

*A Major Project Report on*

# **Deep Learning for Customer Retention: An Autoencoder-Based Churn Prediction Approach**

*Submitted in partial fulfillment of the requirements for the award of the degree of*

**BACHELOR OF TECHNOLOGY**

In

**CSE (DATA SCIENCE)**

By

<b>C YAGNESH</b>	<b>(21AG1A6717)</b>
<b>J VAISHNAV TEJA</b>	<b>(21AG1A6727)</b>
<b>K UDAY KIRAN</b>	<b>(21AG1A6733)</b>
<b>P SHIVA SHASHANK</b>	<b>(21AG5A6751)</b>

Under the guidance of

**Mrs. P Niharika**  
Assistant Professor



**DEPARTMENT OF CSE (DATA SCIENCE)**

**ACE Engineering College**

**Ankushapur(V), Ghatkesar(M), Medchal Dist - 501301(An  
Autonomous Institution, Affiliated to JNTUH, Hyderabad)**

[www.aceec.ac.in](http://www.aceec.ac.in)

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## CERTIFICATE

This is to certify that the major project report entitled **“Deep Learning for Customer Retention: An Autoencoder-Based Churn Prediction Approach”** is a Bonafide work done by **C Yagnesh (21AG1A6717), J Vaishnav Teja (21AG1A6727), K Uday Kiran (21AG1A6733), and P Shiva Shashank (21AG5A6751)** in partial fulfillment for the award of Degree of BACHELOR OF TECHNOLOGY in CSE(Data Science) from JNTUH University, Hyderabad during the academic year 2024 - 2025. This record of bonafide work carried out by them under our guidance and supervision.

The results embodied in this report have not been submitted by the student to any other University or Institution for the award of any degree or diploma.

**Mrs. P Niharika**  
Assistat Professor  
Supervisor

**Dr. P. Chiranjeevi**  
Associate Professor  
HOD, CSE-DS

**External**

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C Yagnesh (21AG1A6717)

J Vaishnav Teja (21AG1A6727)

K Uday Kiran (21AG1A6733)

P Shiva Shashank (21AG1A6751)

**DEEP LEARNING FOR CUSTOMER  
RETENTION: AN AUTOENCODER-BASED  
CHURN PREDICTION APPROACH**

## ABSTRACT

Customer retention is a vital aspect of business sustainability, as acquiring new customers often costs more than retaining existing ones. Identifying customers likely to churn enables companies to take proactive measures to improve engagement and satisfaction. Traditional churn prediction methods often struggle with the complexity and volume of customer behavior data, leading to limited accuracy and scalability.

This study introduces a deep learning-based approach using autoencoders to predict customer churn. Autoencoders are well-suited for modeling complex patterns by learning compressed representations of high-dimensional data. By training on historical customer activity, the autoencoder captures typical behavioral trends and flags deviations that may indicate churn risk. This unsupervised learning technique is particularly effective in identifying subtle signs of disengagement that conventional models may overlook.

The proposed model demonstrates high prediction accuracy and scalability, making it suitable for real-time applications. It enhances retention strategies by enabling timely interventions, ultimately boosting profitability and customer satisfaction. Furthermore, the approach can be extended with Natural Language Processing (NLP) for analyzing customer feedback and integrated with CRM systems to provide a comprehensive retention solution.

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