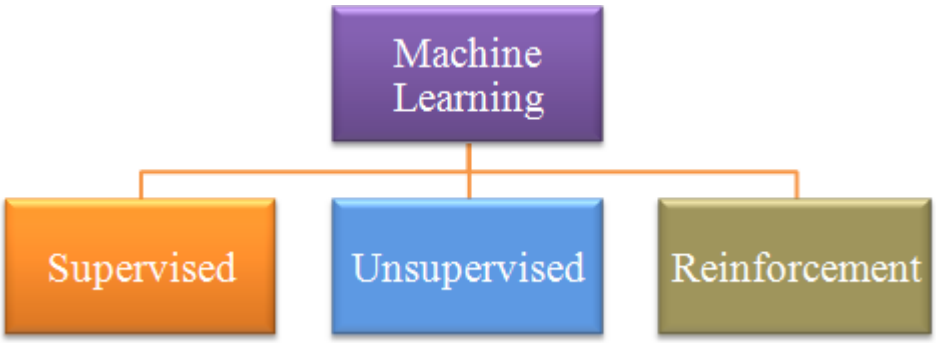

Figure 1: Types of Machine Learning

Supervised learning comprises of a given arrangement of information factors (preparing data) which are pre-named and target data. Utilizing the information factors it produces a mapping capacity to outline to required yields. Parameter alteration methodology proceeds until the system gained an appropriate exactness degree with respect to the instructing data. Unsupervised learning algorithm we just have preparing data rather a result data. That information data isn't recently named. It is utilized in classifiers by perceiving existing examples

or cluster in the information datasets. Reinforcement learning applying this algorithm machine is prepared to outline to a particular decision henceforth the prize or feedback Signals are created. The machine prepared itself to locate the most remunerating activities by remuneration and discipline utilizing past experience The high ground of the Image handling machines Like systems made are CBIR, over people is that they spread nearly the whole electromagnetic range whereas people can't statute so wide range as their eye has a visual constrained band. An image recovery system can work on images of each range as PC created images, ultrasound, and electron microscopy. Image handling has a wide scope of uses in pretty much every territory, for example, drug, industry, remote detecting, stargazing, horticulture, industry, and other related regions. The primary key purpose of Image preparing is Image recovery in which from crude data redesign of shading, surface, shape feature are done before a thinking identified with image content. A productive image recovery needs to work on the assortment of images to recover the applicable images dependent on the inquiry image from the database which is close to human observation. Machine learning has gotten one of the backbones of data innovation. With the consistently expanding measure of data getting accessible there is valid justification to accept that savvy data investigation will turn out to be considerably progressively unavoidable as an essential element for innovative purposes. A great part of the study of machine learning is to tackle those issues and give great certifications to the arrangement. There is various ways an algorithm can model an issue dependent on its associations with the experience or condition or info data. For this entire right off the bat we need to embrace a learning style that an algorithm can receive. In a general sense and deductively these algorithms relies upon the data structures utilized just as hypotheses of learning psychological and genetic structures. Yet at the same time, common strategy for learning gives incredible exposures for understanding and great extension for variety of various kinds of conditions. Many machine learning algorithm is by and large being advanced from present thinking in psychological science and neural networks. Generally, we can say that learning is characterized as far as improving execution dependent on some measure.

