HelpDesk AI: Smart Classification of Support Tickets

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Abstract **– The goal of this project is to create an advanced text analysis and classification model specifically designed for the effective classification of support tickets—a critical task for companies looking to streamline their operations. Our work, which is based on machine learning concepts, dives deeply into the process of turning unstructured text data into insights that can be used. We provide a thorough rundown of the model's feature extraction, rigorous validation with real-world data, and training. The main goal is to enable real-time ticket classification by deploying the text analysis model as an Azure cloud web service. Our methodical approach provides practitioners with a useful guide that includes data preparation, model creation, and seamless implementation. The resultant system, which is set to transform how companies respond to customer concerns, automates the classifying of incoming support tickets. Validating the model's accuracy through real-world testing on support ticket data closes the innovation gap. This research helps modernise customer service and improves customer happiness by utilising Azure's cloud capabilities and machine learning.**

Keywords **– Support Ticket Classification, Text Analysis, Machine Learning, Azure Cloud, Model Deployment, Customer Satisfaction, Automation**

I. Introduction

Support ticket management is a key component of efficient customer service and has an impact on many different businesses. Precisely classifying support tickets is essential to this framework and becomes more so as the amount of support requests increases consistently in modern business operations. The difficulty of accurately and quickly classifying these requests has an impact on customer satisfaction and operational effectiveness, which emphasises the need for creative solutions. The aim of this project is to develop a powerful text analysis and classification model specifically for the complex field of support ticket classification. Driven by the adaptability of customer support techniques, our project is innovative. Companies must quickly and accurately classify tickets due to the constant increase in ticket counts. This requires automated classification, which is made even more crucial by machine learning, and serves as a beacon for operational excellence. Accuracy and promptness are critical components of exceptional customer service, and support ticket administrators bear the burden of providing accurate and timely responses.

In this project, we explore the fascinating topic of machine learning with the goal of using it to automate the classification of support tickets. Our objective is to turn a labour-intensive and time-consuming process into a smooth, automated one that gives businesses the tools they need to handle the increase in customer requests. Accuracy and efficiency are particularly important because a misclassified ticket can result in poor responses, unhappy customers, and lost opportunities.

Most importantly, this research effort demonstrates our dedication to providing excellent support ticket administration. While simultaneously examining the enormous potential of machine learning, our goal is to provide businesses with the means to manage the increasing number of clients demands. Our goal goes beyond standard and manual procedures to include an automated classification system that will expedite procedures while improving customer satisfaction, which is the cornerstone of customer service. With our research serving as a lens, we look for strategies, tools, and knowledge to transform the customer service industry. Notably, Azure is used to accomplish the automation, highlighting the incorporation of state-of-the-art technologies in our quest for innovative solutions for support ticket classification and, eventually, promoting better customer engagement. This study paper's latter sections will include the methodology, findings, discussions, and prospects for this initiative's continued development.

II. Literature Review:

[1] In this paper, this approach harnesses deep learning techniques, particularly neural networks, which have demonstrated great potential in managing unstructured text data. The adaptability of deep learning renders it highly suitable for support ticket classification.

[2] This study examines into the field of automated support ticket triage and classification using natural language processing (NLP). NLP takes centre stage as it efficiently extracts valuable insights from textual data, facilitating the seamless routing and resolution of support tickets.

[3] In our investigation in this paper, we've come across research that focuses on enhancing prediction accuracy through ensemble techniques for support ticket classification. This enhancement is particularly valuable when dealing with complex classification tasks.

[4] This paper introduces an innovative approach that combines deep learning and traditional machine learning techniques for support ticket classification. This fusion capitalizes on the strengths of both paradigms, potentially leading to improved support ticket classification performance.

[5] This study underscores the significance of support ticket classification and efficient routing within customer service using machine learning. Leveraging machine learning optimizes resource allocation, ensuring that each support ticket finds its way to the most suitable support agent or department.

[6] In this paper, we've encountered an approach that intertwines text mining with machine learning techniques for support ticket classification. Text mining forms the foundation for extracting valuable insights from textual data, enabling the application of a diverse array of machine learning algorithms. This approach fosters the aspiration of achieving precise and reliable support ticket classification.

