CUSTOMER SEGMENTATION USING DEEP LEARNING FOR ENHANCED BANKING INSIGHTS

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BUSINESS PROBLEM

Customer segmentation is the process of dividing customers into groups based on shared characteristics to better understand and serve their needs.

- Banks struggle to accurately understand and address diverse customer needs due to traditional segmentation approaches.
- Traditional models fail to capture complex and dynamic spending behaviors, limiting customer insights.

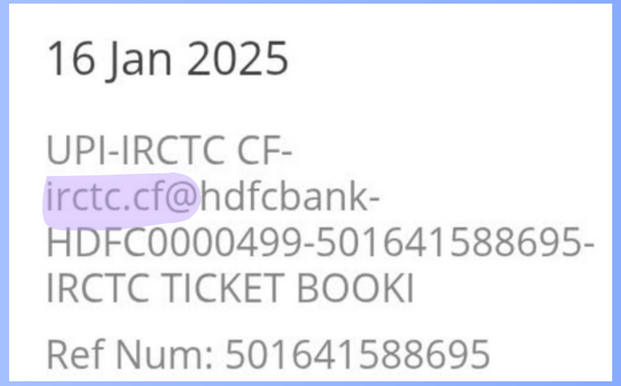
- Inefficient targeting leads to reduced customer satisfaction and higher churn rates.
- Missed opportunities for cross-selling and up-selling result in significant revenue losses.

BUSINESS PROBLEMS AS DATA SCIENCE APPROACH

- Traditional models are unable to capture complex, dynamic spending behaviors from transaction data.
- Manual feature engineering is labor-intensive, time-consuming, and does not scale effectively with large datasets.
- Existing models fail to adapt to changing customer behaviors, leading to outdated and inaccurate customer segments.

OUR FOCUS

- The focus is on leveraging transaction descriptions to segment customers based on their spending behaviors.
- By utilizing deep learning and NLP techniques, the aim is to capture complex patterns in customer transactions
- For example, extracting the keyword "irctc" from a GPay transaction and categorizing it under "travel." This approach enables precise and automated categorization, providing deeper insights into spending behaviors for better customer segmentation.



DATA SCIENCE METHODS

Algorithms & Models:

- Deep Neural Networks (DNNs): For modeling complex, non-linear spending behaviors.
- Autoencoders: Unsupervised feature extraction and dimensionality reduction.
- Recurrent Neural Networks (RNNs): Time-series analysis for sequential spending patterns.
- Long Short-Term Memory (LSTM): Capturing long-term dependencies in spending behavior.
- Generative Adversarial Networks (GANs): Generate synthetic data to improve model robustness.

Toolsets:

- TensorFlow & Keras: For building and training deep learning models.
- Scikit-learn: For data preprocessing, clustering, and evaluating models.
- Pandas & NumPy: For data manipulation and analysis.
- Matplotlib & Seaborn: For visualizing insights from the data.

Data Sets:

- Spending Habits by Category and Item (KAGGLE)
- Customer Segmentation Dataset (KAGGLE)
- Customer Segmentation Classification(KAGGLE)
- Synthetic data generated using Machine learning techniques.

LITERATURE REFERENCES

A review on customer segmentation methods for personalized customer targeting in e-commerce use cases - LINK

AUTHOR *-Miguel Alves Gomes1 · Tobias Meisen1*

SUMMARY- *Techniques like k-means clustering, hybrid approaches, fuzzy c-means, latent class models, and deep learning methods are explored. Among these, k-means clustering is identified as the most commonly used due to it*

Limitation :- *challenges remain, such as handling high-dimensional datasets and aligning segmentation with business goals.*

Future Scope :- *` The study emphasizes the need for robust feature engineering and highlights the role of RFM analysis as a dominant feature selection method. Additionally, it identifies a lack of consensus on evaluation metrics for comparing segmentation*

Sentiment Analysis of Consumer Feedback and Its Impact on Business Strategies by Machine Learning

AUTHOR- *Gupta Mohit ,Prof. Dr. Brune PHILIPP,Prof. Dr. Faußer STEFAN* ***- LINK***

SUMMARY-*The thesis, Customer Segmentation using Machine Learning applied to Banking Industry by Mohit Gupta, explores unsupervised machine learning techniques for customer segmentation using a real dataset from VR Bank. Algorithms like K-Means, DBSCAN, Agglomerative Clustering, and K-Prototype are evaluated based on metrics like Silhouette score and Davies-Bouldin index*

Limitation :- *While K-Means is computationally efficient, it may struggle with very large datasets or those requiring intricate, hierarchical clustering*

Future Scope :- *Further experiments with multiple clustering algorithms and comparison using classification reports or prediction models are suggested to identify optimal techniques for specific datasets*

Improve Profiling Bank Customer's Behavior Using Machine Learning - -LINK

AUTHOR-*EMAD ABD ELAZIZ DAWOOD1 , ESSAMEDEAN ELFAKHRANY2 , AND FAHIMA A. MAGHRABY2*

SUMMARY - *The paper, Improve Profiling Bank Customers' Behavior Using Machine Learning, examines the use of machine learning algorithms to enhance customer profiling in the banking industry. By leveraging both demographic and transaction data*

Limitation :- *Improved K-Means was found effective, but its performance may vary with different datasets or clustering requirements.*

Future Scope :- *Future work aims to implement deep learning algorithms to further improve profiling and predictive accuracy.*