Literature Survey

Author names & Year	Proposed Method	Merits and Demerits

Wangyan Feng, Wenfeng Yan, Shuning Wu and Ningwei Liu (2017)	Proposed a machine learning framework which use cloud document sharing access data to consequently identify client irregular conduct for potential insider danger. In the main stage, venture the entrance log data onto client/document and client/client relationship charts and apply three solo algorithms to produce exception markers. In the subsequent stage, outfit the anomaly pointers and presented the DWT with the Haar wavelet capacity to model clients' fleeting conduct for insider danger detection. A wavelet change maps a one-dimensional capacity into a two-dimensional capacity (for example "time" and "scale"). Officially, in a wavelet change examination application, the initial step is to receive a wavelet capacity, or mother wavelet. At that point, worldly examination is performed with a contracted, high-recurrence variant of the mother wavelet, while recurrence investigation is performed with an enlarged, low-recurrence adaptation of a similar wavelet. Since the first capacity can be spoken to as far as a wavelet development, data tasks can be performed utilizing only the relating wavelet coefficients. Wavelets are characterized by the wavelet work (for example the mother wavelet) and scaling capacity (additionally called the dad wavelet). The (is a capacity used to separate a given capacity into various scale segments, with some specific properties, for example, wave-like oscillation, integral worth is zero, and the integral estimation of its square arrangement is solidarity.	**Merits:** • DWT with the Haar wavelet is able to effectively capture the temporal patterns of the user behaviors. **Demerits:** • More data sources, including but not limited to, active directory logs, windows logon logs, physical security logs, and printer logs, to better detect insider threats holistically
He Ming Yao , Yu Wei Qin, Li Jun Jiang (2016)	proposed the parasitic capacitance extraction comprehensively required by VLSI modeling is fathomed through the proposed new machine learning based strategy for minutes (ML-MoM). Mother into a machine learning process utilizing	**Merits:** • Machine learning algorithms such as MLR, software resources such as Python, and hardware resources such as Amazon Web Service, parasitic extractions can be

	the artificial neural network (ANN). In light of this new elucidation, the traditional MoM explaining is transformed into a machine learning preparing process. Therefore, famous machine learning algorithms, for example, the multiple linear regression (MLR) are advantageously utilized to prepare the model and get the expected arrangements. The recently proposed algorithm is applied to parasitic capacitance extractions. The calculation utilizes the well known distributed computing stage – Amazon Web Service (AWS). Numerical tests exhibit fascinating execution favorable circumstances over the customary MoM. The beginning stage of new algorithm is to reinterpret MoM into a preparation model. It is a solitary layer perceptron (neural network structure). The network component Smn is utilized as the info preparing data. The charge thickness obscure is utilized as the weighting coefficient. The potential Vm is the yield of the neural network. Henceforth, unraveling MoM turns into another procedure: feed Smn to prepare the model. In the wake of preparing, can get the precise estimation of the weighting coefficient. Clearly all the more preparing data will deliver better accuracy in the last arrangement. Subsequently, when the new algorithm is utilized, more field focuses than source focuses are required, which implies M>N. Thus, the MoM tackling process turns into a machine learning preparing process	executed effectively through modern machine learning technologies. • A new gateway for modern computational electromagnetics (CEM) toward electromagnetic compatibility (EMC). Many new opportunities and possibilities could start from this point **Demerits:** • More data sources, including but not limited to, active directory logs, windows logon logs, physical security logs, and printer logs, to better detect insider threats holistically.
Jyun-Shun Liang, Kerwin Wang (2017)	Proposed a novel instrument to remove the vibration features of pivoting machinery. The instrument comprises of a sound range analyzer, a sign preparing circuit and a solitary board computer. The machine learning utilized in incorporates Random Forest, K-Nearest	**Merits:** • Robust with regard to the search space; for instance, classes don't have to be linearly separable. Classifier can be updated online at very little cost as new instances with known

	Neighbor Classifier (KNN) , and Support Vector Machine (SVM). Right off the bat, Random Forest is one of the solid classifiers in machine learning. It has numerous focal points, for example, low-summed up blunder, valuable for data mining, and so forth. Besides, KNN is a regular of sluggish learning algorithm. The "languid" implies that it doesn't take in discriminative capacity from database yet retains database. Be that as it may, it would cause KNN "overfitting" in high dimensional space, the features should be shortened through dimensionality decrease. Thirdly, SVM is an algorithm that changes unique space to higher-dimensional space. It utilizes super vectors to discover hyperplane from the preparation data. In addition, SVM has been generally utilized in shortcoming classification. In utilized Random Forest to remove the significant features of the vibration range. Developed the KNN model to realtime order diverse mechanical vibration. The preparation data used to build the model was taken from the engine while it was lingering or penetrating wood or plastic examples. The Random Forest model doesn't experience the ill effects of overfitting. Then again, the KNN model fits the preparation data well with two significant features. The SVM model gives a high accuracy on ordering the preparation data. The decision capacity of the two models is delineated. The decision limit of the RBF part SVM model isn't tight with the goal that the classifier won't cause high speculation mistake on inconspicuous data.	classes are presented. **Demerits:** • KNN algorithm is that it is a lazy learner, i.e. it does not learn anything from the training data and simply uses the training data itself for classification.
HAN LIU1, MIHAELA COCEA, WEILI DING (2017)	Proposed handling of picture features in classification undertakings. Specifically, audit two primary kinds of feature selection systems, in particular filter and wrapper. C4.5 is an algorithm of decision tree learning. The idea of this algorithm	**Merits:** • A significant advantage of a decision tree is that it forces the consideration of all possible outcomes of a decision and traces each path to a conclusion. It

