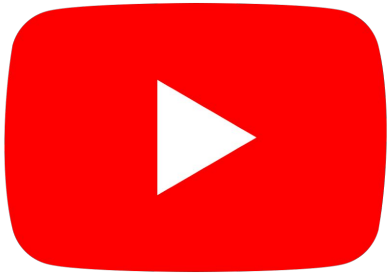


YouTube

LIVE NOW

VIDEO INFORMATION EVALUATION SYSTEM

Chien Yuan Chang 12/17/2021

5 BILLION VIDEOS

are watched on Youtube every single day

300 HOURS

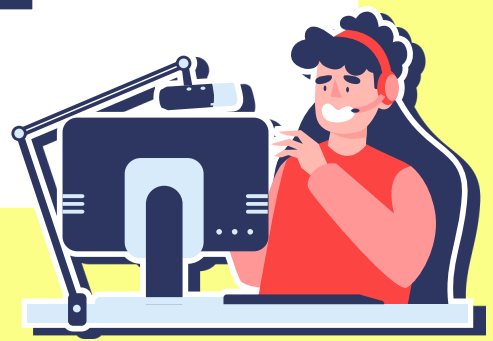
of video are uploaded every minute

$3-$5

are earned per 1000 video views

*Source: https://fortunelords.com/youtube-statistics/
https://influencermarketinghub.com/how-much-do-youtubers-make/

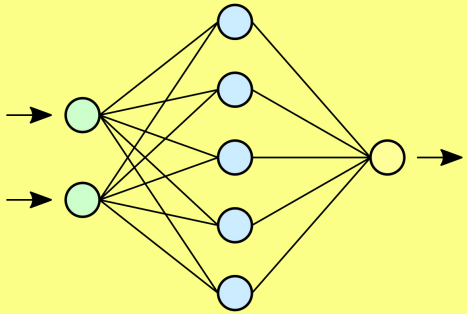
MORE VIEWS
MORE REVENUE



Building a Web App to Estimate the Views can help YouTube Creators optimize Thumbnails and Titles

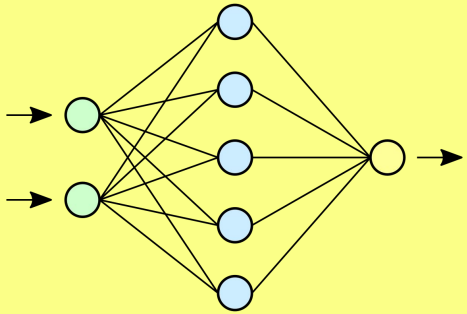
WORKFLOW

Data Ingestion and Storage → Modeling → Deployment



WORKFLOW

Data Ingestion and Storage → Modeling → Deployment



YOUTUBE DATA - FIVE BRANCHES

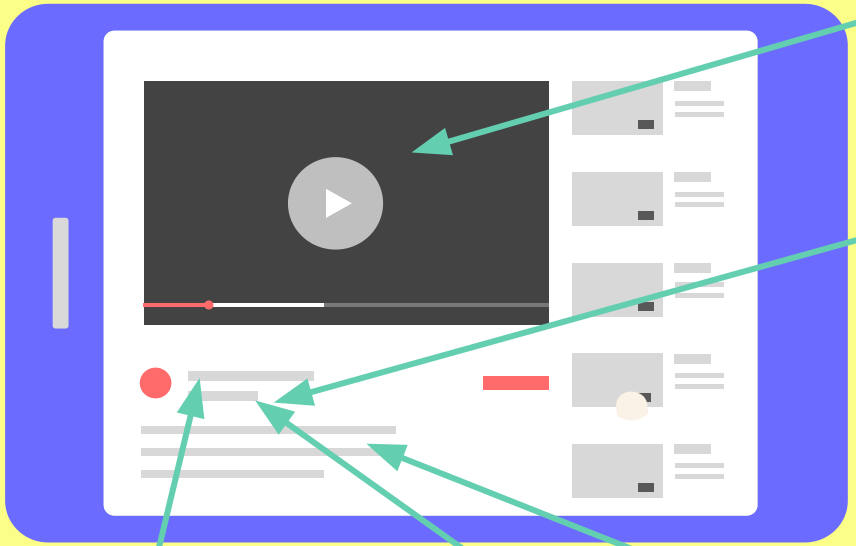


Image Data: Thumbnail

Numerical and Categorical Data:
View Count, Published Time, Duration, Category, Definition, Dimension, Made for kids, Subscriber Count, Channel Country and Channel video Count

