**Initial Plan:**

The project aims to build a web app that summarizes (educational) YouTube videos by extracting captions and generating concise summaries.

The first version (MVP) will focus on fetching captions from the video and implement NLP-based summarization.

Then create a simple web interface for users to input a video link and get summarized notes.

If official captions are not available, alternative solutions like speech-to-text models will be explored later.

**Extracting transcripts from youtube:**

There are 2 options available:

1. Use youtube-transcript-api

2. Use YouTube Data API

Going with Option 2:

* For more control and to keep things official we'll start by exploring OAuth 2.0 authentication to download captions officially.

(We are required to have OAuth Credentials, basic initial authentication in the code with the credentials and manage youtube api with required permissions)

* This will extract captions from the videos only if the captions are posted by owner. If a video does not have captions, we will use Automatic Captions (if available):

YouTube sometimes auto-generates captions even if the creator didn’t upload them. The API response will indicate if auto-captions exist. If it is not available: we'll let Users Know.

* By default, Google restricts OAuth authentication to only developer-approved testers until you submit your app for verification. So, Add Yourself as a Test User in Google Cloud Console.

**Implementing code:**

* Implemented OAuth 2.0 authentication using google-auth-oauthlib to access YouTube captions.
* Wrote a function (get\_captions()) to list available captions for a video.
* Attempted to download captions using yt.captions().download(id=caption\_id), assuming official captions could be accessed.
* Encountered 403 Forbidden errors when trying to download captions, indicating API permission issues.

**Key Discoveries:**

* YouTube API does not allow downloading auto-generated captions.
* Even manually uploaded captions require ownership or explicit permission from the video owner.
* Testing with different videos still resulted in permission errors (403 Forbidden).

**Important Decisions & Changes:**

* Modified get\_captions() to check whether captions are auto-generated (trackKind = "ASR") or manually uploaded.
* Confirmed that only the video owner can download captions, making the API approach unsuitable for third-party videos.
* Proceed with alternative solution using the youtube-transcript-api package, which allows fetching auto-generated transcripts without authentication.