CUSTOMER CHURN PREDICTION USING DIFFERENT MACHINE LEARNING ALGORITHMS

B PHANINDRA KUMAR¹, P. VENU GOPAL², Kandipalli Naga Devi Mounika³, Komaragiri Shanmukha sri mithra⁴, Bandi Vijaya priskilla⁵, Karaka Gowtham⁶

Asst. Professor, Dept. Of CSE-DS, NRI Institute of Technology, A.P-521212.
Associate Professor, Dept. Of CSE-DS, NRI Institute of Technology, A.P-521212.
Dept. Of CSE-DS, NRI Institute of Technology, A.P- 521212.
Dept. Of CSE-DS, NRI Institute of Technology, A.P-521212.
Dept. Of CSE-DS, NRI Institute of Technology, A.P-521212.

ABSTRACT_ Customer attrition is a common problem for businesses, especially in the quick-paced telecom sector. It occurs when customers decide to end their agreement with a company and switch to a different service provider. In the very competitive telecom market, where customers have a plenty of choices, the yearly turnover rate typically ranges from 15 to 25 percent.

Retaining customers is essential to the long-term profitability of organizations in this industry. Nevertheless, it may be difficult to provide each customer with individualized care due to the vast volume of customers. Simply said, it is not feasible to devote significant efforts to every client; the expenses would outweigh any potential benefits.

But what if you could pinpoint the customers who are most likely to leave before they do? By anticipating their demands, businesses may focus their retention efforts on these "high-risk" clients more effectively, ultimately fostering loyalty and expanding their clientele. To forecast customer attrition, a comprehensive understanding of each customer's actions and interactions across several channels is required. This includes examining past purchases, in-store visits, customer service interactions, internet transactions, and even social media engagements. By combining information from several different sources, companies can spot early warning signs of potential client attrition and take preventative measures to retain their customers. Telecom companies that manage customer
churn well can grow and thrive while holding onto their market share. A company's profits increase when its clientele expands and the expense of acquiring new ones decreases. Therefore, reducing client attrition and implementing effective retention strategies are critical for success in this competitive industry.

1. INTRODUCTION

2. LITERATURE SURVEY

<table>
<thead>
<tr>
<th>Title of Paper</th>
<th>Name of Journal</th>
<th>Published Year</th>
<th>Advantages</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>“customer churning analysis using machine learning and algorithms”</td>
<td>International Journal of Intelligent Networks</td>
<td>2023</td>
<td>- Utilizes machine learning techniques such as decision trees, random forests, and gradient boosting to predict customer churn.</td>
<td>- Limited to the telecom industry, may not generalize to other sectors.</td>
</tr>
<tr>
<td>&quot;A Comparative Analysis of Machine Learning Models for Customer Churn Prediction&quot;</td>
<td>IEEE Access</td>
<td>2020</td>
<td>- Provides a comparative analysis of various machine learning models (e.g., logistic regression, support vector machines, neural networks) for churn prediction.</td>
<td>- Limited to comparing existing models, does not propose novel techniques.</td>
</tr>
<tr>
<td>&quot;Customer Churn Prediction in the Telecommunication Sector: A Systematic Review and Meta-Analysis&quot;</td>
<td>IEEE Transactions on Engineering Management</td>
<td>2021</td>
<td>- Systematic review and meta-analysis of churn prediction methods in the telecommunication sector, providing insights into the effectiveness of different approaches.</td>
<td>- Focuses specifically on the telecommunication sector, may not be applicable to other industries.</td>
</tr>
<tr>
<td>&quot;Enhanced Customer Churn Prediction Model Using Ensemble Learning and Feature Engineering&quot;</td>
<td>Expert Systems with Applications</td>
<td>2020</td>
<td>- Incorporates ensemble learning techniques and feature engineering to enhance the accuracy of churn prediction models.</td>
<td>- Requires expertise in feature engineering and ensemble learning, may be complex to implement and interpret.</td>
</tr>
<tr>
<td>&quot;Deep Learning Approaches for Customer Churn Prediction: A Comprehensive Review and Future Directions&quot;</td>
<td>Journal of Big Data</td>
<td>2021</td>
<td>- Comprehensive review of deep learning approaches for churn prediction, exploring the potential of neural networks and deep learning architectures.</td>
<td>- Deep learning models may require large amounts of data and computational resources, may not always outperform traditional techniques.</td>
</tr>
</tbody>
</table>
3. PROPOSED SYSTEM

Data Collection: Gather relevant customer data, such as demographics, purchase history, customer interactions, and any other data that could indicate churn.

Data Preprocessing: Clean and prepare the collected data by handling missing values, encoding categorical variables, and scaling numerical features.

Feature Engineering: Create new features or transform existing ones that capture important patterns or behaviors related to churn. This could include variables like customer tenure, usage patterns, or customer satisfaction scores.

Model Development: Build a predictive model using machine learning algorithms, such as logistic regression, decision trees, or random forests. Train the model using historical data, where churn is labeled, to predict future churn.

Churn Prediction: Apply the trained model to new customer data to predict churn probabilities for each customer. Sort the customers based on their churn probabilities to prioritize retention efforts on customers at high risk of churn.

Retention Strategies: Based on the churn predictions, develop personalized retention strategies for different customer segments. This could involve targeted offers, loyalty programs, proactive customer outreach, or tailored communication to address specific concerns.