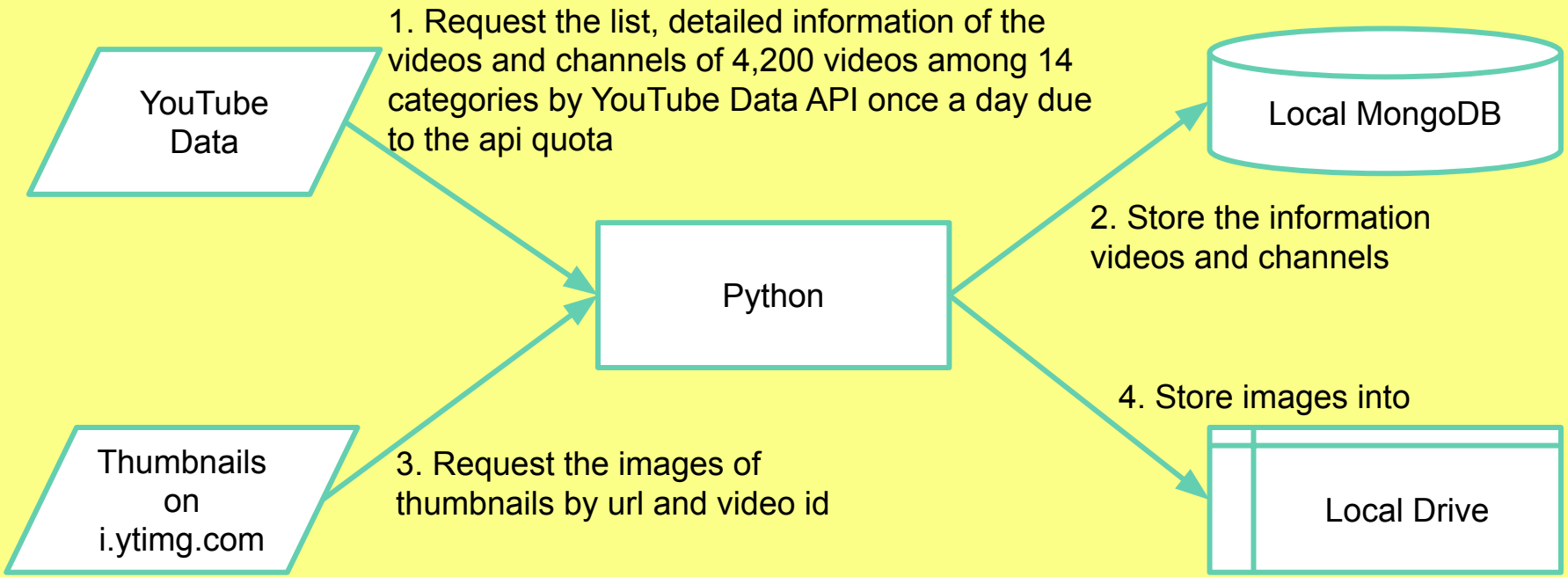
Target:
Log 10 of Daily Views of the Video

Text Data: Title

Text Data: Tags

Text Data: Description

DATA FLOW DIAGRAM - LOCAL



DATA FLOW DIAGRAM - CLOUD

YouTube Data

Request the list and the detailed information of the videos and channels of 1,400 videos among 14 categories by YouTube Data API automatically every 8 hours due to the api quota

Amazon Lambda (Python)

Send and Store

MongoDB Atlas

Retrieve

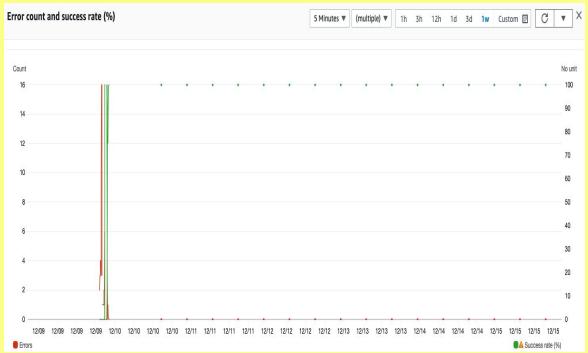
Google Colab (Python)

