

## CUSTOMER CHURN PREDICTION

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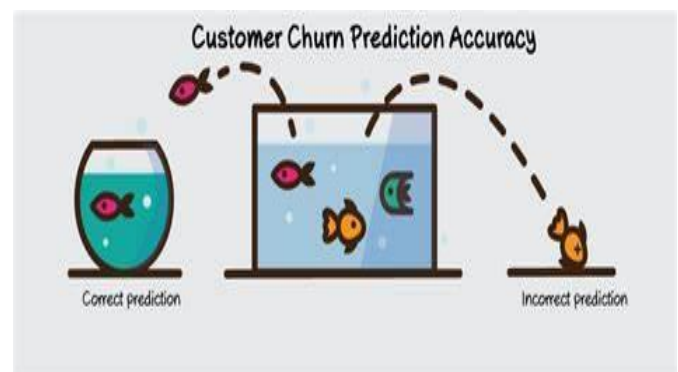
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**Abstract** - Churn rate is something used to predict the number of customers leaving a particular company. It is used to maintain a sustainable customer-company. Deep learning method is used to analyze the churn rate and process huge amounts of customer data. In this paper, a deep learning method is used to predict the number of customers who will be retained in the industry and will be churned out. The model used here is Artificial Neural network model, this model is the most used in all the churn rate prediction. Machine learning is a type of deep learning model that uses neural networks multilayer architecture. The artificial neural network is based on the collection nodes we will call the artificial neurons, which further model the neurons in a biological brain. The results of the models were compared with accuracy classification tools, which are precision, recall etc. The results showed that the deep learning model achieved better classification and prediction success than other compared models. After prediction of the result the final data is displayed in the dashboard for live visualization. This paper mainly focuses on the churn rate prediction using machine learning and deep learning models and analyzing the final result using a live dashboard display using python libraries.

human behavior. AI systems unit of measurement wish to perform difficult tasks in an exceedingly} very technique that is like but humans solve problems. Deep learning might be a collection of machine learning, that's primarily a neural network with three or heaps of layers. These neural networks conceive to simulate the behavior of the human brain albeit removed from matching its ability permitting it to "learn" from large amounts of data.



**Key Words:** Churn rate, Deep Learning, Machine Learning, Artificial Neural network, Prediction.

### 1. INTRODUCTION

Churn prediction implies that detection that customers unit of measurement probably to depart a service or to cancel a subscription to a service. Churn studies are used for years to understand chance and to see a property customer-company relationship. Deep learning is one in each of the fashionable methods used in churn analysis as a result of its ability to technique large amounts of consumer info. throughout this study, a deep learning model is planned to predict whether or not customers at intervals the retail business will churn at intervals the longer term. It is a crucial prediction for many businesses as a results of accomplishment new shoppers sometimes costs over holding existing ones. Machine learning might be a subfield of AI, that's usually printed as a result of the potential of a machine to imitate intelligent

### 1.1 LITERATURE SURVEY

Ning metallic element [1] projected the employment of boosting formulas to spice up a consumer churn prediction model at intervals that customers unit separated into two clusters supported the burden assigned by the boosting algorithmic program. As a result, a high risk consumer cluster has been found. provision regression is used as a basis learner, and a churn prediction model is made on each cluster, severally. The experimental results showed that the boosting formula provides a wise separation of churn information compared with one provision regression model.

P.C.Pendharkar [2] taught two Genetic Algorithm(GA) based totally neural network (NN) models to predict the consumer churn. the first GA-based NN model used a cross entropy based totally criteria to predict consumer churn, and additionally the second GA based totally NN model created some efforts to directly increase the prediction accuracy of consumer churn. exploitation real-world consumer dataset and three various sizes of NNs, they compared the two GA-

based NN models with a mathematics z- score model exploitation model analysis criterion like prediction accuracy, high 100% docile elevate and house beneath Receiver Characteristics (ROC) curve. The results of experiments indicated that every GA-based NN model crushed the mathematics z-score model on all performance criteria.

