Senior project 3

Short Track AI Highlight Editor

5분반

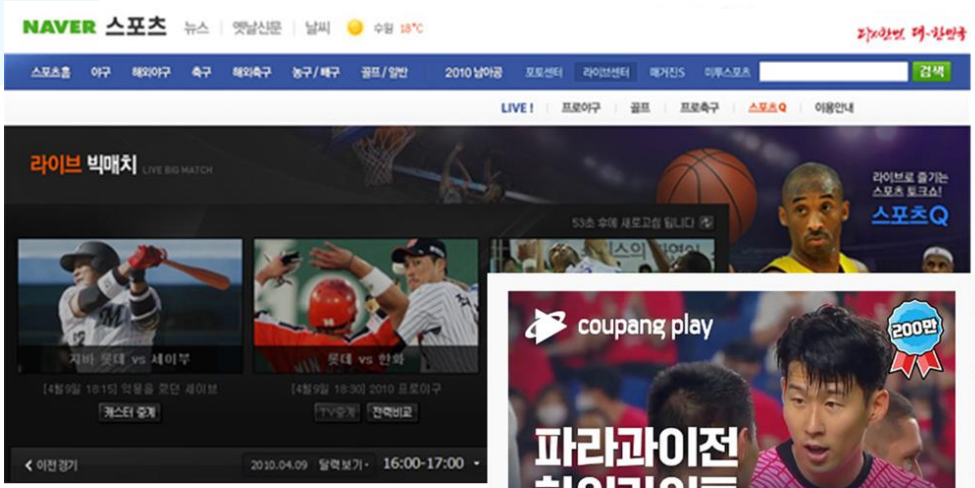
팀5 : 김예찬, 김동민, 박민규, 이동섭

Table of Contents

01

Preview

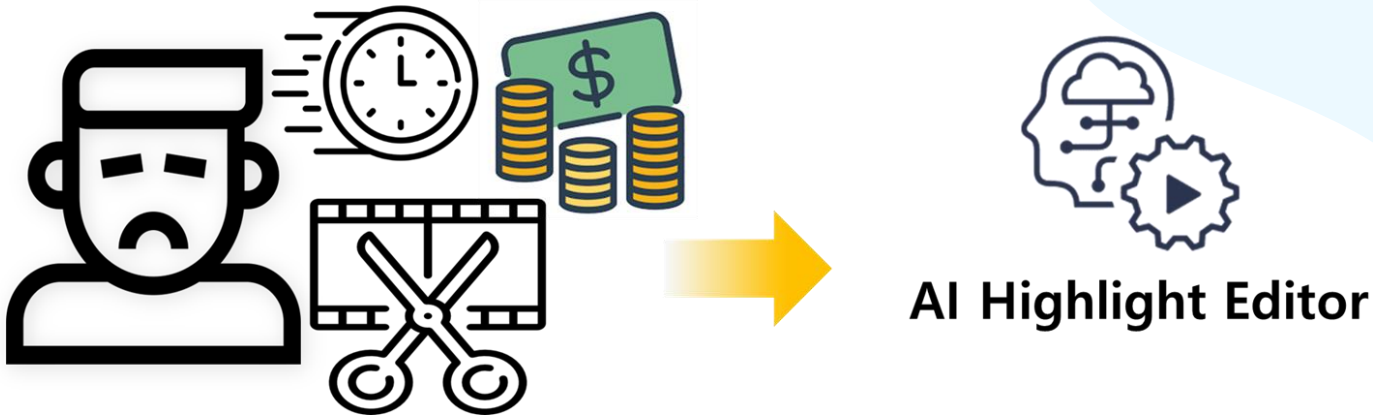
Our Project



Demand of Sports highlight is growing

People want to see rapid highlights after games

Motivation



Cost a lot of time, labor, money to edit sports videos

Reduce the cost of editing highlights

Idea description

Create a highlight video by analyzing various scenes in full short track video.

Rank change, falling, passing the final/finish line, caster's rising voice tone and keyords extract.

