**Project: YouTube Trending Video Analyzer with Sentiment & Privacy Detection**

1. **Introduction:**

This project aims to develop a real-time YouTube trending video analyzer that leverages machine learning and natural language processing techniques to extract insights from video metadata. The system provides sentiment analysis, trend momentum visualization, and privacy risk detection for trending videos in any selected region.

**2. Objectives:**

* Fetch real-time YouTube trending video data.
* Analyze metadata such as title, description, tags, and publish time.
* Perform sentiment analysis on video titles and descriptions.
* Calculate view momentum to assess the trendiness of videos.
* Detect potential privacy risks based on metadata patterns.
* Present results using an interactive user interface.

**3. Tools & Technologies Used:**

* **Programming Language:** Python
* **Frontend/UI:** Gradio
* **APIs:** YouTube Data API v3
* **Libraries:** Pandas, TextBlob, Matplotlib, Google API Client

**4. Methodology:**

* **Data Collection:** Real-time video data is fetched using the YouTube Data API, including video titles, descriptions, publish times, view counts, likes, and comments.
* **Feature Engineering:** Title length, description length, tag count, publishing hour/day, and days since published are calculated.
* **Sentiment Analysis:** TextBlob is used to determine the sentiment polarity of titles and descriptions.
* **Momentum Analysis:** Simulated previous day views are used to calculate the momentum (growth in view count).
* **Privacy Detection:** Heuristics based on metadata (e.g., sensitive keywords, excessive personal info) are used to estimate a privacy risk score.

**5. Implementation:**

An interactive Gradio-based UI allows users to input a region code and number of videos to analyze. It outputs a table of enriched video data and a momentum bar chart, along with sentiment and privacy risk indicators.

**6. Results:**

The application successfully identifies the sentiment of video content, visualizes the trending momentum, and flags potential privacy risks, offering a comprehensive overview of trending content.

**7. Conclusion:**

This project combines real-time data analysis, sentiment evaluation, trend prediction, and privacy assessment in a single platform. It can assist marketers, researchers, and content creators in understanding video performance and associated risks more effectively.

**8. Future Work:**

* Integrate more advanced NLP techniques like BERT for better sentiment and privacy detection.
* Add language detection and multilingual support.
* Incorporate engagement prediction models based on historical trends.