**Developing a Comprehensive Complaint Management System at XYZ Bank**

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**Problem Statement**: As an AI/ML engineer, you are tasked with developing a complaint management system chatbot for a financial institution. The chatbot should be able to categorize customer complaints based on the financial product involved (e.g., credit card, savings bank) and suggest appropriate solutions. This system will help streamline the complaint resolution process, improve customer satisfaction, and provide valuable insights into common issues faced by customers.

* **NLP for Customer Feedback Analysis:** Understanding reasons for dissatisfaction by analysing textual feedback from surveys, complaints, and social media.
* Tag categories with respective feedback comments. (Current Account, Customer Support, Fixed Deposit, Loans, Online Banking, Savings Account etc)
* **Generative AI Based Complaint Management Chatbot:** Developing and testing a Gen AI based chatbot, to categorize complaints based on the input received from bank users and to suggest solutions.

**Solution:**

* Develop a well-structured solution architecture utilizing the proposed techniques.
* Showcase the functionality of solution and its potential impact.

**Dataset:** For this assignment, you will work with the following datasets: Attached.

**Task Requirements:**

a) Data Understanding and Preprocessing:

* Examine the provided datasets and describe their structure.
* Identify relevant features for churn prediction.
* Propose and implement necessary data cleaning and preprocessing steps.
* Handle missing values and outliers appropriately.
* Perform exploratory data analysis to gain insights.

b) NLP for Customer Feedback Analysis:

* Preprocess textual data from customer feedback.
* Tag Categories with respective feedback comments. (Current Account, Customer Support, Fixed Deposit, Loans, Online Banking, Savings Account etc)
* For the missing categories in the product category column, generate it based on the sample data provided.
* Implement sentiment analysis to gauge overall customer satisfaction.
* Develop a method to extract key insights and reasons for dissatisfaction.

c) Generative AI for Complaint Management System:

* Propose an approach for using generative AI to take user complaints as input and categorize complaints based on the product type viz. credit card, savings account etc,
* Create a simple user interface for interacting with the chatbot. Ensure the interface is user-friendly and provides clear instructions and route the problem specific product type.

Example : My Debit Card often gets blocked without reason.

Response from Chat bot: Thank you for facing issue with Debit Cards we will route to Debit Cards team.

Or Routed to Debit Cards Team

* Develop a method for the chatbot to ask clarifying questions when needed

d) System Integration and Deployment:

* Outline an architecture for integrating all components into a cohesive system.
* Propose a deployment strategy (e.g., cloud-based, on-premises)
* Describe how you would handle real-time data processing and model updates.
* Discuss potential scalability challenges and how to address them.

e) Ethical Considerations and Privacy:

* Discuss potential ethical implications of the churn prediction system.
* Propose measures to ensure customer privacy and data protection.
* Address any potential biases in the model and how to mitigate them.

**Deliverables:**

* Jupyter notebook(s) with complete solution that provide entire workflow, from data loading, EDA, FE to Model building and deployment code with clear comments and explanations.
* Chatbot application code.
* Python scripts for your final implementation.
* A presentation (maximum 10 slides) summarizing your approach, key findings, and recommendations for stakeholders.
* Requirements.txt file listing all necessary libraries and their versions.