

SMS SPAM DETECTION SYSTEM USING NLP

FINAL REPORT

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PROJECT OVERVIEW

THE **SMS SPAM DETECTION SYSTEM** IS A MACHINE LEARNING-BASED PROJECT BUILT TO IDENTIFY WHETHER AN SMS MESSAGE IS **SPAM OR HAM** (NON-SPAM). USING **NATURAL LANGUAGE PROCESSING (NLP)** TECHNIQUES AND A **NAIVE BAYES CLASSIFIER**, THE SYSTEM ANALYZES THE CONTENT OF THE MESSAGES TO MAKE THIS CLASSIFICATION. THE APP IS BUILT WITH **STREAMLIT** AND ALLOWS USERS TO INPUT THEIR OWN SMS MESSAGES FOR REAL-TIME SPAM DETECTION.

TECHNOLOGIES USED

PYTHON 3.X

STREAMLIT - FOR THE WEB INTERFACE

PANDAS - DATA HANDLING

SCIKIT-LEARN - MACHINE LEARNING MODELS AND DATA PREPROCESSING

NLTK - NATURAL LANGUAGE PROCESSING (NLP)

REQUESTS - FOR DOWNLOADING THE DATASET

ZIPFILE - EXTRACTING FILES FROM A ZIP ARCHIVE

TFIDFVECTORIZER - FOR FEATURE EXTRACTION

HOW IT WORKS

DATASET: THE DATASET USED IS THE **SMS SPAM COLLECTION** DATASET, WHICH IS AVAILABLE AS A ZIP FILE. IT CONTAINS LABELED SMS

MESSAGES THAT ARE CATEGORIZED AS EITHER **SPAM** OR **HAM** (NON-**SPAM**).

PREPROCESSING:

- **TEXT NORMALIZATION:** THE TEXT DATA IS CLEANED BY REMOVING NON-ALPHABETICAL CHARACTERS, CONVERTING THE TEXT TO LOWERCASE, AND ELIMINATING STOP WORDS USING NLTK'S STOPWORDS.
- **TOKENIZATION:** THE TEXT IS SPLIT INTO INDIVIDUAL WORDS, WHICH ARE THEN PROCESSED AND CLEANED.

FEATURE EXTRACTION:

- THE **TF-IDF (TERM FREQUENCY-VERSE DOCUMENT FREQUENCY)** METHOD IS USED TO CONVERT TEXT DATA INTO NUMERICAL FEATURES FOR MACHINE LEARNING MODELS.

MODEL TRAINING:

- A **MULTINOMIAL NAIVE BAYES CLASSIFIER** IS USED TO TRAIN THE MODEL ON THE CLEANED AND VECTORIZED TEXT DATA.
- THE MODEL IS TRAINED USING A SPLIT OF 80% TRAINING DATA AND 20% TESTING DATA.

MODEL EVALUATION:

- THE MODEL'S ACCURACY IS EVALUATED USING ACCURACY SCORE AFTER PREDICTING LABELS FOR TEST DATA.

USER INPUT:

- THE WEB INTERFACE ALLOWS USERS TO INPUT AN SMS MESSAGE FOR REAL-TIME SPAM CLASSIFICATION. THE SYSTEM WILL CLASSIFY THE MESSAGE AS **SPAM** OR **HAM**.
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FEATURES

SMS MESSAGE CLASSIFICATION: USERS CAN INPUT A MESSAGE, AND THE SYSTEM WILL CLASSIFY IT AS SPAM OR HAM (NON-SPAM).

DATASET PREVIEW: USERS CAN VIEW A PREVIEW OF THE DATASET TO UNDERSTAND ITS STRUCTURE.

MODEL ACCURACY DISPLAY: THE APPLICATION SHOWS THE MODEL'S ACCURACY BASED ON THE TESTING SET.

REAL-TIME SPAM DETECTION: THE SYSTEM PERFORMS REAL-TIME CLASSIFICATION AS SOON AS THE USER ENTERS THE MESSAGE.

USAGE

CLASSIFY NEW MESSAGES:

- ENTER AN SMS MESSAGE INTO THE INPUT BOX AND CLICK **CLASSIFY**.
- THE MODEL WILL PREDICT WHETHER THE MESSAGE IS **SPAM** OR **HAM**.

VIEW DATASET:

- THE FIRST FEW ROWS OF THE DATASET WILL BE SHOWN IN THE APPLICATION FOR REFERENCE.

MODEL EVALUATION:

