Review Sentiment Prediction

Binary Classification Problem

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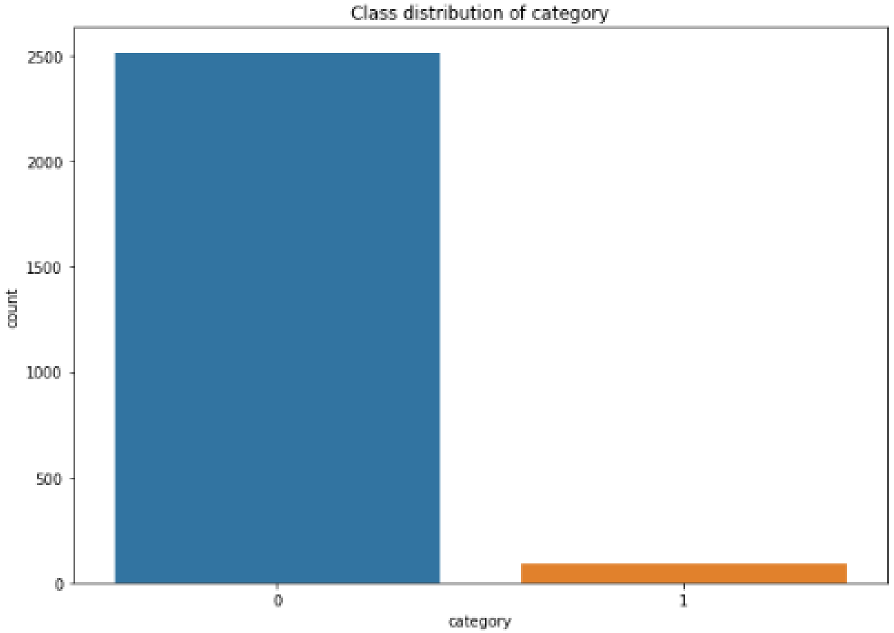
Initial Data Observation

- Training data has 3 features: **id, text and category**
- Here text is already converted into numbers but given in string format
- Category is the sentiments containing positive (1) and negative (0) classes
- Training data has 2598 entries while testing data has 866 entries
- None of the features have missing values
- Target variable has imbalanced class distribution
- Scaling is not required as all the numerical features are in similar scale

Exploratory Data Analysis (EDA)

- Distribution of Target Classes



1. Heavily class imbalance is observed. From the above figure, we can clearly see that class 1 (positive sentiment) is very less that class 0 (negative sentiment).

Feature Encoding

- Here, following 3 different NLP techniques are tried to vectorize the text feature:

1. **Count Vectorizer** converts a collection of text documents to a matrix of token counts
2. **TFIDF Vectorizer** converts a collection of raw documents to a matrix of TF-IDF features.
3. **Hash Vectorizer** converts a collection of text documents to a matrix of token occurrences

Class imbalance handling and Train/Test split

- The target variable ***category*** has imbalance between two classes.
- Class **1** needs to be up-sampled in order to make it equivalent to the class **0**. **SMOTE** technique is used to handle class imbalance.
- Here, **90:10** splitting of training and validation data lead to higher ***precision score*** compare to other splits.

Machine Learning Models

- Tried following few classifiers and selected the best performing model for further tuning and testing.

  1. Logistic Regression
  2. Random Forest
  3. XGBoost
  4. Stochastic Gradient Descent (SGD) Classifier
  5. Linear SVC

- Out of these models, **Logistic Regression** outperformed all others with having **precision score** of **0.98** on test data.

Evaluation metric

- For this problem, **precision score with micro average** is used to evaluate the model on test data.
- Precision attempts to answer the following question: What proportion of positive identifications was actually correct? The precision is intuitively the ability of the classifier not to label as positive a sample that is negative.
- The best value is 1 and the worst value is 0.
- Precision = TP / (TP + FP)

Conclusion

- This is the binary classification problem with imbalanced target classes.
- The given feature ***text*** is already tokenized and converted into numeric values.
- ***id*** is removed from the data due to unimportance in predicting target variable.
- **Logistic Regression** performs better compare to other known classifiers with **Precision** of **0.98** on test data.

Thank you