M.A.H. Farquad [3] projected a hybrid approach to beat the drawbacks of general SVM model that generates a recorder model (i.e., it does not reveal the data gained throughout work in human apprehensible form). The hybrid approach contains three parts: at intervals the first part, SVM-RFE (SVM-recursive feature elimination) is employed to chop back the feature set. within the second half, a dataset with reduced choices is then accustomed acquire Associate in Nursing SVM model and support vectors unit extracted. at intervals the ultimate half, rules unit then generated exploitation Naive mathematician Tree (NBTree that would be a mix of decision tree with naive theorem Classifier). The dataset used here is bank mastercard consumer dataset (Business Intelligence Cup 2004) that's very unbalanced with ninety 3.24% loyal and half-dozen.76% churned customers. The experiment showed that the model does not ascendible to massive datasets.

## 1.2 PROBLEM STATEMENT

For any company, customers are the best assets. Losing regular customers may be a nice loss, meantime gathering customers could also be time overwhelming, it's a much better answer to retain the purchasers while not a churn, even before they move away. All company needs to understand customers feedback by that they'll establish their drawbacks for a specific product.

## 2. ALGORITHMS

### 2.1 RANDOM FOREST

Random Forest might be a popular machine learning rule that belongs to the supervised learning technique. it's usually used for every Classification and Regression problems in mil. It's supported the thought of ensemble learning, that would be a way of blending multiple classifiers to unravel a complicated draw back and to reinforce the performance of the model. because the name suggests, "Random Forest might be a classifier that contains kind of decision trees on varied subsets of the given dataset and takes the common to reinforce the prognostic accuracy of that dataset instead of wanting forward to at least one decision tree, the random forest takes the prediction from each tree and supported the majority votes of predictions, and it predicts the final word output. The larger kind of trees at intervals the forest ends up in higher accuracy and prevents the matter of overfitting.

### 2.2 LOGISTIC REGRESSION

Logistic regression could also be associate maths analysis technique to predict a binary outcome, like affirmative or no, supported previous observations of associate info set. A supply regression model predicts a dependent information variable by analyzing the link between one or heaps of existing freelance variables. As associate example, a supply regression are often accustomed predict whether or not a political will didate can win or lose Associate in Nursing election or whether or not a faculty|highschool] student ar reaching to be admitted or to not a particular school. These binary outcomes allow straightforward choices between two alternatives.

### 2.3 SUPPORT VECTOR MACHINE

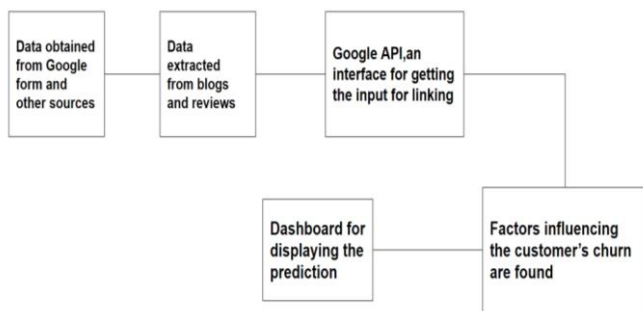
Support Vector Machine(SVM) could also be a supervised machine learning formula used for every classification and regression. though we tend to are spoken communication regression problems more its best fitted to classification. The target of SVM formula is to look out a hyperplane in associate N-dimensional house that clearly classifies the data points. it's a linear model for classification and regression problems. it'll solve linear and non-linear problems and work well for many smart problems. The idea of SVM is simple: The formula creates a line or a hyperplane that separates the data into classes.

### 2.4 DECISION TREES

Decision Trees (DTs) are a non-parametric supervised learning methodology used for classification and regression. The goal is to make a model that predicts the worth of a target variable by learning straightforward call rules inferred from the information options. A tree may be seen as a piecewise constant approximation. The choice tree classifier creates the classification model by building a call tree. every node within the tree specifies a check on Associate in Nursing attribute, every branch falling from that node corresponds to at least one of the doable values for that attribute.

### 2.5 ARTIFICIAL NEURAL NETWORK (ANN)

Deep learning is acquainted because it may be a form of machine learning that typically employs multilayer design referred to as neural networks. The term artificial neural networks is principally supported the gathering nodes wherever we are going to decision the factitious neurons. the most advantage of ANN is its data processing capability, storing knowledge, memory distribution and having fault tolerance.