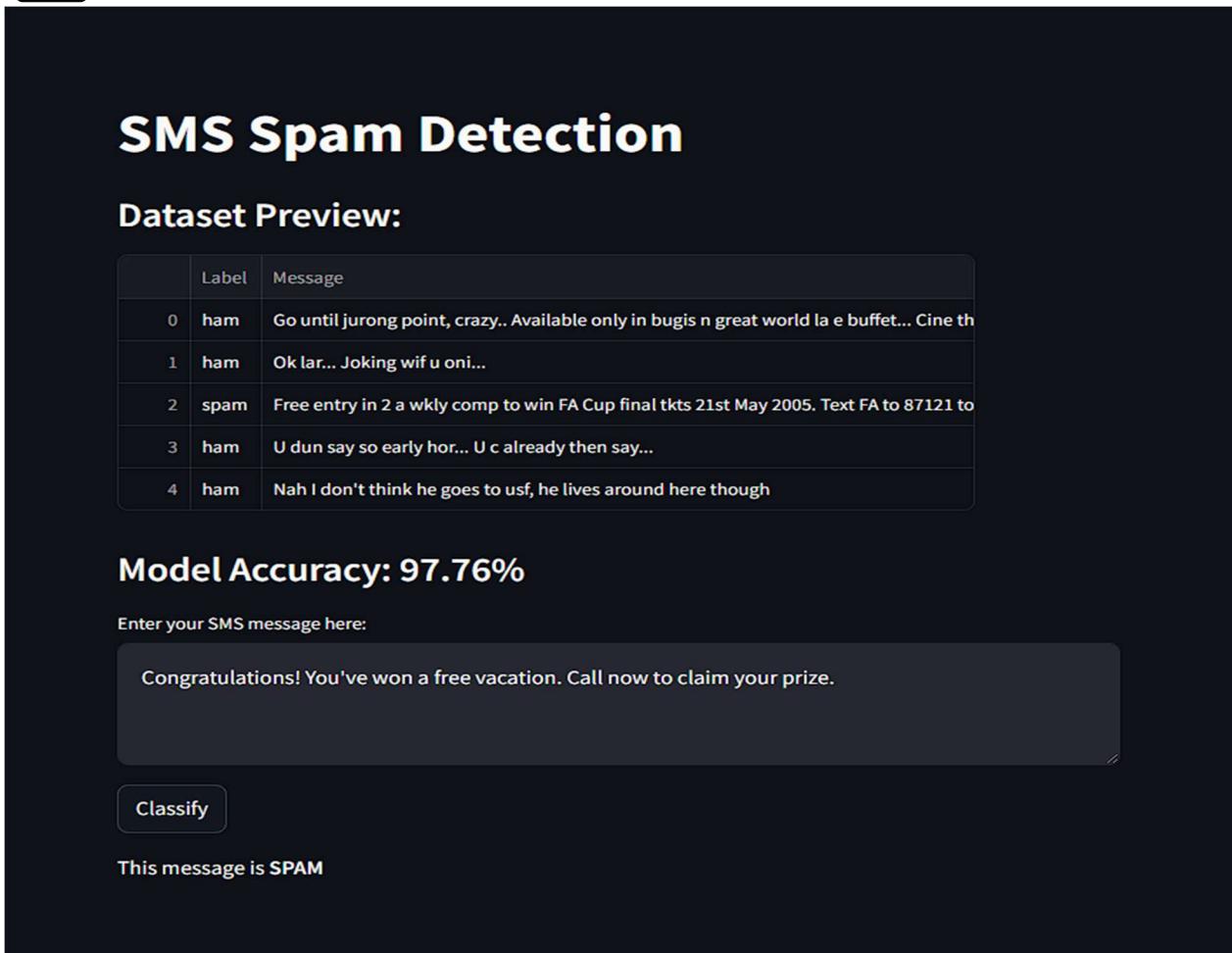
- THE ACCURACY OF THE MODEL BASED ON TEST DATA IS DISPLAYED TO INFORM USERS OF THE MODEL'S PERFORMANCE.
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STREAMLIT INTERFACE

THE APP USES STREAMLIT FOR THE USER INTERFACE, WITH THE FOLLOWING SECTIONS:

1. TITLE: "SMS SPAM DETECTION"
 2. UPLOAD SECTION: USERS CAN UPLOAD THEIR CSV FILE OR USE THE DEFAULT DATASET.
 3. DATASET PREVIEW: DISPLAYS THE FIRST FEW ROWS OF THE DATASET.
 4. SPAM CLASSIFICATION: USERS CAN INPUT A NEW SMS MESSAGE AND CLASSIFY IT AS SPAM OR HAM.
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SCREENSHOTS



The screenshot shows the Streamlit interface for SMS Spam Detection. At the top, it says "SMS Spam Detection". Below that is a section titled "Dataset Preview" containing a table with five rows of data:

	Label	Message
0	ham	Go until jurong point, crazy.. Available only in bugis n great world la e buffet... Cine th
1	ham	Ok lar... Joking wif u oni...
2	spam	Free entry in 2 a wkly comp to win FA Cup final tkts 21st May 2005. Text FA to 87121 to
3	ham	U dun say so early hor... U c already then say...
4	ham	Nah I don't think he goes to usf, he lives around here though

Below the preview is a section titled "Model Accuracy: 97.76%". A text input field asks "Enter your SMS message here:" followed by a success message: "Congratulations! You've won a free vacation. Call now to claim your prize.". At the bottom, there's a "Classify" button and the text "This message is SPAM".

SMS Spam Detection

Dataset Preview:

	Label	Message
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Model Accuracy: 97.76%

Enter your SMS message here:

Hey, can you send me the report by tomorrow?

Classify

This message is HAM

ACKNOWLEDGMENTS

- **UCI MACHINE LEARNING REPOSITORY FOR PROVIDING THE SMS SPAM COLLECTION DATASET.**
- **STREAMLIT FOR CREATING THE USER-FRIENDLY INTERFACE.**
- **SCIKIT-LEARN FOR PROVIDING THE MACHINE LEARNING MODELS AND TOOLS.**
- **NLTK FOR NATURAL LANGUAGE PROCESSING TOOLS.**