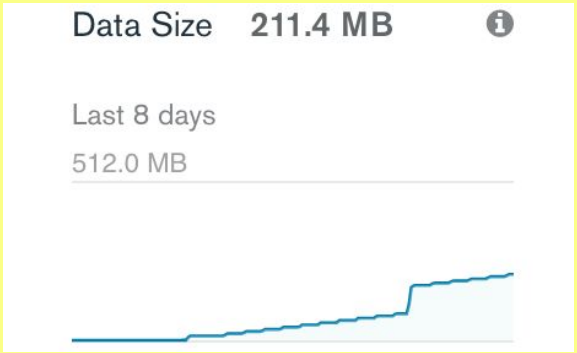
Thumbnails on i.ytimg.com

Request the images of thumbnails by url and video id before training models

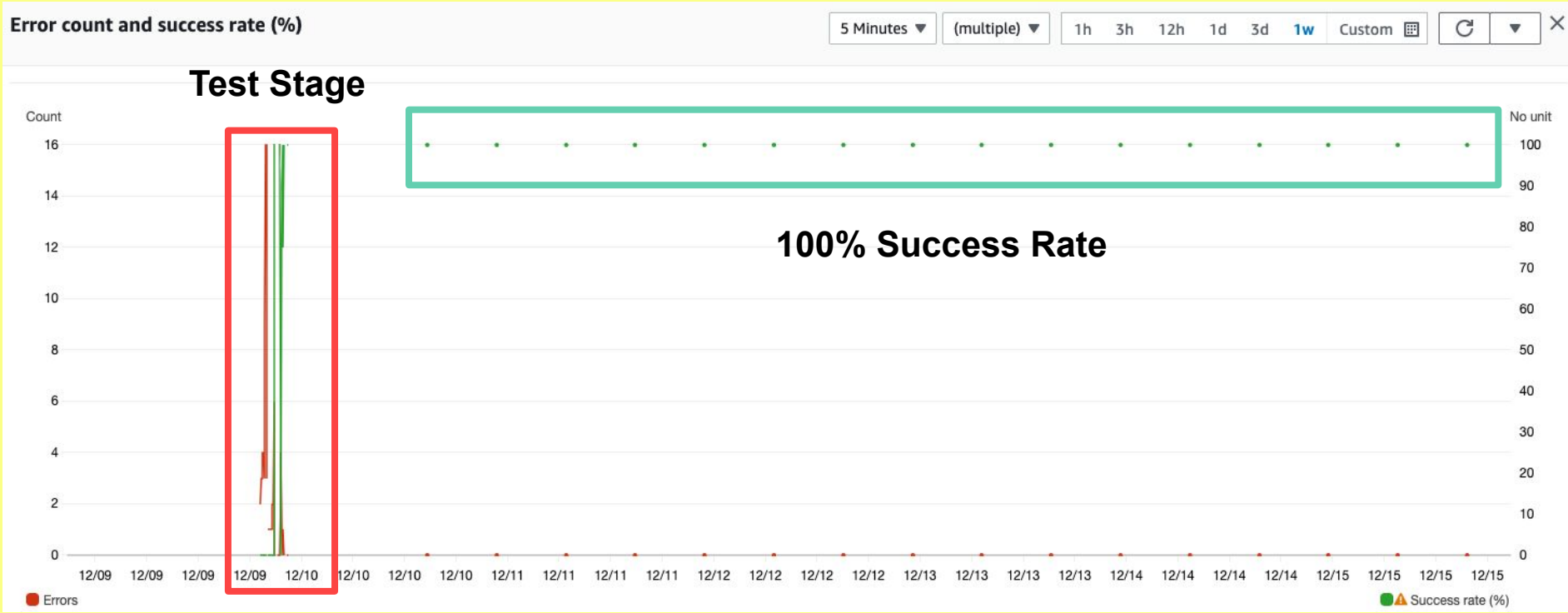
Store images

Google Drive

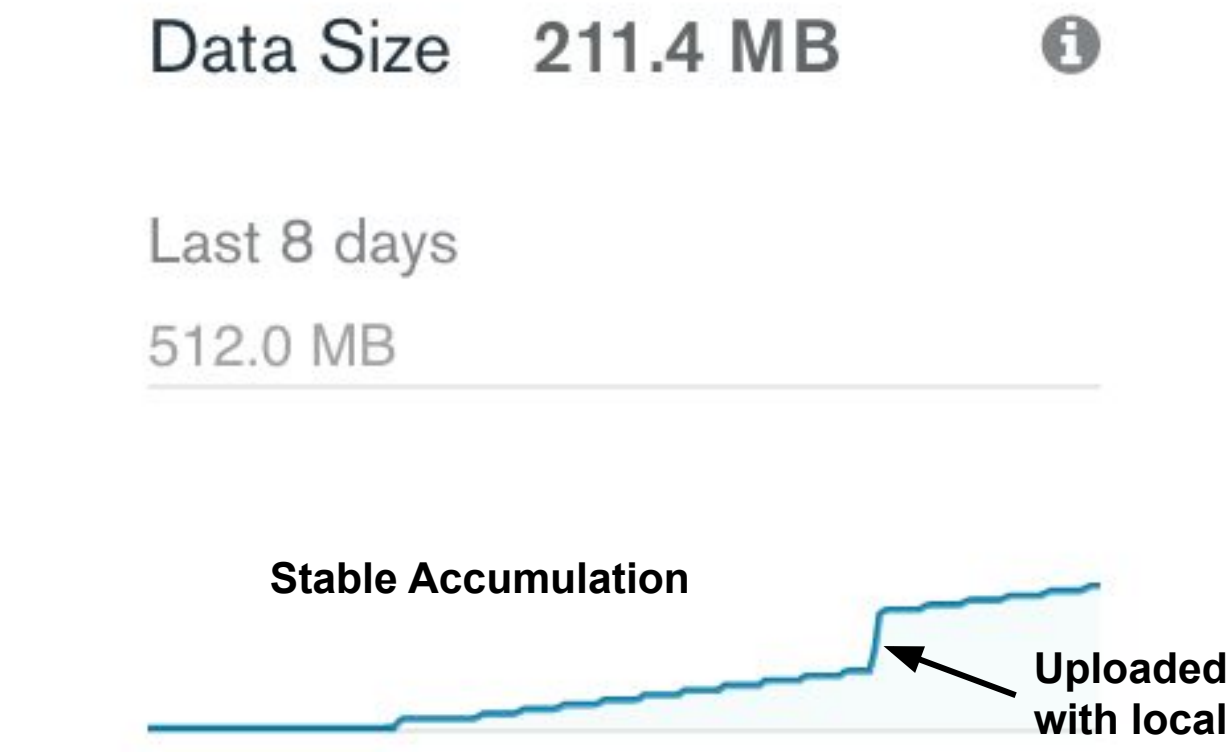




AMAZON LAMBDA - SUCCESS RATE

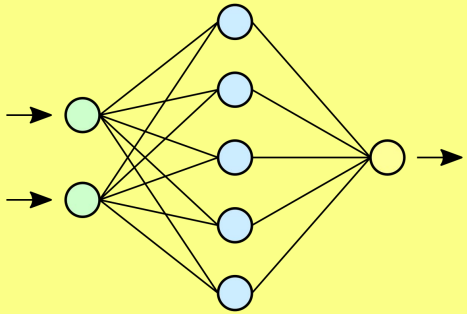


MONGODB ATLAS



WORKFLOW

Data Ingestion and Storage → Modeling → Deployment



DATA FOR MODEL TRAINING

- 18,763 data points

- Total 38,221 data points
- 10,472 unduplicated and clean data points
  - 6,282(60%): Training
  - 2,095(20%): Validation
  - 2,095(20%): Test

