Project Report: Hate Speech Detection Using Transformers (Deep Learning)

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2. Problem Statement

Hate speech refers to any form of verbal, written, or behavioral communication that attacks or uses derogatory or discriminatory language against individuals or groups based on factors such as religion, ethnicity, nationality, race, gender, or other identity markers. This project aims to build a machine learning model that can detect hate speech in text using Python.

The task of hate speech detection is often treated as a sentiment classification problem. For this project, we will focus on classifying hate speech using Twitter tweets as our data source. By training the model on data typically used for sentiment classification, we can create an effective tool to identify tweets containing hate speech.

3. Business Understanding

Hate speech detection is essential for online platforms to maintain a safe and inclusive environment.
1. Market Need: With the rise of social media, hate speech has become more prevalent, requiring effective detection systems to foster positive engagement.

2. Brand Impact: Companies that fail to address hate speech risk damaging their reputation and losing users. Proactive measures enhance corporate responsibility and build community trust.

3. Regulatory Compliance: As regulations against hate speech tighten, effective detection helps organizations avoid legal issues and fines.

4. Operational Efficiency: Automating detection reduces the workload on human moderators, enabling faster responses to incidents.

5. Data Insights: A machine learning model provides valuable insights into user behavior, guiding policy adjustments and interventions.

This project addresses a critical societal issue while positioning businesses for success in a digital landscape.

4.Data Collection

The dataset for this project, sourced from Kaggle, consists of Twitter data used for research in hate speech detection. The dataset contains 31,962 observations and three features. The text is categorized into three classes: hate speech, offensive language, and neither. It is important to note that the dataset includes content that may be considered offensive, including racist, sexist, or homophobic language.

5.1 Text Cleaning:

- **5.1.1 Convert to Lowercase:**
  All text was converted to lowercase to ensure uniformity. For example, words like "Racism" and "racism" should be treated as the same in a vector space model, preventing the creation of unnecessary dimensions.
- **5.1.2 Remove Punctuation:**
  Punctuation marks do not contribute meaningful information to the model, so they were removed using regular expressions.
- **5.1.3 Remove URLs:**
  Since URLs are not relevant to the hate speech detection model, they were removed from the text to ensure only the core content is processed.
- **5.1.4 Remove @tags:**
  User mentions, signified by @tags, were removed because they are irrelevant to the model's task of detecting hate speech.
- **5.1.5 Remove Special Characters:**
  Special characters such as [!"#$%&'()*+,-./:;<=>?@[]^_{|}~] were eliminated as they hold no significance for the model. This was accomplished using Python's isalnum()` function.