**Project #4 for the Biomedical Information Retrieval Course**

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**Project Overview:**

This project involves implementing and analyzing term weighting technology for text documents in the vector space. It focuses on integrating Porter's algorithm and explores 2-3 TF-IDF methods, including Standard TF-IDF, Smoothed TF-IDF, or Probabilistic TF-IDF. The goal is to rank documents using a chosen similarity measure, either cosine or euclidean.

**Key Features:**

1. ***Text Preprocessing Options***
   * **Lowercasing:** Convert all text to lowercase.
   * **Remove Stopwords:** Eliminate common words that do not contribute significantly to document meaning.
   * **Porter Stemming:** Reduce words to their root form for improved analysis.
2. ***TF-IDF Algorithms***
   * **Standard TF-IDF:** Calculates the standard TF-IDF weights for document analysis.
   * **Smoothed TF-IDF:** Incorporates sublinear term frequency and smooth inverse document frequency for enhanced performance.
   * **Probabilistic TF-IDF:** Implements a custom probabilistic TF-IDF calculation.
3. ***Similarity Measures***
   * **Cosine Similarity:** Measures the cosine of the angle between two vectors.
   * **Euclidean Distance:** Represents the "inverse" of the Euclidean distance between TF-IDF vectors.
4. ***Visualization***
   * **Ranked Documents:** Displays documents sorted by similarity to the input text.
   * **Total Similarity per Category:** Offers a bar plot ranking document categories based on total similarity.

**Conclusion:**

In summary, this project presents a flexible framework for term weighting in text document analysis. The integration of Porter's algorithm, coupled with the option to choose from various TF-IDF methods and similarity measures, offers a customizable approach to document ranking. This project contributes to a deeper understanding of text mining techniques and their applications in information retrieval.