Monitoring and Refinement: Continuously monitor the performance of the churn analysis system and refine the model as new data becomes available. This iterative process helps improve the accuracy and effectiveness of the system over time.

The proposed system involves leveraging advanced analytics techniques, such as machine learning and predictive modeling, to analyze vast amounts of customer data and predict churn more accurately. The proposed system emphasizes continuous monitoring and refinement of churn prediction models to adapt to changing customer behaviors and market conditions. Monitoring and Maintenance: Continuously monitor the performance of the deployed model and retrain it periodically with new data to ensure its effectiveness over time.
3.1 IMPLEMENTATION

Fig1: Architecture

4. RESULTS AND DISCUSSION
5. CONCLUSION

The EDA showed both strengths and weaknesses of the operator.

Below are the factors and segments of customers the operator must focus on to reduce churn:

- Customers who have onboarded within the last 3 months.
- There seems to be an issue with the fiber optic as an internet service.
- Senior citizens without any dependents or partners.
- Market looks to be price sensitive, customers with high monthly charges are one of the major reasons for churn.
- Customers with monthly contracts have a higher churn rate as compared to customers with longer contract periods.
• Customers opting for payments through electronic cheque and paperless billing.

• Strengths of the operator which came out as part of analysis are listed below:

• Customers opting for tech support and online security have a lower churn percentage.

• Customers who cross the 10 months AON churn less.

Future Enhancement

One potential future enhancement for customer churn prediction could be incorporating more advanced machine learning techniques such as logistic regression, k-neighbors classifier, decision tree, gaussianb, xgboost, gradient boosting classifier methods to improve the accuracy of predictions. Additionally, integrating more diverse data sources beyond traditional demographic and transactional data, such as social media activity or customer feedback, could provide deeper insights into customer behavior and preferences, leading to more accurate predictions and targeted retention strategies.

REFERENCES


6. Jain H, Khunteta A, Srivastava S. Churn Prediction in


Interested Research areas are: Internet of Things, Machine Learning and Image Processing.

Author profile:

B. PHANINDRA KUMAR Working as a Assistant Professor of the CSE (Data Science) Department of NRI INSTITUTE OF TECHNOLOGY. Boasting over 13+ Years of rich experience in engineering academics. He has successfully taught a spectrum of under graduate and post graduate courses while also mentoring numerous B.Tech., M.Tech. Projects.

P.VENU GOPAL Working as a Assistant Professor of the CSE (Data Science) Department of NRI INSTITUTE OF TECHNOLOGY. Boasting over 16+ Years of rich experience in engineering
academics. He has successfully taught a spectrum of undergraduate and post graduate courses while also mentoring numerous B.Tech., M.Tech. Projects. Interested Research areas are: Internet of Things, Machine Learning and Image Processing.

Kandipalli Naga Devi Mounika is currently enrolled in the B.Tech program in Computer Science and Engineering with a specialization Data Science at NRI Institute of Technology. She has successfully completed a mini-project focused on COVID-19 DEATH RATE ANALYSIS showcasing her practical skills in the field of machine learning. Ms. Kandipalli Naga Devi Mounika has completed a noteworthy internship with Blackbucks company, gaining valuable industry experience. Furthermore, she holds certifications from Udemy 2023 Data Visualization in Tableau & Python (2 Courses in 1), SkillUP Semplichearn Power BI for Beginners, Microsoft CertifiedDynamics 365 Fundamentals Customer Engagement Apps (CRM), underscoring her commitment to continuous learning and professional development. Had an Industrial Internship Certification on full stack programming using Java.

Komaragiri Shanmukha sri mithra is currently enrolled in the B.Tech program in Computer Science and Engineering with a specialization Data Science at NRI Institute of Technology. He has successfully completed a mini-project focused on Migration prediction showcasing his practical skills in the field of artificial intelligence & machine learning. Mr. Komaragiri Shanmukha sri mithra has completed a noteworthy internship with Blackbucks company, gaining valuable industry experience. underscoring his commitment to continuous learning and professional development. He had Certifications on scrum –Certiprof, Introduction to Python – Analytics Vidhya, Basic of SQL – Hackerrank and Blackbucks Internship - BlackBucks Pvt LTD.
Bandi Vijaya priskilla is currently enrolled in the B.tech program in computer science and engineering with a specialisation of Data science at Nri Institute of Technology. She has successfully completed a mini-project focused on Twitter sentiment analysis showcasing her practical skills in the field of Machine learning and natural language processing modules. Ms. Bandi Vijaya priskilla has completed a noteworthy internship with Blackbucks company, gaining valuable industry experience. Furthermore, she holds certifications from Planet spark in 2024 and also she done internship on Java full stack development and Oracle and also html and css certifications on ihub talent academy and also she completed her certification on Data structures on great learning and Had an industrial internship Certification on full stack programming using java.

Karaka Gowtham is currently enrolled in the B.Tech program in Computer Science and Engineering with a specialization Data Science at NRI Institute of Technology. He has successfully completed a mini-project focused on FLOWER RECOGNITION showcasing his practical skills in the field of artificial intelligence & machine learning. Mr. Karaka Gowtham has completed a noteworthy internship with Blackbucks company, gaining valuable industry experience. underscoring his commitment to continuous learning and professional development. He had an Industrial Internship Certification on full stack programming using Java.