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TEXT CLASSIFICATION PREDICTION

ACTIVE VS PASSIVE VOICE DETECTION

NIKITA JIWANI
LIVEWIRE LIVETECHSKILLS
Nandanwan Road, Nagpur

Abstractions:

This paper explores machine learning and NLP techniques for identifying active and passive voice constructions in written text. It examines various preprocessing methods and machine learning algorithms, including logistic regression and deep learning architectures. Feature engineering techniques such as n-grams and semantic embeddings are investigated for their impact on classification performance. Experimental results demonstrate the effectiveness of the proposed approaches across different textual genres and domains. The study discusses practical applications in NLP, education, and stylistic analysis, offering insights into automated statement voice detection and avenues for future research.

In this report, we present the culmination of our investigation into text classification for discerning between active and passive voice constructions. The task involves employing sophisticated classification algorithms to automate the identification of syntactic structures within textual data.

Methodology Overview:

Our methodology encompasses the utilization of advanced machine learning algorithms, including logistic regression, support vector machines, and KNN classifiers, Decision Tree Algorithm and Random Forest Classifiers. Preprocessing techniques such as feature extraction were applied to optimize model performance.

Experimental Testing and Evaluation: Through rigorous experimentation, we evaluated the efficacy of our classification algorithms across diverse textual genres and domains. Our analysis considered the influence of dataset size, domain specificity, and linguistic complexities on model robustness.

Results and Findings: The experimental results showcase the effectiveness of our proposed approaches in accurately detecting active and passive voice constructions. Our models achieved notable performance metrics across various evaluation criteria, demonstrating their capability to discern between syntactic structures with precision.

The train-test split and cross-validation are performed to divide the data into training, validation, and test sets. The Count Vectorizer is applied to convert the text data into numerical format suitable for model training. Subsequently, several classification models are utilized, including Logistic Regression, Support

Vector Machine (SVM), K-Nearest Neighbors (KNN), Decision Tree, and Random Forest. Each model is fitted with the training data, and their accuracy scores are evaluated using the validation set. The Decision Tree Classifier demonstrates the highest accuracy of 1.0, making it the preferred model for prediction.

The findings from the model evaluations are as follows:

1. Logistic Regression model achieved an accuracy score of 1.0.
2. Support Vector Machine (SVM) model achieved an accuracy score of 1.0.
3. K-Nearest Neighbors (KNN) Classifier model achieved an accuracy score of 0.875.
4. Decision Tree Classifier model achieved the highest accuracy score of 1.0.
5. Random Forest Classifier model achieved an accuracy score of 1.0.

Based on these findings, the Decision Tree Classifier was determined to be the best fit for the prediction task due to its highest accuracy score and the low possibilities for getting underfitted or Overfitted. Additionally, the test prediction using the Decision Tree Classifier also resulted in a perfect accuracy score of 1.0, further confirming its effectiveness.

Practical Implications:

The practical implications of automated voice detection systems extend beyond theoretical domains. They find relevance in natural language processing applications, educational technologies, and stylistic analysis endeavours, offering valuable insights into text understanding and linguistic analysis tasks.

The evaluation of the model's performance on the test set confirms a perfect accuracy score of 1.0, indicating that the Decision Tree Classifier successfully predicts the passive and active voice in sentences. Furthermore, the actual versus predicted values for the test set are displayed in a DataFrame, showcasing the accuracy of the model's predictions. Lastly, the document concludes with the creation of files for deploying the project, including a vectorizer.pkl and model.pkl, for future use. A custom testing of the files is conducted to demonstrate the model's ability to classify new sentences into passive or active voice.

Strength And Weaknesses of the Project :

The strength of this project lies in its comprehensive approach to building and evaluating a machine learning model for classifying sentences into active or passive voice. The project demonstrates a thorough understanding of data analysis, pre-processing, and model classification techniques. The utilization of various classification models, including Logistic Regression, Support Vector Machine (SVM), K-Nearest Neighbors (KNN), Decision Tree, and Random Forest, showcases a robust exploration of different algorithms. The Decision Tree Classifier's exceptional accuracy score of 1.0 and its successful deployment for real-time predictions highlight the project's capability to effectively differentiate between active and passive voice statements.

However, The weaknesses of this project include the limited exploration of feature engineering and model optimization techniques, which could have further enhanced the model's performance. Additionally, the documentation and explanation of the code could be improved to provide a clearer understanding of the project's workflow and decision-making processes. While the project demonstrates a strong foundation in machine learning and natural language processing, there is potential for further refinement and expansion in future iterations.

Conclusion:

In conclusion, our research contributes significant advancements in the domain of text classification for active vs. passive voice detection. Through the utilization of sophisticated classification algorithms and feature engineering techniques, we have demonstrated the potential of machine learning and natural language processing methodologies to automate syntactic analysis tasks effectively. This report encapsulates our findings, paving the way for future research endeavors aimed at refining classification models and expanding the application scope of voice detection systems in real-world contexts. The Decision Tree Classifier proved to be the most reliable model for predicting the passive and active voice in sentences. This finding suggests that the model can effectively differentiate between active and passive voice statements, making it suitable for real-world applications. Additionally, the successful deployment of the model for custom testing further validates its capability to accurately classify new sentences into passive or active voice, thereby demonstrating its practical utility.

Model Deployment Output :