	includes the assessment of features on an iterative premise. Specifically, a decision tree has a root hub and various inward hubs. Every one of these hubs is marked a feature and otherwise called a non-leaf hub, which shows that at every cycle of decision tree learning, a feature should be chosen towards naming a non-leaf hub of a tree. The C4.5 algorithm utilizes entropy or data gain towards heuristic selection of features, which shows that the chose feature is judged heuristically as the best one in the feature set. Following the fruition of a learning task, as a decision tree works in a white box way, the scholarly tree can show which features are added into it as non-leaf hubs, for example those features, which are not added into the tree, are made a decision as immaterial as per the heuristic qualities. Based on the above proclamation, C4.5 can accomplish self-assessment of features during the time spent learning a decision tree and after the fruition of the learning. Self-assessment of features during the time spent learning is expected to limit the computational multifaceted nature of feature selection. Likewise, as showed, C4.5 performs comparatively or far better than the other well known learning algorithms in picture classification. In this area, position the assessment of features with regards to decision tree learning.	creates a comprehensive analysis of the consequences along each branch and identifies decision nodes that need further analysis. **Demerits:** • They are unstable, meaning that a small change in the data can lead to a large change in the structure of the optimal decision tree. They are often relatively inaccurate. Many other predictors perform better with similar data.
Mohd Naim Mohd Ibrahim, Mohd Zaliman Mohd Yusoff (2015)	Proposed procedure to arrange tweets notion utilizing Naïve Bayes methods dependent on coaches' discernment into three classes; positive, negative or nonpartisan. The tweets which comprise catchphrase 'Maybank' and 'Malaysia' is being get from twitter stream utilizing Python Twitter library named Twython. Every one of the tweets are put away in database utilizing MongoDB. 50 of most significant tweets for each 'Maybank' and	**Merits:** • Super simple, you're just doing a bunch of counts. If the NB conditional independence assumpt ion actually holds, a Naive Bayes classifier will converge quicker than discriminative models like logistic regression, so you need less training data. **Demerits:** • Data scarcity. Chances of loss of

	'Malaysia' catchphrase is being chosen for this investigation. These two watchword is picked for showing capacity of Naïve Bayes for assessment classification in political and business condition. The vast majority of the tweets are blended language among Malay and English sentences/word. This is nature of current internet based life pattern among netizens to stirred up dialects. The tweets are being separated to two sections, one sections which comprise 25 tweets for preparing reason and another part which comprise 25 tweets for classification utilizing Naïve Bayes. The tweets that are chosen for each part is randomly picked. The 25 tweets are appeared to the coach for them to prepare. The preparation is finished via mentor to choose notion whether Positive, Negative or Neutral that the coach think/feel for each tweet. The selection interface is appeared in screen shot beneath. At that point the mentor need to click 'Train' catch to spare the preparation. These preparation data will be utilized in following stage for classification of the tweets opinion. The staying 25 tweets will be characterized their slant utilizing Naïve Bayes algorithm. The preparation data is being utilized as features to the Naïve Bayes to figure the likelihood of outstanding tweets for classification reason. The programmed classification is being finished by using Python NLTK Library.	accuracy. Zero Frequency i.e. if the category of any categorical variable is not seen in training data set then model assigns a zero probability to that category and then a prediction cannot be made
Roger Alimi, Amir Ivry, Elad Fisher and Eyal Weiss (2019)	proposed the algorithms that recognize dc jumps inserted in normal magnetic field data. To improve protection from commotion, we created two machine-learning algorithms that utilize transient and measurable physical-based features of a pre-procured and surely understood exploratory dataset. The primary algorithm utilizes a support vector machine classifier, while the second	**Merits:** • The proposed learning-based support vector machine technique (SVM) manages this issue by creating a classifier that adventures nine transient and physical features of the deliberate magnetic sign. • The bit put together strategy depends with respect to