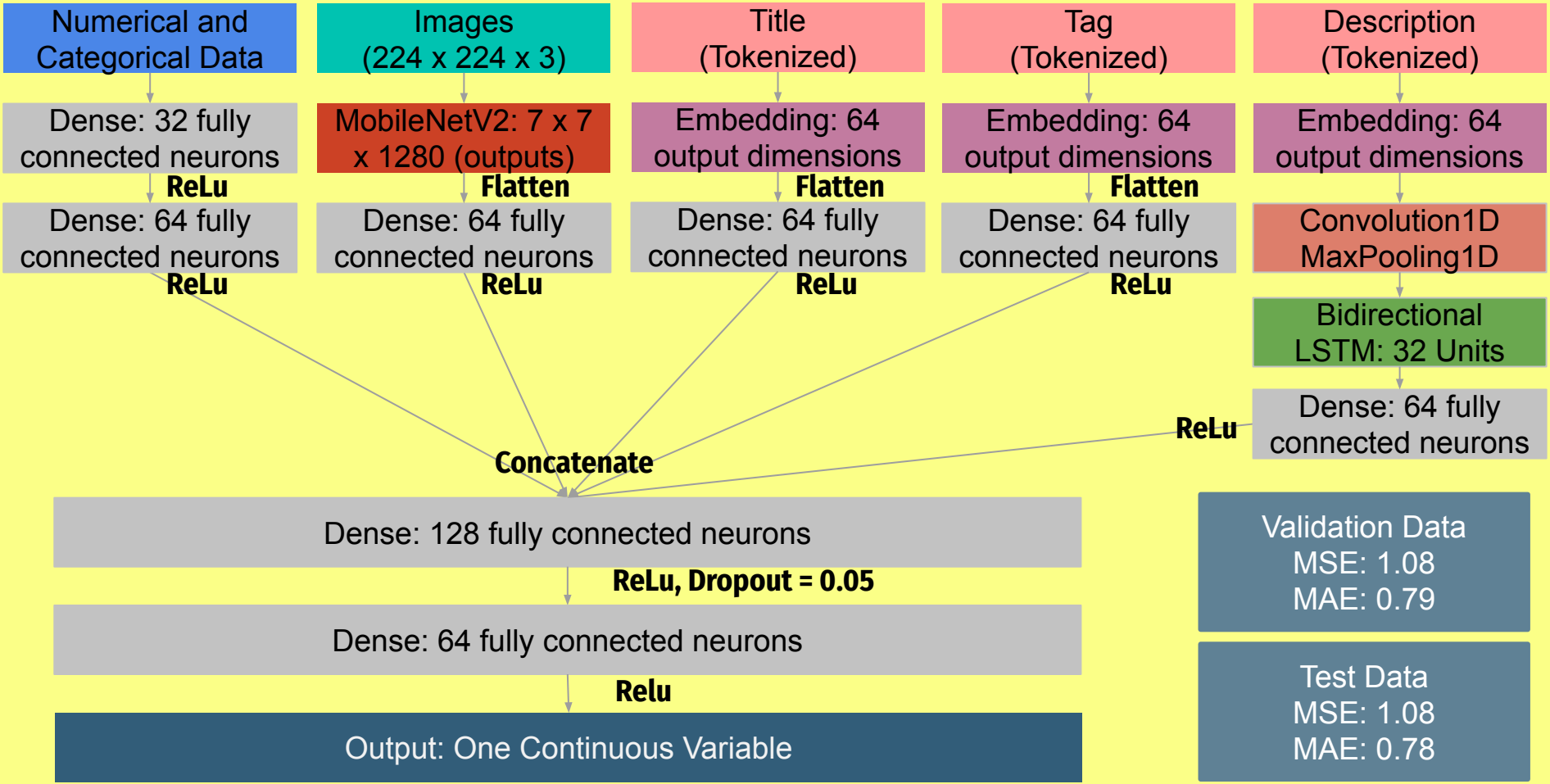
BASELINE MODEL - LINEAR REGRESSION

Feature Branches
Numerical and Categorical Video Information → One-hot Encoding and Standardization
Thumbnails → Resize, Rescale and SVD
Title → NLP, Tokenizer and PCA
Tag → NLP, Tokenizer and PCA
Description → NLP, Tokenizer and PCA

Target:
Log 10 of Daily Views of the Video

Validation Data
MSE > 1.57
MAE > 0.96

FINAL MODEL - NEURAL NETWORK



Validation Data
MSE: 1.08
MAE: 0.79

Test Data
MSE: 1.08
MAE: 0.78

FINAL RESULT FOR THE USERS - IMPROVEMENT RATE

Numerical and Categorical Data	Thumbnails	Title	Tags	Description
User Input	User Input	User Input	User Input	User Input
User Input	Blank Image (White)	Empty	Empty	Empty

