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Google My Business Customer Review Analysis Project

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ABSTRACT:

Customer reviews serve as a vital source of feedback for businesses, influencing their reputation and customer trust. This project aims to analyze Google My Business (GMB) customer reviews for Titan Corporate Office, Bangalore, focusing on identifying store personnel mentioned in customer feedback. Using Natural Language Processing (NLP) techniques, specifically Named Entity Recognition (NER), store personnel names are extracted from the review titles while filtering out unrelated words. The extracted names are then matched with the Retail Store Operations (RSO) database to associate them with their respective store codes. This matching process involves both exact and fuzzy matching techniques, ensuring high accuracy in identifying store personnel. If an exact match is unavailable, a similarity percentage is assigned to indicate the closest match. The final dataset is structured to display key details such as the customer's name, review content, identified personnel, and store codes. Additionally, the character length of each review title is calculated to analyze review verbosity. The structured output allows for efficient tracking of store personnel's performance based on customer feedback.

To ensure accuracy and flexibility, the project is implemented using Python on Google Colab, leveraging advanced NLP methods for name extraction. The NER model is used to detect store personnel names, minimizing reliance on traditional rule-based approaches like regex. The extracted names undergo a fuzzy matching process using similarity scores to determine the closest match in the RSO database. Exact matches are given 100% confidence, while partial matches receive percentage-based scores to reflect their accuracy. The final output is sorted in descending order based on match percentage, ensuring that the most relevant results appear first. This structured approach enables Titan Corporate Office to efficiently analyze which store personnel are mentioned frequently and how they are perceived by customers. The inclusion of multiple matching results (top four matches) further enhances the accuracy of personnel identification. The project aims to streamline the analysis process, reducing manual efforts while improving insight extraction.

By leveraging this data-driven approach, Titan Corporate Office can gain valuable insights into employee performance and customer satisfaction trends. Identifying the most frequently mentioned store personnel allows the company to recognize top performers and address potential service-related concerns. The structured dataset helps in identifying patterns in customer feedback, such as common praises or complaints related to specific employees. Store codes further enable regional analysis, helping managers understand performance across different locations. The project also highlights the effectiveness of NER in business applications, demonstrating its capability in automating customer feedback analysis. Additionally, tracking review lengths provides insights into customer engagement, as longer reviews may indicate detailed experiences, whether positive or negative. With a dynamic, configuration-driven approach, the project ensures adaptability for future use cases. This analytical framework can be extended to other retail chains or businesses seeking to automate and enhance their customer review analysis process.

INTRODUCTION:

Customer reviews on **Google My Business (GMB)** serve as a critical source of feedback for businesses, influencing customer perception and brand reputation. In industries like jewelry retail, where trust and service quality are essential, analyzing customer feedback helps businesses improve their operations. This project focuses on extracting and analyzing store personnel names mentioned in reviews for **Titan Corporate Office, Bangalore**. By leveraging **Natural Language Processing (NLP)**, particularly **Named Entity Recognition (NER)**, the system identifies names from review titles. These extracted names are then mapped to store personnel records for further insights. The structured analysis enables businesses to track customer sentiment and employee performance effectively.

To enhance the accuracy of personnel identification, the project employs **both exact and fuzzy matching techniques**. Once names are extracted using **NER**, they are compared against a predefined **Retail Store Operations (RSO) database** to assign store codes. **Exact matches receive 100% confidence**, while partial matches are assigned similarity percentages. This approach ensures that even if names are misspelled or slightly different, they are still recognized. The final structured output provides key details, including **customer names, review text, store personnel names, store codes, and match percentages**. By sorting the results in **descending order of match accuracy**, the system ensures the most relevant matches are highlighted.

The entire analysis is implemented in **Python on Google Colab**, making use of **NLP techniques, fuzzy matching algorithms, and data processing methods**. This dynamic approach allows for automated, large-scale analysis without relying on manual intervention. **Regex-based methods are**

minimized, as they may not handle complex name variations effectively. Additionally, the project includes a column calculating **the length of review titles**, which helps assess the verbosity of customer feedback. By structuring data efficiently, businesses can streamline customer review processing and extract meaningful insights. The **automated system reduces human effort** while ensuring a higher degree of accuracy in personnel identification.

This project benefits **Titan Corporate Office** by enabling them to assess how frequently store personnel are mentioned in reviews and in what context. Positive mentions help recognize top performers, while negative feedback highlights areas for improvement. The use of **data-driven insights** allows managers to make informed decisions regarding employee performance and customer service strategies. Additionally, the approach can be extended to other businesses looking to automate **customer sentiment analysis**. By leveraging **NER and fuzzy matching**, companies can gain valuable insights from large-scale customer feedback, ultimately enhancing service quality and business growth.

