**YouTube Transcript Summarization using Flask and T5 Pre-Trained Model and NLP**

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***Abstract*-** YouTube Transcript Summarization is web application that is developed using Flask web framework and T5 model for summarizing the video transcript or subtitles. This application is useful for the student who wants to make notes of YouTube lectures as well as for all the people who uses YouTube for learning purpose.

**Keyword** – YouTube, Transcript, Summarization, NLP, Flask, python, transformer, torch, REST, API.

1. Introduction

**T**here are number of video lectures and recording being created and uploaded on internet throughout the day. Sometimes it is difficult to cover the whole video because we don’t have much time to view the whole video. Although if we can watch the whole video we couldn’t find relevant information out of it. So summarization of transcript or subtitles can solve this problem. The task of a text summarizer is to produce a synopsis of any document (or set of documents) submitted to it. The level of sophistication of a synopsis can vary from a simple list of isolated keywords that indicate the major content of the document(s), through a list of independent single sentences that together express the major content, to a coherent, fully planned and generated text that compresses the document(s). The more sophisticated a synopsis, the more effort it generally takes to produce.

Youtube transcript summarization is abstractive summarization which means the model produces a completely different text that is shorter than the original, it generates new sentences in a new form, just like humans do. In this project, we will use transformers for this approach. YouTube Transcript Summarization is web application made using flask and T5 model that summarize the YouTube video transcript or subtitle. This application uses HTML as fronten which is used to render the web page where user can type the youtube video URL and also to see the summary of the transcript. For backend we have used the flask. .This application uses three dependencies flask , youtube\_transcript\_api and transformers[torch].Flask is micro web framework written in python which is used for making RESTful API apps. YTS is also made using flask web framework. YTS uses Youtube Transcript API. It allows you to get the transcript or subtitles for a given YouTube video. It also works for automatically generated

subtitles, supports translating subtitles.Youtube transcript api also used for formatting the the transcript from JSON to text.

1. Literature survey

literature review revealed research and studies based on the implementation of a summarization of text using Natural Language Processing and creating web application using Flask and also the different python dependencies required for making this web application i.e. YoutubeTranscriptApi ,Transformer , Flask, T5 pretrained model:

[1] Automated Text Summarization in SUMMARIST by Eduard Hovy and Chin-Yew Lin: They describe the about the Text Summarization equation i.e. summarization = topic identification + interpretation + generation and also about Text Pre-processing.

[2] Text Summarization ISSN: 2278-0181: This discuss about Text Summarization using Restricted Boltzmann Machine(RBM),Deep Neural Networks(DNN).

[3] Text Summarization e-ISSN: 2395-0056 : They describe about summarization using Recurrent Neural Network(RNN).

[4] Python Flask Framework by Vasanth Nagarajan - A Step by Step Guide For the Beginners for learning flask web framework. [5] T5 by Hugging Face Community: Pretrained T5 model documentation.

[6] Youtube-transcript-api: pypi.org.

The approach builds up after literature review

* Get transcripts/subtitles for a given YouTube video Id using a Python API.
* Perform text summarization on obtained transcripts using HuggingFace transformers.
* Build a Flask backend REST API to expose the summarization service to the client.

1. System Objective

This application is used to summarize the transcript of youtube video by NLP techniques. The objective of this application is to help students to revise the lecture without actually seeing the whole video. Summarization of text is essential to get the important information while dealing with large collection of documents. With the advent of World Wide Web information has become intrinsic part of our life. To remember the details of every information is not possible for human mind. Therefore summarization of text documents plays a very important role in information gathering. Also the objective to make application.

* Responsive
* User Friendly
* Robust

This application can also be used for

* Meetings and video-conferencing - A system that could turn voice to text and generate summaries from your team meetings.
* Patent research - A summarizer to extract the most salient claims across patents.

1. Application architecture

Diagram

Description automatically generated

YouTube Transcript Summarization application involves following step to perform summarization.

1. **Render the home page**

The application first render the home page which have input field where user can type the youtube video url

@app.route('/home')

def home\_page():

return render\_template('home.html')

1. **Validating the URL**

In this step we will validate the URL whether the URL is valid or not. For this we will use Javascript which do this operation on client side.

function isValidURL(string) {

var res = string.match(/(http(s)?:\/\/.)?(www\.)?[-a-zA-Z0-9@:%.\_\+~#=]{2,256}\.[a-z]{2,6}\b([-a-zA-Z0-9@:%\_\+.~#?&//=]\*)/g);

return (res !== null)

};

1. **Requesting Argument**

The application request for youtube video which is passed as argument in the URL.

args = request.args

youtube\_url =args.get("youtube\_url")

1. **Slice the videoID**

In this step the application slice or trim the url so that we can get videoID by calling the getVideoID() function. VideoID is a unique key used for identifying a particular video.

def getVideoId(youtube\_url):

id = youtube\_url.split("v=")

videoID = id[1][:11]

**5. Fetch the transcript**

In this phase we will fetch the transcript by calling Youtube Transcript

6.**. Transforming JSON transcript to Text**

Fetched transcript is in JSON format but we have convert this into text so that we can summarization on that.

transcript = getYoutubeTranscript(youtubeID)

formatter = TextFormatter()

text\_transcript = formatter.format\_transcript(transcript)

**7. Summarize the transcript**

Parse the text transcript to the T5 model for summarizing the transcript.

def summarizeTranscriptT5(youtubeID):

model = T5ForConditionalGeneration.from\_pretrained("t5-base")

tokenizer = T5Tokenizer.from\_pretrained("t5-base")

text\_transcript = getTextTranscript(youtubeID)

inputs = tokenizer.encode("summarize: " + text\_transcript, return\_tensors="pt", max\_length=1024, truncation=True)

outputs = model.generate(

inputs,

max\_length=150,

min\_length=40,

length\_penalty=2.0,

num\_beams=4,

early\_stopping=True)

return tokenizer.decode(outputs[0])

You can control the summary length by changing the value of max\_length and min\_length.

**8. Render the summary**

Finally we render the summary to the web page where user can see the summary.

1. features

1.Youtube Transcript Summarizer summarize the youtube video transcript or subtitles.

2.It saves time as you don’t have to watch the whole.

3.It helps you to gather relevant information from video.

4.It perform abstractive summarization.

5.It validates the URL.

6. Users can log in with a specific id and give the test and can see the result as well.

1. CONCLUSION

After considering extractive summarization and abstractive summarization, YouTube Transcript Summarization uses abstractive summarization approach to perform summarization. It

perform summarization operation in 3 stages- Fetch Transcript, Convert from JSON to Text and perform summarization.

VII. Future Work

The approach used in the making of the application can also be applied to summarize the transcript of other video lecture platform like Coursera, Udemy. In future YouTube Transcript Summarizer will be converted into Video Transcript Summarizer and will be used as general-purpose transcript summarizer application.

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