Fixed

Prediction

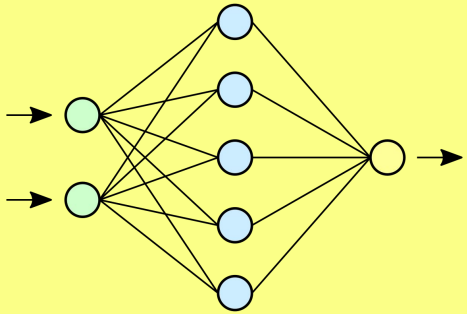
Baseline

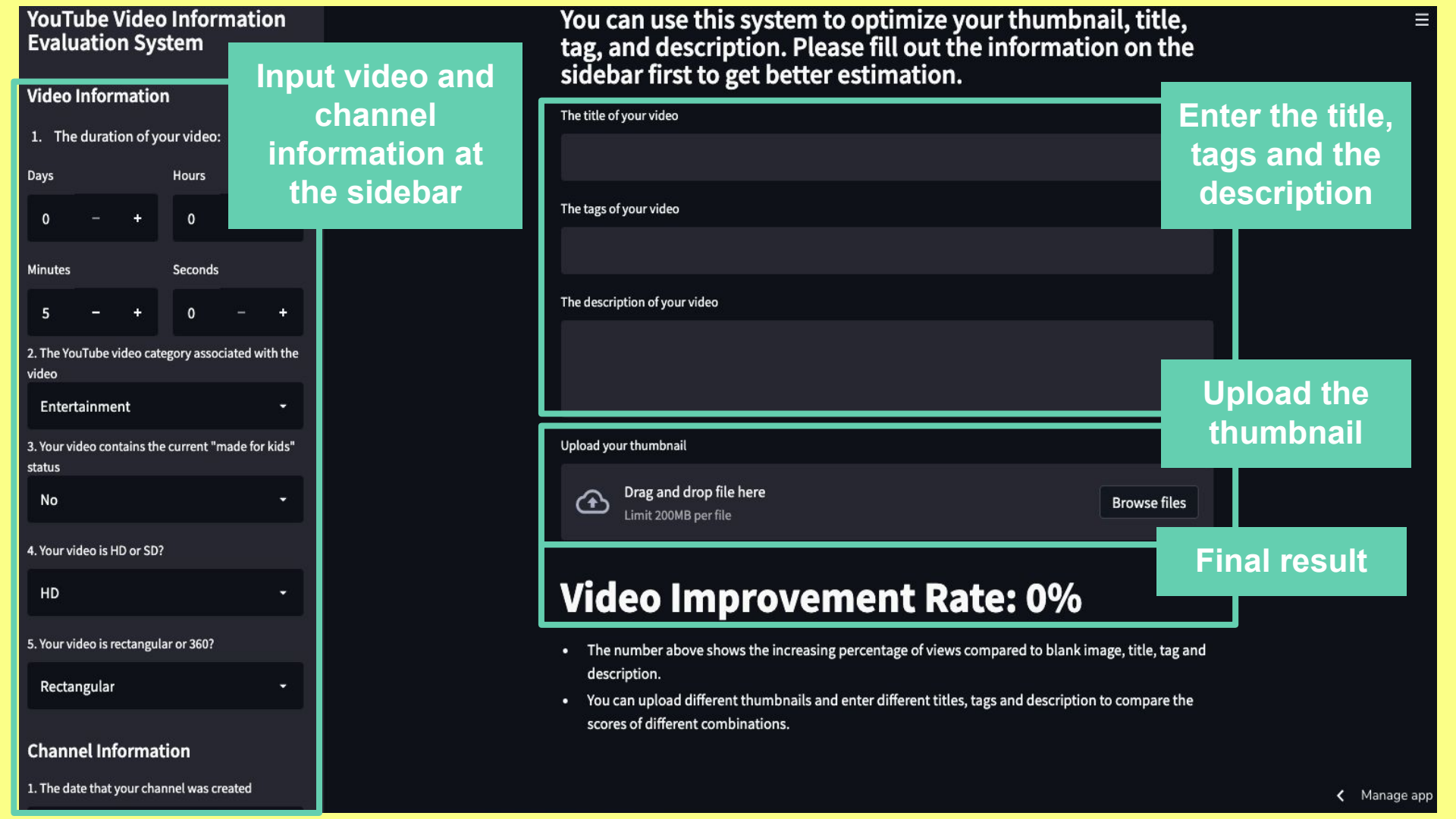
Improvement Rate

How many percentage of views can increase when compared with blank image, title, tag and description