System Architecture

Input

Short Track Video

MoviePy

Frame 01

Frame 02

Frame 03

Frame 04

Object Detection

Google Cloud Vision API

OCR

Google Cloud Speech API

STT

Score analysis

XGBoost classification

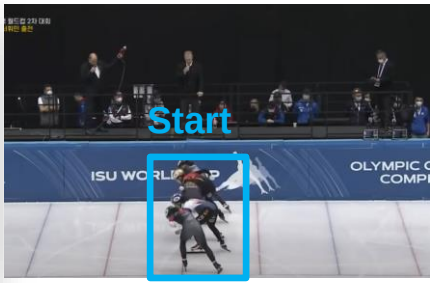
Output

Highlight Video

Object Detection

Yolov5 model

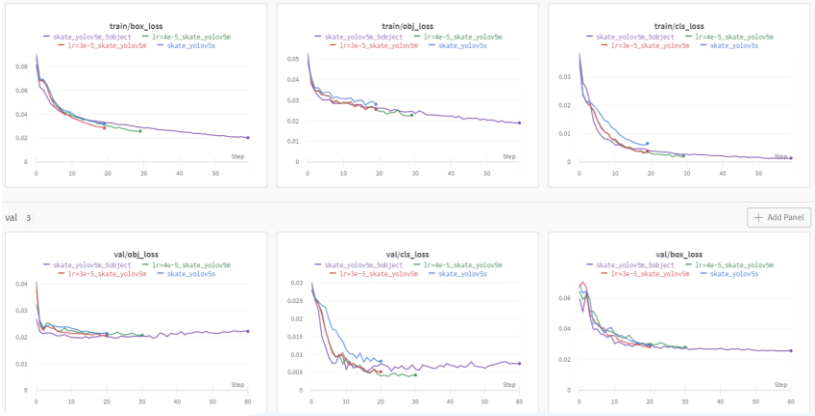
- A total of 2000 images labeling
- Trained 4 objects – skating, fall_down, start, finsh



Object Detection

- Hyperperameter tuning with WandB.
- Visualized best trained model and epoch.

Weights & Biases

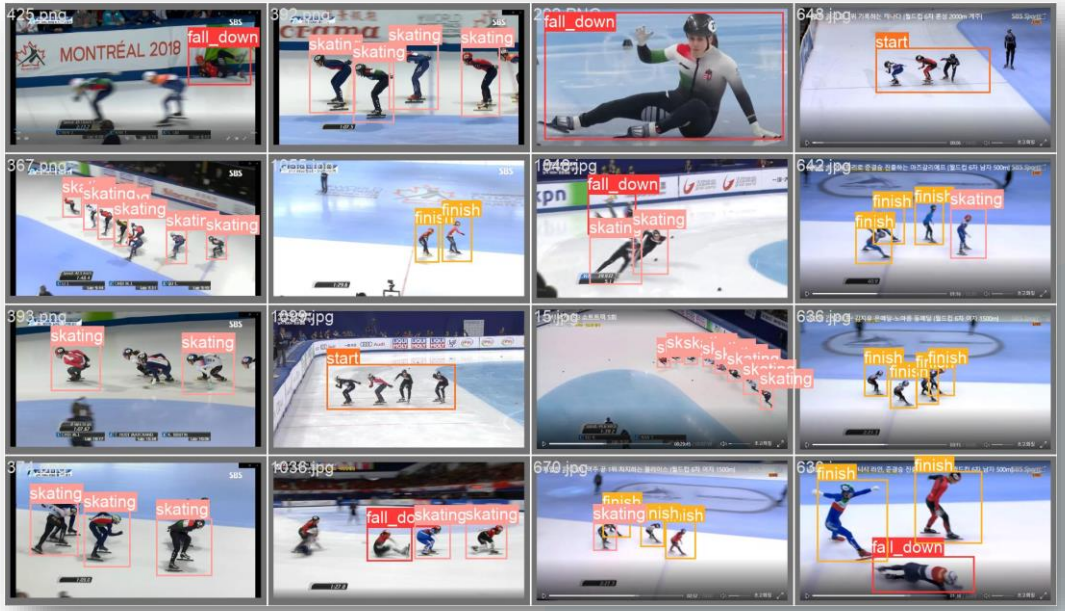



```
Validating runs/train/skate_yolov5m_5object/weights/best.pt...
Fusing layers...
YOLOv5m summary: 212 layers, 20869098 parameters, 0 gradients, 47.9 GFLOPs
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 7/7 [00:03<00:00,  1.76it/s]
                   all        110        281       0.93      0.939      0.949      0.673
             fall_down        110         33      0.937      0.908      0.944      0.553
               skating        110        187       0.89      0.947      0.949      0.604
                 start        110         15      0.975      0.933      0.936      0.789
                finish        110         36      0.891      0.905      0.919      0.517
```

