

Title: SMS Spam Detection using Machine Learning Algorithms

1. Abstract:

This project demonstrates the use of artificial intelligence and machine learning techniques to automatically detect SMS spam messages. Using natural language processing (NLP) tools and classification algorithms, a model is trained to distinguish between spam and legitimate messages (ham).

2. Introduction:

With the rapid growth of digital communication, spam messages have become a common nuisance. Machine learning can help automate the detection of such messages, improving user safety and communication efficiency.

3. Objective:

To develop a machine learning model that can accurately classify text messages as spam or ham.

4. Tools and Technologies Used:

- Python Programming Language
- Jupyter Notebook / Google Colab
- Libraries: Pandas, NumPy, Scikit-learn, NLTK
- NLP Techniques: TF-IDF Vectorization
- Visualization: Matplotlib, Seaborn

5. Dataset Description:

The dataset used is the "SMS Spam Collection Dataset" from UCI/Kaggle. It consists of labeled SMS messages as 'spam' or 'ham'.

6. Methodology:

- Load and clean the data using Pandas.
- Convert text to lowercase, remove punctuation and stopwords.
- Label encoding: 'ham' = 0, 'spam' = 1.
- Text vectorization using TF-IDF.
- Train-test split of the dataset.
- Model training using Multinomial Naive Bayes classifier.
- Evaluate using accuracy, confusion matrix, precision, and recall.

7. Code Overview (Python):

- Load dataset and preprocess text.
- Apply TF-IDF vectorization.
- Split data into training and testing sets.
- Train model and make predictions.
- Evaluate model performance.

8. Results:

The model achieved a high level of accuracy in classifying messages. The Naive Bayes classifier is especially well-suited for text classification tasks like spam detection.

9. Conclusion:

The spam classifier project effectively demonstrates the power of machine learning in solving real-world problems. It successfully identifies spam messages with high accuracy using simple and interpretable models.

10. Future Scope:

- Deploy as a web application using Streamlit or Flask.

- Improve accuracy using ensemble methods or deep learning.
- Extend to detect spam in other languages or platforms.

11. References:

- UCI SMS Spam Collection Dataset
- Scikit-learn Documentation
- NLTK Documentation
- Kaggle Dataset Repository

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