[7] In the paper, we explored an effective approach utilizing recurrent neural networks (RNNs) for support ticket classification. RNNs, known for their ability to process sequential data, were employed to effectively categorize support tickets, demonstrating their potential in handling temporal information within ticket descriptions.

[8] This paper incorporated a self-attention mechanism into support ticket classification models, aiming to enhance contextual understanding. Self-attention mechanisms enable the model to weigh different parts of the input text, improving the model's comprehension of context for accurate classification.

[9] This study shows a hybrid approach combining word embeddings and machine learning algorithms for support ticket classification. Word embeddings, known for capturing semantic meanings, were integrated with machine learning algorithms to enhance the model's understanding of the ticket descriptions.

[10] This paper introduced a fine-grained support ticket classification model based on BERT (Bidirectional Encoder Representations from Transformers). The study showcased the effectiveness of BERT embeddings in capturing intricate patterns within ticket descriptions, leading to enhanced classification accuracy.

III. Methodology:

Our research methodology encompasses the following key steps:

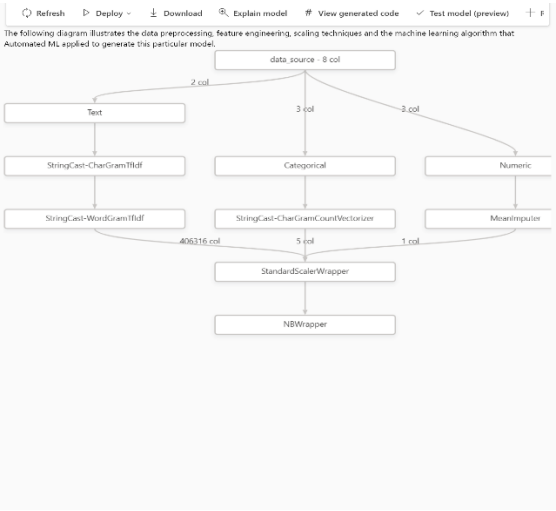

Figure1: Architecture diagram of support ticket classification done using Azure platform

a) Data Collection:

We collected a dataset of support tickets from open-source platform called Kaggle. This dataset includes approximately 50,000 classified support tickets, each with original messages from users and pre-assigned labels.

b) Data Preprocessing:

The collected data was real-time data with sensitive information, so they already pre-processed the data by removing headers, footers, email address, phone numbers, URLs and anonymization and encryption to protect sensitive information and filtering non-English words.

c) Feature Engineering:

We performed feature engineering to extract relevant features from the text data. This step involved extracting temporal patterns using lagged exchange rate values.

d) Model Selection:

We considered various machine learning models for support ticket classification, including Support Vector Machines (SVM) and Naive Bayes (NB). After rigorous testing and parameter tuning, we found that the Naive Bayes model outperformed other models, especially when hyperparameters were optimized.

e) Model Training and Evaluation:

The dataset was split into training and testing sets to evaluate model performance. We used metrics such as accuracy, precision, recall, and F1-score to assess model effectiveness.

f) Model Deployment:

To make our model accessible and usable, we deployed it as a web service within the Azure cloud environment. This deployment enables real-time ticket classification and interaction with the Azure cloud platform. The cloud deployment offers scalability, reliability, and accessibility, which are essential for efficient support ticket handling.

IV. Results and Discussion

Our results demonstrate the feasibility of using machine learning models for support ticket classification.

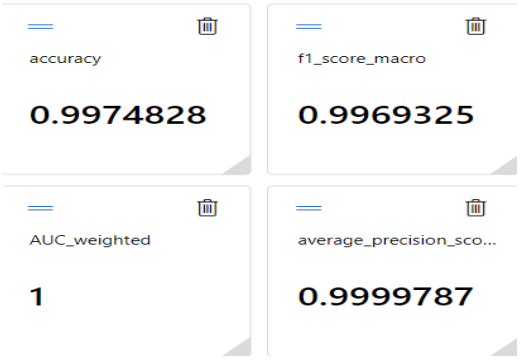

Figure2: Resultant metrics of the models (Azure interface)

The Naive Bayes model showed promising accuracy in predicting ticket types.