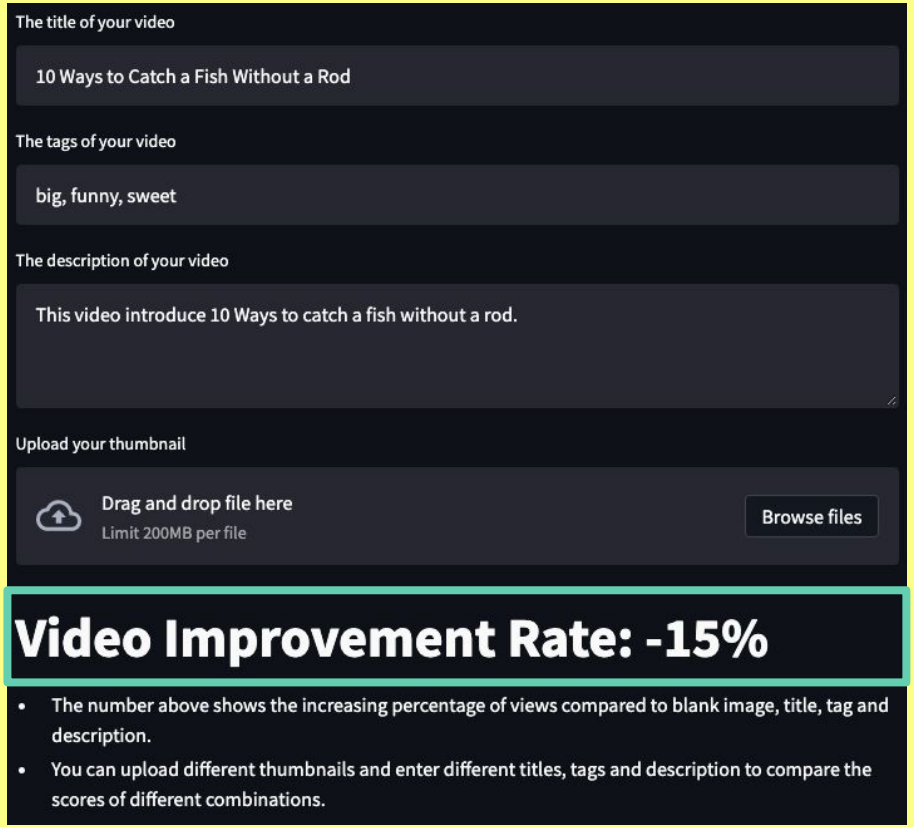
WORKFLOW

Data Ingestion and Storage → Modeling → Deployment



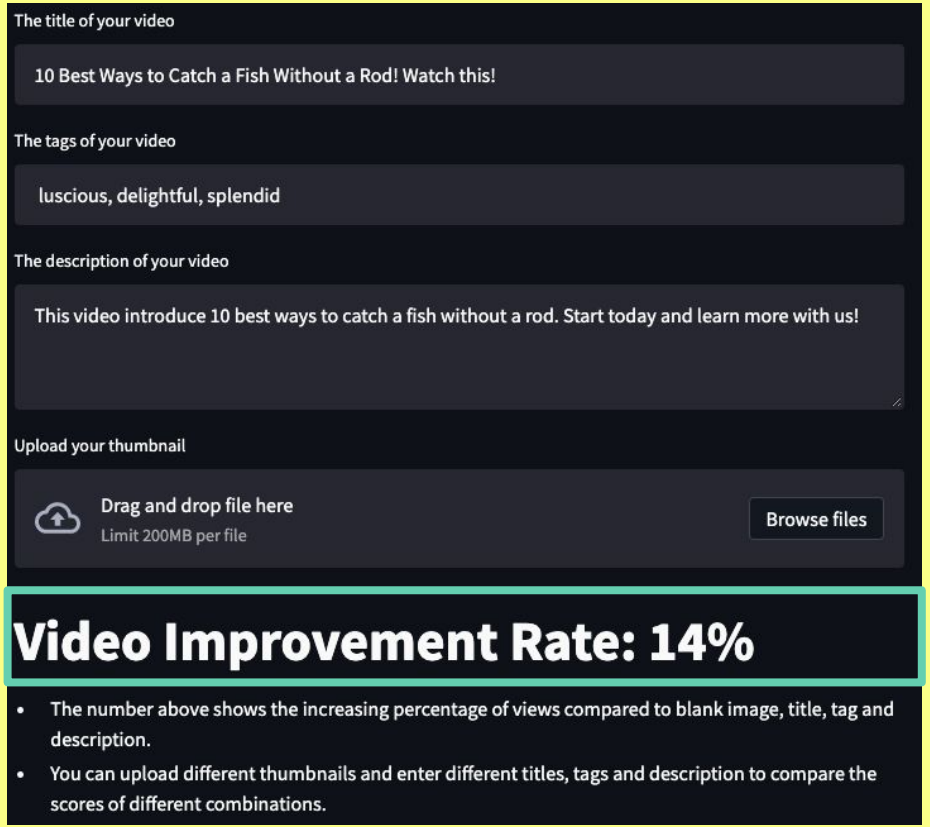

YouTube Video Information Evaluation System
Input video and channel information at the sidebar
Video Information
1. The duration of your video:
Days
Hours
0
0
Minutes
Seconds
5
0
2. The YouTube video category associated with the video
Entertainment
3. Your video contains the current "made for kids" status
No
4. Your video is HD or SD?
HD
5. Your video is rectangular or 360?
Rectangular
Channel Information
1. The date that your channel was created
You can use this system to optimize your thumbnail, title, tag, and description. Please fill out the information on the sidebar first to get better estimation.
Enter the title, tags and the description
The title of your video
The tags of your video
The description of your video
Upload the thumbnail
Upload your thumbnail
Drag and drop file here
Limit 200MB per file
Browse files
Final result
Video Improvement Rate: 0%
The number above shows the increasing percentage of views compared to blank image, title, tag and description.
You can upload different thumbnails and enter different titles, tags and description to compare the scores of different combinations.
Manage app

COMPARE THE TEXT- THE SEQUENCE ALSO MATTERS!



Video Improvement Rate: -15%

- The number above shows the increasing percentage of views compared to blank image, title, tag and description.
- You can upload different thumbnails and enter different titles, tags and description to compare the scores of different combinations.



Video Improvement Rate: 14%

- The number above shows the increasing percentage of views compared to blank image, title, tag and description.
- You can upload different thumbnails and enter different titles, tags and description to compare the scores of different combinations.

COMPARE THE THUMBNAILS - THUMBNAIL MATTERS!

Video Improvement Rate: 44370%

- The number above shows the increasing percentage of views compared to blank image, title, tag and description.
- You can upload different thumbnails and enter different titles, tags and description to compare the scores of different combinations.

Video Improvement Rate: 264311%

- The number above shows the increasing percentage of views compared to blank image, title, tag and description.
- You can upload different thumbnails and enter different titles, tags and description to compare the scores of different combinations.