### 3. BENIFITS OF THE PROJECT

The project is primarily involved with anticipating client churn. Predicting client churn as before long as doable will assist retailers in designing what product enhancements may be created. Once evaluating your whole, it's additionally vital to think about why customers ar exploit your whole, that is usually spoken as client churn or rate of attrition. To see why folks are exploit your whole, a client churn analysis is needed.

### 4. CONCLUSION

Churn prediction is very important for the assorted industries and organizations so as to retain their customers. Algorithms ar accustomed predict the shoppers moving out of a company. It additionally helps industries to enhance their product by adding new options to their merchandise. Dashboard used here is for a simple visual image of consumers reviews.

### 5. REFERENCES

[1]M.A.H. Farquad, Vadlamani Ravi, S. Bapi Raju "Churn prediction victimisation approachable support vector machine: associate analytical CRM application", *Applied Soft Computing* nineteen (2014) 31-40.

[2] Chih-Fong Tsai, Yu-Hsin metal "Customer churn prediction by hybrid neural networks", *professional Systems with Applications* thirty six (2009) 12547-12553.

[3] Abhishek and Ratnesh ,"Predicting client Churn Prediction in telecommunication Sector victimisation numerous Machine Learning Techniques", within the proceedings of 2017 International Conference on Advanced Computation and Telecommunication, Bhopal, India, 2017.

[4] Abinash and Srinivasulu U, "Machine Learning techniques applied to postpaid subscribers: case study on the telecommunication trade of Morocco", within the proceedings of 2017 International Conference on creative Computing and IP , Coimbatore, India, pp. 721-725, 2017.

[5]Kavitha V, Hemanth G , Mohan S.V and Harish M , "Churn Prediction of client in telecommunication trade victimisation Machine Learning Algorithms", *International Journal of Engineering analysis & Technology*(2278-0181), Vol. 9, Issue 05, pp. 181-184, 2020.

[6]Krishna B.N, and Sasikala ,"Predictive Analysis and Modeling of client Churn in telecommunication victimisation Machine Learning Technique ,"In the proceedings of International Conference on Trends in natural philosophy and IP , Tirunelveli, India, pp. 6-11, 2019.

[7]H. Jain, A. Khunteta, and S. Srivastava, "Churn prediction in telecommunication victimisation provision regression and logit boost," *Procedia applied science*, vol. 167, pp. 101-112, 2020.

[8]T. Xu, Y. Ma, and K. Kim, "Telecom churn prediction system supported ensemble learning victimisation feature grouping," *Applied Sciences*, vol. 11, no. 11, p. 4742, 2021.

[9]R. Kamalraj, S. Neelakandan, M. Ranjith Kumar, V. Chandra Shekhar Rao, R. Anand, and H. Singh, "Interpretable filter primarily based convolutional neural network (IF-CNN) for aldohexose prediction and classification victimisation PD-SS rule," *mensuration*, vol. 183, Article ID 109804, 2021.

[10]A. De Caigny, K. Coussement, K. W. De Bock, and S. Lessmann, "Incorporating matter data in client churn prediction models supported a convolutional neural network," *International Journal of statement*, vol. 36, no. 4, pp. 1563-1578, 2020.

[11]Ahmed, A. A., & Maheswari, D. (2017). Churn prediction on large telecommunication knowledge victimisation hybrid firefly primarily based classification. *Egyptian IP Journal*, 18, 215-220.

[12]Amin, A., Anwar, S., Adnan, A., Nawaz, M., Alawfi, K., Hussain, A., et al. (2017). client churn prediction within the telecommunication sector employing a rough set approach. *Neurocomputing*, 237, 242-254.

[13]Sabbeh, S. F. (2018). Machine-learning techniques for client retention: A comparative study. *International Journal of Advanced applied science and Applications*, 9(2), 273-281.

[14]Andreea, D., Alexandra, A. M., Stancu, S., et al. (2020). Churn prediction in telecommunication industry: Model interpretability. *Journal of japanese Europe analysis in Business and social science*, 2020, 241442.

[15]Karanovic, M., Sladojevic, S., Arsenovic, M., & Stefanivic, D. (2018). Telecommunication churn prediction—Deep learning approach. In *twenty sixth Telecommunications forum TELFOR 2018*, Serbia, Belgrade.