Precision on test dataset : 0.93

Object Detection

- Prediction on test dataset



OCR (Optical Character Recognition)

Google Cloud Vision API

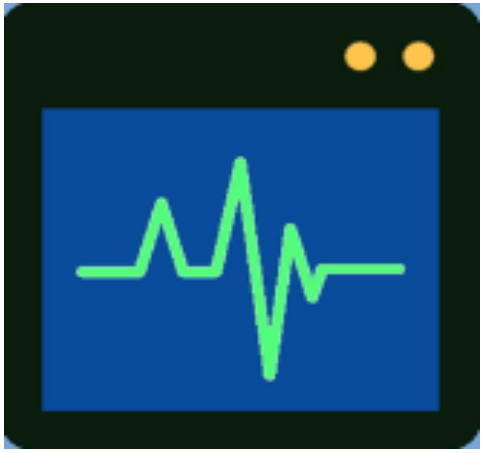
```
ranking:  ['1. K. BOUTIN', '2. L. van RUIJVEN', '3. KIM A.L.']

img keyword Set:  {'결승', 'lap:', '1500m', '준결승', '여자', '500m'}

lap time:  ['2:05.7', 'Lap: 9.52', 'Lap: 9.68', 'Lap: 9.62']
```

OCR (Optical Character Recognition)

OCR (Optical Character Recognition)

- Check the last lap with the **Unofficial Result.**
- The faster the **Lap time**, the higher the score.

voice recognition



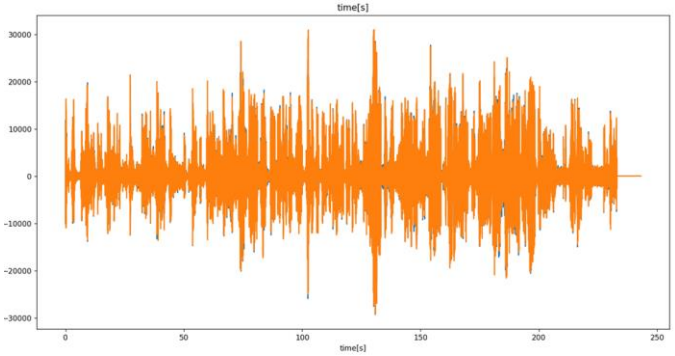
Frequency

Speech-to-text

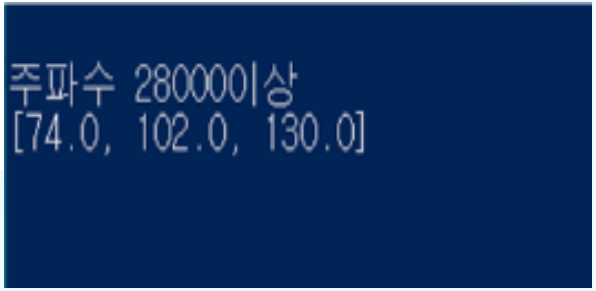
voice recognition

Measure the **amplitude** of the **frequency** to distinguish the excited sound of the caster.

➡ Extraction of highlights through the characteristics of spectator and caster sound.



Frequency extraction



More than 28000

voice speech-to-text

Google Cloud Speech API


```
word_time = [] #키워드 시간초 저장
word_time2 = []
word_time3 = []

keyword = [ "랭킹","조심","엉키는", "의식", "찬스","인코스", "자리", "연결", "첫번째 주자", "선두", "결승전", "가장먼저", "1번주자"
        "안전하게" ] #키워드 1점

keyword2 = [  "결과" "도움", "잘들어왔", "마킹", "밀어", "잡아당겼","빠르게", "에이스", "추격", "출발합니다"
        "좋아", "좋습니다", "넘겨줍니다", "타이밍"," 추격", "두바퀴", "치고 나갑니다."]     #3점

keyword3 = ["출발", "충돌", "마지막", "추월", "넘어졌습니다", "넘어짐", "파이널", "결승선 통과", "부딪", "레디", "스타트", "넘어"
            "한바퀴", "마지막 주자", "파이널랩", "결승진출", "미끄러",  "마지막 코너"]   #5점
```