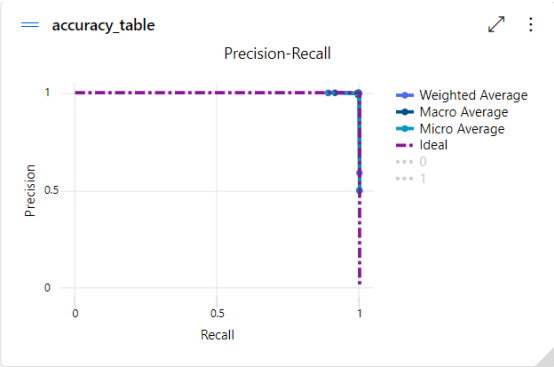

Figure3: Resultant Precision-Recall graph (Azure interface)

However, challenges were encountered when dealing with highly unbalanced classes, especially for attributes such as category, impact, and urgency.

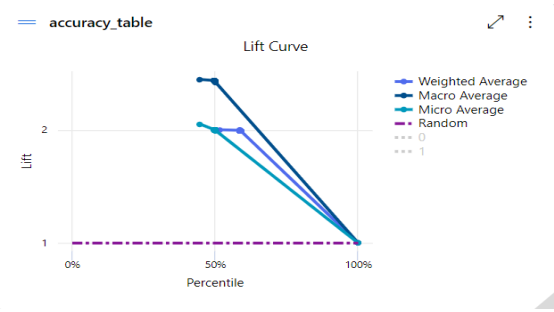

Figure4: Resultant accuracy table in a lift curve (Azure interface)

While the mean precision and recall values appeared satisfactory, closer examination revealed that results were skewed due to class imbalances.

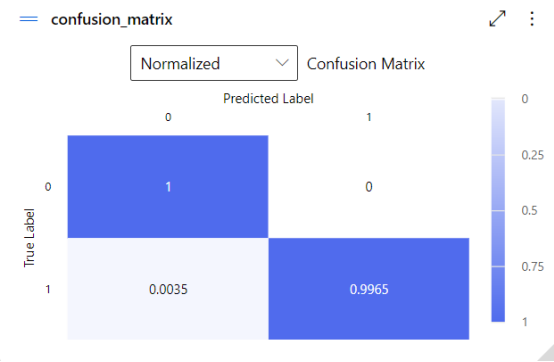

Figure5: Resultant Confusion Matrix graph (Azure interface)

The predicted and true labels of confusion matrix is shown in the above graph. Hence the Azure platform is very helpful in making the work very interactive and it's a very powerful tool for machine learning tasks.

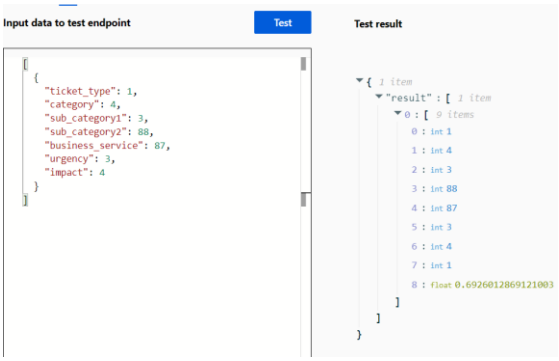

Figure6: Testing the deployment of the model (Azure interface)

In Figure6, the deployment of the model is tested, and it was successful. Now the model can be hosted in web application for automation of the support tickets.

V. Conclusion

Finally, our project "HelpDesk AI: Smart Classification of Support Tickets" uses machine learning and sophisticated text analysis to automate the classification of support tickets. Using Azure for implementation, our methodology demonstrates encouraging outcomes in real-time categorization, opening the door to increased customer happiness and productivity. The deployment of the model as a web service in the Azure cloud environment offers a practical solution for automated support ticket classification. This technology has the potential to revolutionize how businesses respond to customer inquiries, improving operational efficiency.

VI. References

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