CONCLUSION

- Not precise enough to provide the number of prediction to the users
- A reference for users to compare their inputs, especially thumbnails

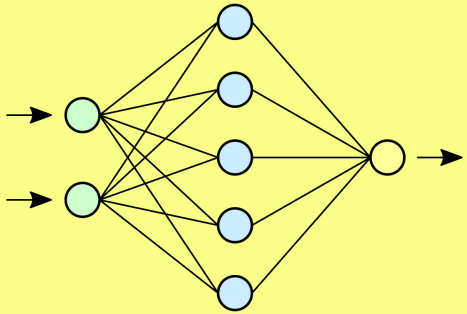
Welcome to try it:

https://share.streamlit.io/koscew/metis_module7_data_engineering_project/main

FUTURE WORK

More data

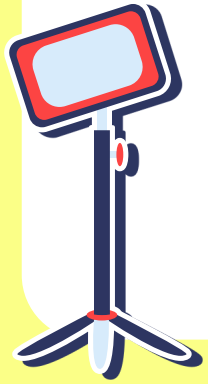
- Increase layers and neurons
- More preprocessing (NLP)
- Time Series

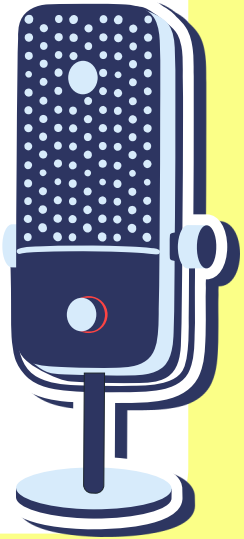


UI Optimization

THANK YOU!

DO YOU HAVE ANY QUESTIONS?





APPENDIX

RESOURCES

- YouTube Data API
  - https://developers.google.com/youtube/v3/docs/
- Amazon Lambda
  - https://aws.amazon.com/lambda/
- MongoDB Atlas
  - https://www.mongodb.com/
- Google Colab
  - https://colab.research.google.com

YOUTUBE DATA API

Search

```
{
  "kind": "youtube#searchResult",
  "etag": etag,
  "id": {
    "kind": string,
    "videoId": string,
    "channelId": string,
    "playlistId": string
  },
  "snippet": {
    "publishedAt": datetime,
    "channelId": string,
    "title": string,
    "description": string,
    "thumbnails": {
      (key): {
        "url": string,
        "width": unsigned integer,
        "height": unsigned integer
      }
    },
    "channelTitle": string,
    "liveBroadcastContent": string
  }
}
```

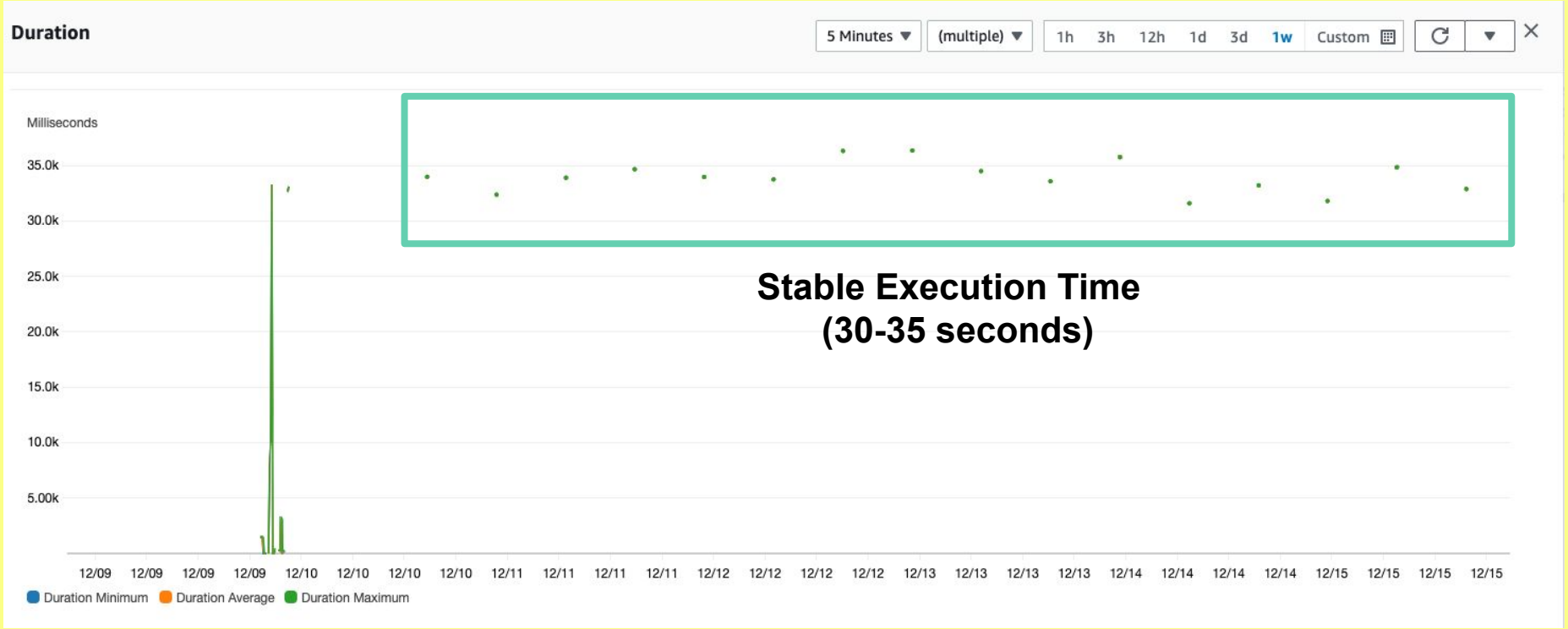
Videos

```
{
  "kind": "youtube#video",
  "etag": etag,
  "id": string,
  "snippet": {
    "publishedAt": datetime,
    "channelId": string,
    "title": string,
    "description": string,
    "thumbnails": {
      (key): {
        "url": string,
        "width": unsigned integer,
        "height": unsigned integer
      }
    },
    "channelTitle": string,
    "tags": [
      string
    ],
    "categoryId": string,
    "liveBroadcastContent": string,
    "defaultLanguage": string,
    "localized": {
      "title": string,
```