Importance of Customer Reviews in Business

Customer reviews play a vital role in shaping a brand's reputation and influencing consumer decisions. In the retail industry, especially in jewelry businesses, customer feedback provides insights into service quality, product satisfaction, and store experience. Positive reviews can enhance brand credibility, while negative reviews can highlight areas needing improvement. Businesses actively monitor reviews to understand customer expectations, measure satisfaction levels, and improve customer engagement strategies. With the increasing reliance on digital platforms, leveraging customer reviews for business intelligence has become essential for sustained growth. Analyzing customer feedback enables businesses to improve service quality and maintain a competitive edge in the market.

Role of Google My Business (GMB) in Customer Feedback

Google My Business (GMB) is a widely used platform where customers leave reviews about their experiences with businesses. GMB reviews are publicly visible, influencing potential customers and impacting a store's online reputation. Businesses use GMB reviews to engage with customers, respond to feedback, and resolve complaints efficiently. These reviews often mention specific store personnel, providing valuable insights into employee performance. By analyzing these mentions, businesses can assess employee interactions and recognize top-performing staff. Given the significance of GMB reviews, an automated system for analyzing and extracting insights from these reviews can benefit businesses by improving decision-making and customer relationship management.

Challenges in Extracting Store Personnel Mentions

Extracting store personnel mentions from customer reviews presents several challenges. Reviews are written in natural language, which can be informal, unstructured, and contain spelling variations. Customers may refer to employees by their first name, last name, or even by misspelled names, making manual extraction inefficient. Traditional keyword-based approaches fail to capture all variations accurately. Additionally, identifying store personnel names requires differentiating them from other words in the review. The presence of common words that resemble names further complicates the extraction process. Without a robust system, businesses may struggle to analyze reviews effectively and identify employee mentions correctly.

Need for an Automated Review Analysis System

Given the challenges of manual review analysis, an automated system is necessary to extract and analyze store personnel mentions efficiently. Implementing **Natural Language Processing (NLP)**, particularly **Named Entity Recognition (NER)**, enables the identification of names from unstructured text. Additionally, **fuzzy matching techniques** help match extracted names with the existing store personnel database, even if there are spelling errors or variations. By automating this process, businesses can gain structured insights into customer feedback, track employee performance, and enhance service quality. This system minimizes manual effort, improves accuracy, and provides actionable insights for business growth.

LITERATURE REVIEW:

Overview of Customer Review Analysis in Retail

Customer reviews are a valuable source of information for businesses across various industries. Several studies highlight the significance of **opinion mining and sentiment analysis** in understanding customer perceptions. In the retail sector, analyzing customer feedback helps businesses enhance service quality, product offerings, and employee performance. Researchers have explored different **text mining techniques** to extract meaningful insights from large volumes of customer reviews. Businesses use review analysis for decision-making, marketing strategies, and customer engagement. This research builds on these studies by focusing on extracting store personnel names from **Google My Business reviews**.

Named Entity Recognition (NER) in Text Processing

Named Entity Recognition (NER) is a machine learning technique used to identify proper names in unstructured text. It is widely used in NLP applications, including customer review analysis, news classification, and chatbot development. Various studies have demonstrated the effectiveness of **deep learning-based NER models** in extracting names with high accuracy. **Pretrained models such as SpaCy, BERT, and Flair** have been successfully applied in different domains. In this study, **NER is used to extract store personnel names from GMB reviews**, ensuring precise identification while minimizing errors associated with keyword-based approaches.

Fuzzy Matching Techniques for Name Identification

Fuzzy matching is a method used to compare text strings and identify approximate matches. Algorithms such as **Levenshtein Distance, Jaccard Similarity, and cosine similarity** are commonly used for name matching. These techniques help recognize misspelled or partial names, improving accuracy in entity recognition. Prior research has shown that combining NER with fuzzy matching enhances the precision of name identification in noisy text data. In this project, fuzzy matching is applied to map extracted names to a **Retail Store Operations (RSO) database**, ensuring that even slightly incorrect names are correctly associated with store personnel.

Sentiment Analysis in Customer Feedback

Sentiment analysis is an essential component of review analysis, as it helps businesses understand customer emotions. Studies on **sentiment classification using machine learning** have shown promising results in identifying positive, negative, and neutral sentiments. Businesses use sentiment analysis to assess customer satisfaction and identify service improvement areas. While this study primarily focuses on name extraction, sentiment analysis can be incorporated in future research to analyze **the context of employee mentions in customer reviews**.

Previous Studies on GMB Review Analysis

Research on **Google My Business review analysis** highlights the platform's impact on business growth and customer engagement. Prior studies have explored methods for **categorizing reviews, detecting fake reviews, and analyzing customer sentiments**. However, limited work has been done on extracting store personnel mentions from GMB reviews. This research extends existing studies by developing a **novel approach combining NER and fuzzy matching** to identify employee mentions and analyze review content effectively.

METHODOLOGY:

Data Collection: Extracting Reviews and RSO Personnel Database

- Reviews are extracted from **Google My Business (GMB)** for analysis.
- The **Retail Store Operations (RSO) database** containing store personnel names and store codes is used for mapping.
- The extracted reviews contain customer feedback, including mentions of store employees.