Video Frame Processing

Divided

Highlight

Merge

Criteria for selecting highlight elements

2015-2018	국가대표 상비군
2015	회장배 전국남녀쇼트트랙 1500m 1위
2016	전국동계체전 1500m 3위 / 3000m relay 1위
2017	31회 종별종합대회 Super final 3위
2018	99회 동계체전 1000m 2위 / 3000m relay 1위
2019	제 33회 종별 종합 3000m Super final 2위
2019	제 36회 전국남녀 1000m 2위 / 3000m 1위
2020	단국대학교 국제스포츠 학과 졸업
2020	스포츠 건강 트레이너 1급
2020	스포츠 재활 트레이너 1급
2020	스포츠 마사지 체형관리사 1급
2020	국제 키즈요가 지도자 1급
2019	영어회화능력평가시험 ESPT 자격증

Former National Team substitute
Short track speed skating player
김윤선 선수

- **Asked expert and ice skating organization for advice.**

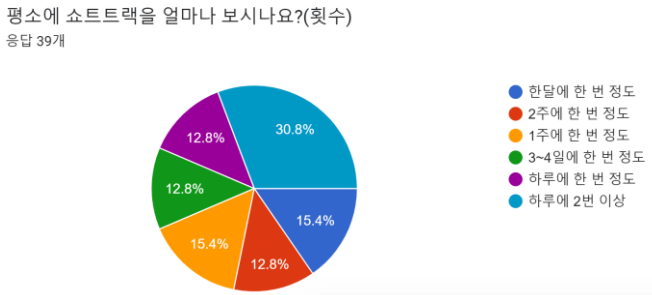