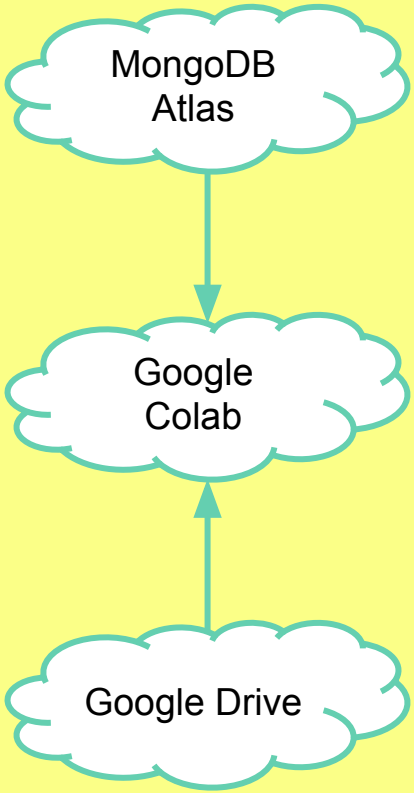
Channels

```
{
  "kind": "youtube#channel",
  "etag": etag,
  "id": string,
  "snippet": {
    "title": string,
    "description": string,
    "customUrl": string,
    "publishedAt": datetime,
    "thumbnails": {
      (key): {
        "url": string,
        "width": unsigned integer,
        "height": unsigned integer
      }
    },
    "defaultLanguage": string,
    "localized": {
      "title": string,
      "description": string
    },
    "country": string
  },
  "contentDetails": {
    "relatedPlaylists": {
```

AMAZON LAMBDA - DURATION



MODELING - NEURAL NETWORK



Feature Branches

Numerical and Categorical Video Information
→ One-hot Encoding and Standardization

Thumbnails
→ Resize, Rescale and Transfer Learning

Title
→ NLP, Tokenizer and Embedding

Tag
→ NLP, Tokenizer and Embedding

Description
→ NLP, Tokenizer, Embedding, CNN and Bidirectional LSTM

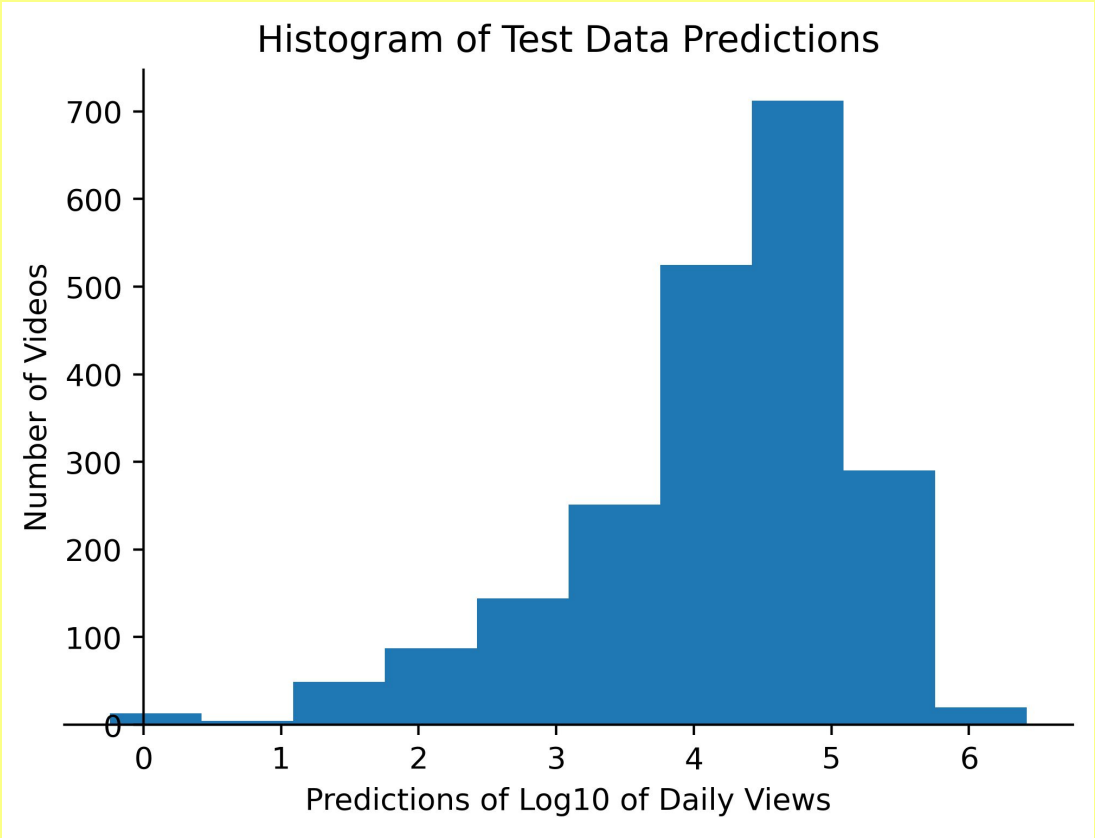
Target:
Log 10 of Daily Views of the Video

Neural Network Model

Validation Data
MSE: 1.08
MAE: 0.79

Test Data
MSE: 1.08
MAE: 0.78

IT CAN BE A REFERENCE



DEPLOY ON STREAMLIT

- Scaler
- Tokenizers
- Model

Streamlit code
on local machine

- Push to Github
- Deploy on streamlit.io