	depends on neural network design. We contrast these new approaches with an increasingly classical part based technique. For that reason, the recipient working trademark bend is created, which permits the analysis capacity of the various classifiers by looking at their exhibitions crosswise over different activity focuses. The precision of the machine-learning-based algorithms over the classic technique and the quick union of the relating beneficiary working trademark bends are illustrated.	observational parametric advancement, it experiences high affectability to clamor. **Demerits:** • The SVM can deliver summing up and hearty models to a certain extent, its capacity to handle exceptionally complex relations is restricted by its single nonlinearity modeling (allegorical, spiral, and so on.). This disadvantage prompts unacceptable heartiness and calls for deep learning arrangements.
ENDER SEVINC (2019)	a novel transformative feature selection algorithm incorporated with Single Hidden Layer Feed-forward Neural Networks (SLFN)s. Our primary objective is to discover the most proficient subset of features and give the best expectation precision. The algorithm joins the transformative method of genetic algorithms (GA) and figures the wellness esteems (expectation precision) of each chose subset of features by utilizing Extreme Learning Machines (ELM). The consequences of the SLFN are determined in a quicker way, which is truly appropriate for the GA while advancing the selection of the best subset of features. Its rapid and precision for arriving at results are incorporated with the transformative GA strategies. With the assistance of GA, the current best outcomes are improved.	**Merits:** • A new transformative GA with ELM is proposed. • The Extreme Learning Machines (ELM) proposes a learning procedure for the SLFNs. • The best two algorithms/techniques are consolidated into our proposed algorithm named as Feature Selection with ELM (FS-ELM). • The primary objective of FS-ELM is to have an incredible and quick strategy for the classification of the data for binary and multi-classes in a sensible period. **Demerits:** • ELM has a few burdens, for example, over-fitting issue. • The ELM classifier network, since excessively few/many hidden hubs utilized, would prompt under-fitting/over-fitting issues in design classification.
Charles Feng, Shuning Wu and Ningwei Liu (2017)	Proposed a user-centric machine learning system for the cybersecurity activity focus in genuine endeavor condition. Ordinary data sources in SOC, their work process, and how to use and process these data sets to construct a viable machine learning system. The machine learning system sits in SOC work process	**Merits:** • Create names from SOC examination notes, to associate IP, host, and users to create user-centric features, to choose machine learning algorithms and assess exhibitions, just as how to such a machine learning system in

	joins distinctive occasion logs, SIEM cautions and SOC examination results and produces far-reaching user chance scores for security activity focus. Rather than legitimately delving into huge measures of SIEM alarms and attempting to discover needle in a pile, SOC experts can utilize the hazard scores from machine learning systems to organize their examinations, beginning from the users with most noteworthy dangers. This will extraordinarily improve their proficiency, enhance their activity line the board, and at last upgrade the undertakings security. In particular, our methodology builds a structure of a user-centric machine learning system to assess user chance dependent on ready data. This methodology can give security investigators an exhaustive hazard score of a user and security experts can concentrate on those users with high hazard scores. Supposedly, there is no past research on building a total systematic answer for this application. The fundamental commitment of this paper is as per the following: A propelled user-centric machine learning system is proposed and assessed by genuine industry data to assess user dangers. The system can successfully diminish the assets to investigate alarms physically while simultaneously improve undertaking security. A tale data building process is offered which coordinates ready data, security logs, and SOC expert's examination notes to create features and spread marks for machine learning models.	SOC generation condition. **Demerits:** • SIEM is essential for better security danger mindfulness. • Excessive data may be more awful than absence of data.
Yi Shi, Yalin Sagduyu, and Alexander Grushin (2017)	Proposed an exploratory machine learning assault dependent on deep learning to gather the usefulness of a subjective classifier by surveying it as a black box, and utilizing returned names to construct a practically equal machine. Assume a classier has been now prepared	**Merits:** • An foe can utilize deep learning to dependably induce the vital data by utilizing names recently acquired from the classifier enduring an onslaught, and assemble a practically comparable