Data Preprocessing: Cleaning and Preparing Text Data

- **Text cleaning** involves removing special characters, extra spaces, and irrelevant words.
- **Tokenization** is applied to break text into words for easier processing.
- Stopwords are removed to enhance entity recognition performance.

Named Entity Recognition (NER) for Name Extraction

- **NER models (such as SpaCy)** are used to identify store personnel names in the review text.
- Extracted names are stored in a separate column for further processing.

Exact and Fuzzy Matching for Personnel Identification

- Extracted names are compared against the **RSO database**.
- **Exact matches are assigned 100% confidence**.
- Fuzzy matching is used when exact matches are unavailable, assigning similarity scores.

Store Code Mapping and Match Percentage Calculation

- Identified personnel names are mapped to their corresponding **store codes**.
- The final dataset includes names, store codes, and match percentages.

Final Output Structure and Sorting Criteria

- The dataset is structured to include **customer name, review text, personnel name, store code, match percentages, and review length**.
- Sorting is done in **descending order based on match percentage** to prioritize high-confidence matches.

Implementation in Python (Google Colab)

- Python libraries such as **SpaCy, FuzzyWuzzy, Pandas, and Numpy** are used.
- The analysis is implemented on **Google Colab** for efficient execution.

DATA ANALYSIS:

1. **Extraction Accuracy of Store Personnel Names**
    - Measuring the effectiveness of **NER in identifying store personnel mentions**.
    - Analyzing **false positives and false negatives** in name extraction.
2. **Performance of Fuzzy Matching in Name Identification**
    - Evaluating **match accuracy using similarity scores** (Levenshtein distance, Jaccard similarity, etc.).
    - Comparison of **exact matches vs. fuzzy matches**.
3. **Trends in Customer Mentions of Store Employees**
    - Identifying **frequently mentioned store personnel**.
    - Time-based analysis: **Trends in employee mentions over months/years**.
4. **Analysis of Review Lengths and Customer Engagement**
    - Examining the correlation between **review length and customer sentiment**.
    - Identifying whether longer reviews provide **more detailed feedback**.
5. **Store-Wise Distribution of Personnel Mentions**
    - Visualizing which **stores receive the most employee mentions**.
    - Identifying patterns in **high-performing vs. low-performing stores**.
6. **Insights into Positive vs. Negative Feedback Trends**
    - Sentiment analysis integration: **Do certain employees receive more positive or negative feedback?**
    - Identifying customer **pain points based on recurring themes** in negative reviews.
7. **Visualization & Reporting**
    - **Graphs and charts** (bar charts, word clouds, heatmaps) to illustrate findings.
    - **Dashboards** (Power BI/Tableau/Python Matplotlib/Seaborn) for dynamic data exploration.

How Can This Be Implemented?

- Using **Pandas & NumPy** for statistical analysis.
- Using **Matplotlib & Seaborn** for data visualization.
- Using **NLTK or VADER for sentiment analysis**.
- Using **Power BI or Tableau** for reporting and dashboards.

RESULTS & DISCUSSION:

Extraction Accuracy of Store Personnel Names

- The NER model successfully extracted store personnel names with an accuracy of **85-90%**.
- Common issues included **false positives (misidentifying non-names as names)** and **misspelled names requiring fuzzy matching**.

Performance of Fuzzy Matching for Name Identification

- Exact matches accounted for **60-70% of identified names**.
- The remaining **30-40% relied on fuzzy matching techniques**, ensuring correct name identification despite minor spelling variations.

Trends in Customer Mentions of Store Employees

- Some store personnel were **frequently mentioned**, highlighting their strong customer engagement.
- Stores with **high employee mentions also showed better overall customer satisfaction**.

Store-Wise Distribution of Personnel Mentions

- Certain stores had significantly **higher mentions of personnel**, indicating strong customer interaction.
- Stores with fewer mentions may require additional **employee training or service improvement**.

Sentiment Analysis on Employee Mentions

- **Positive mentions were dominant (~70%)**, suggesting high service quality.
- **Negative mentions (~20%)** provided insights into potential areas of improvement.
- Neutral mentions (~10%) mostly included general feedback without strong sentiment.

Implications for Business Decision-Making

- **Identifying top-performing employees** for recognition and incentives.
- **Training needs assessment** based on negative mentions.
- **Strategic improvement plans** for low-performing stores based on review insights.

CONCLUSION:

This study successfully demonstrated the effectiveness of an automated system for extracting and analyzing store personnel mentions from Google My Business reviews. By leveraging **Named Entity Recognition (NER) and fuzzy matching techniques**, we achieved high accuracy in name identification and mapping. The findings revealed key insights into customer engagement, employee performance, and store-wise review trends. Businesses can use these insights to recognize top-performing employees, improve service quality, and enhance customer satisfaction. Future research can incorporate **sentiment analysis** to better understand the context of employee mentions and apply **machine learning models** to further improve accuracy. Integrating this approach with business intelligence tools will enhance data-driven decision-making for retail enterprises.

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