	by choosing to prepare data, kind of the classifier, and hyper parameters of the classifier. This classifier is made for online access as a Black Box system without uncovering any data other than the info and yield connections. Every user can survey this classifier by giving test data as the info and watching the names as the yield of classification. Various techniques can be utilized for classification purposes, for example, Naive Bayes, Support Vector Machine (SVM) and Artificial Neural Network (ANN) to separate the structure of the preparation data, fabricate a model and classify the test data. Gullible Bayes is a probabilistic classifier dependent on applying Bayes' hypothesis with (innocent) freedom suspicions between the features. Credulous Bayes constructs restrictive probabilities of features (spoke to as vectors of feature esteems) under each class and decides the for the most part likely class for the features of test data. SVM is a non-probabilistic linear classifier that speaks to the features of preparing data as focuses in space and maps them with the goal that the features of the different classes are isolated by a hole that is as wide as could reasonably be expected. SVM maps features of test data into a similar space and predicts them to have a place with a class dependent on which side of the hole they fall on.	machine learning classifier without knowing the sort, structure or hidden parameters of the first classifier **Demerits:** • Emerging need to recognize methodologies for relieving such exploratory black-box assaults with deep learning to secure online data systems. • The algorithm has been prepared, and endeavor to reveal data about its inward activities, so as to distinguish shortcomings of the algorithm.
Zhaoxian Zhou, Sarbagya Shakya and Zhanxin Sha (2017)	Proposed a trial assessing the execution of football players in countermovement jumps (CMJs). Three techniques including time domain, recurrence domain, and machine learning algorithms are proposed for execution assessment. Linear regression (LR), random forest (RF), and choice tree (DT). Chosen features incorporate the pace of power at 100 ms RF100, the pace of power at 200 ms RF200, top power Fzmax, least	**Merits:** • Chosen features machine learning algorithms can assess the player execution all the more precisely, and linear regression delivers the best forecast outcomes up until now. **Demerits:** • Fundamental impediment of Linear Regression is the suspicion of linearity between the dependent

	power Fzmin, drive, and mean recurrence. The dataset is named by the stature of the hop. We pass the data from the dataset through various machine learning regression strategies and attempt to fit the data in the regression line. The entire dataset of size 133 is randomly isolated into 80% of preparing dataset and 20% of the testing dataset. The models are prepared by utilizing the preparation dataset and are tried with the testing dataset by utilizing 10 overlap cross approval techniques. During this expectation procedure errors are determined and arranged in three distinct measures: Mean absolute error (MAE): measures the normal greatness of the errors in a lot of forecasts, without thinking about their course. Root mean squared error (RMSE): is the square root of the normal of squared contrasts among forecast and real perception. The coefficient of assurance (R2 error): quantifies the extent of changeability in anticipated statures clarified by the regression model. These errors speak to the normal of the all-out error of the distinction between the anticipated worth and the real worth.	variable and the autonomous factors.

MACHINE LEARNING ALGORITHMS

K-Nearest Neighbors Algorithm

In design acknowledgment, the k-Nearest Neighbors algorithm (or k-NN for short) is a nonparametric technique utilized for classification and regression.[1] In the two cases, the info comprises of the k nearest preparing models in the component space. The yield relies upon whether k-NN is utilized for classification or regression: In k-NN classification, the yield is a class participation. An article is grouped by a dominant part vote of its neighbors, with the item being appointed to the class generally basic among its k nearest neighbors (k is a positive whole number, ordinarily little). In the event that k = 1, at that point the article is basically relegated to

the class of that solitary nearest neighbor. In k-NN regression, the yield is the property estimation for the article. This worth is the normal of the estimations of its k nearest neighbors. k-NN is a kind of occasion based learning, or languid learning, where the capacity is just approximated locally and all calculation is conceded until classification. The k-NN algorithm is among the most straightforward of all machine learning algorithms.

Support Vector Machine (SVM)

SVM is so well known an ML procedure that it very well maybe its very own gathering. It uses an isolating hyper plane or a decision plane to differentiate decision limits among a lot of data focuses classified with various names. It is a carefully supervised classification algorithm. At the end of the day, the algorithm builds up an ideal hyper plane using input data or preparing data and this decision plane in turns classifications new models. In view of the kernel being used, SVM can perform both linear and nonlinear classification.

Advantages:

- SVM works moderately well when there is a clear edge of division between classes. SVM is increasingly successful in high dimensional spaces.
- SVM is powerful in situations where the number of measurements is more noteworthy than the number of tests.

Naive Bayes:

It is a likelihood based classification procedure. It considers all highlights autonomous of one another. It computes likelihood of each element freely for a specific class mark. Naïve Bayes is utilized in this paper for malware prediction utilizing web traffic data. These are the means behind the Naïve Bayes algorithm:

1. Preparing data set is taken as information.
2. Highlights are extricated from that preparation data. In this paper web traffic data comprises of 43 highlights.
3. At that point from the preparation data for each component Naïve bayes figures likelihood that in the event that element has specific worth, at that point the dataset class be will malicious or not.

4. In the event that each component has constrained potential qualities, at that point above probabilities can be determined. Be that as it may, if the huge number of qualities is there for each element, scope of qualities can likewise be taken.
5. At that point for each line of test data set after the preparation stage. Based all things considered probabilities determined from preparing data decision is taken.

Advantages:

a) Since this methodology depends on the likelihood it very well may be applied to a wide assortment of spaces and results can be utilized from multiple points of view.
b) Doesn‟trequire enormous measure of data before preparing to start.
c) These algorithms are computationally quick to decide.

Artificial Neural Network (ANN) Algorithms

A model is dependent on the manufactured and activities of real neural networks of people or creatures. ANNs are viewed as non-linear models as it attempts to find a complex relationship among information and yield data. In any case, it draws test from data instead of thinking about the whole set and in this manner decreasing expense and time. Models: Perception, Back Propagation, Hop-field Network, Radial Basis Function Network (RBFN) and so forth.

Advantages:

ANNs can learn and model non-linear and complex connections, which is extremely significant in light of the fact that, all things considered, a considerable lot of the connections among data sources and yields are non-linear just as perplexing.

Decision tree:

This kind of classifier models data with the assistance of a tree. Tree is having highlights as the inward hubs and edges show the estimations of highlights. And edges isolated hubs dependent on the qualities. All the leaf hubs of the decision tree speaks to a class which is relied upon to be acquired on the off chance that we have every one of the highlights having particular qualities which are in the way from the root to that class having middle of the road include hubs. Probably the most mainstream decision tree algorithms are ID3, C4.5, CART. ID3 is one of the

most straightforward decision tree approaches it utilizes idea of data gain as the parting criteria. C4.5 is the development of ID3. It takes a shot at the guideline of addition proportion.

Advantages:

All decision tree approaches are simple to understand and easy to interpret.

CONCLUSION

Machine learning techniques and algorithms have been reviewed in this paper. This paper additionally reviewed algorithms portraying the different sorts of machine learning systems, algorithms and techniques. Different uses of Machine learning and numerous devices required for handling are additionally being reviewed. In the Literature review segment we contemplated different machine learning algorithms they are K-Nearest Neighbors Algorithm, Support Vector Machine (SVM), Naive Bayes, Artificial Neural Network (ANN) Algorithms Decision tree Algorithms executed in past years in various zones in blend with the convention strategies and concentrated how they beat the past models.

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