First lap, Finish moment

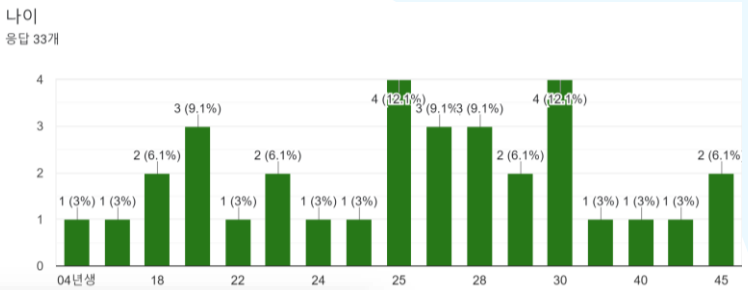
Falling down

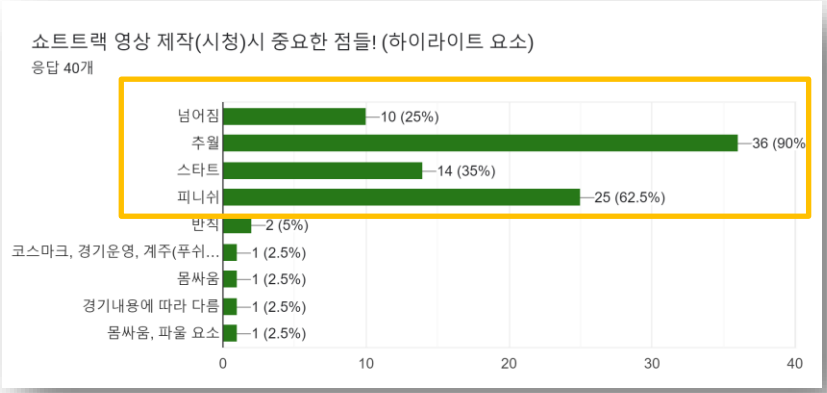
Overtake

Criteria for selecting highlight elements

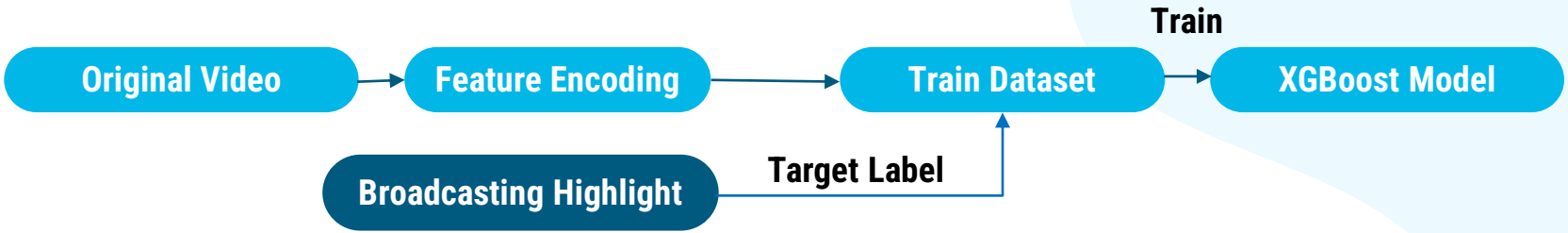
- **Survey on short track community**







XGBoost Algorithm



- **Example train dataset**

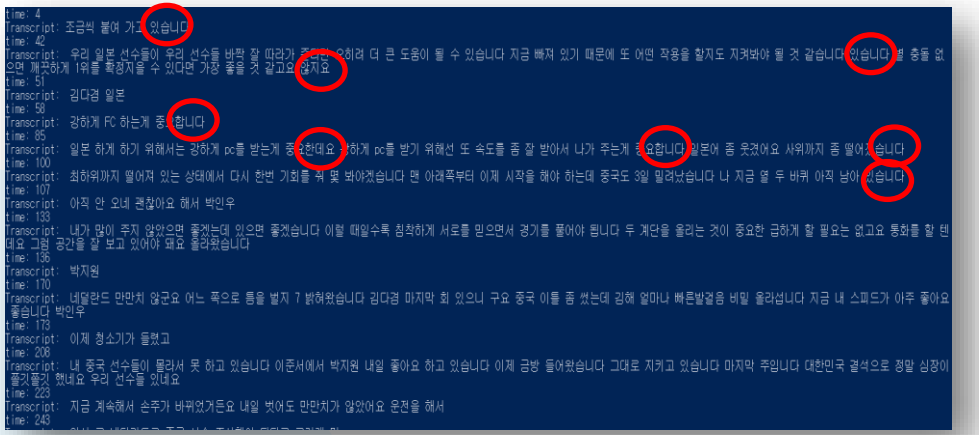
fall_down	start_finsh	rank_change	keyword	frequency	Label
0	1	0	1	0	1
1	0	0	1	0	1
0	0	1	0	0	0
0	0	1	0	1	1

02

Improvements

Improvements

STT

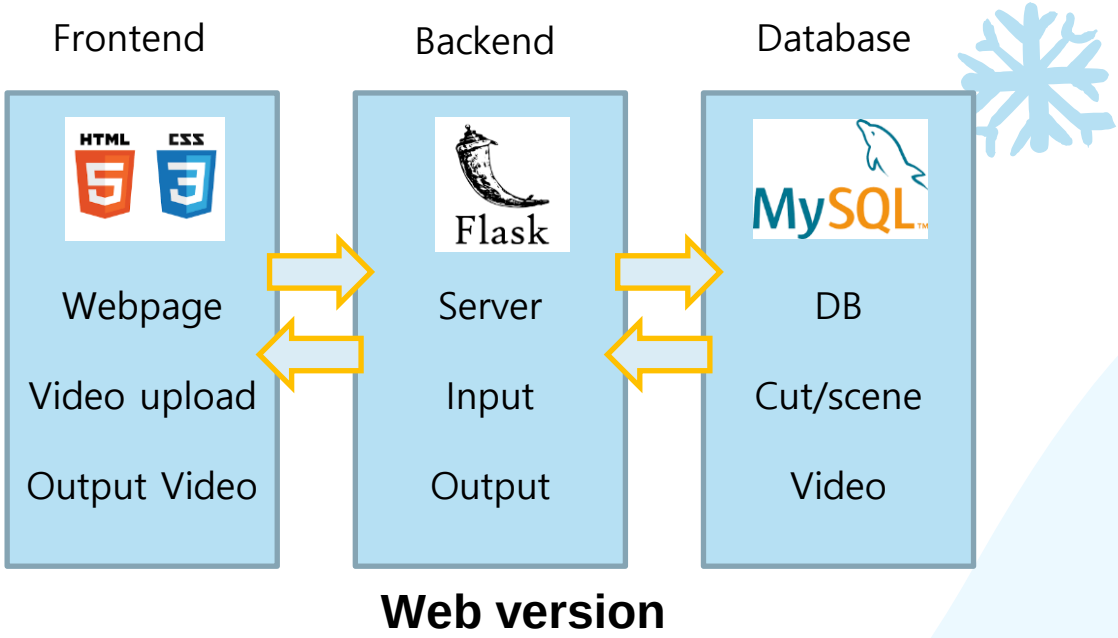


Detect terminating language
“~니다”, ”요 "

Keep the caster’s commentary

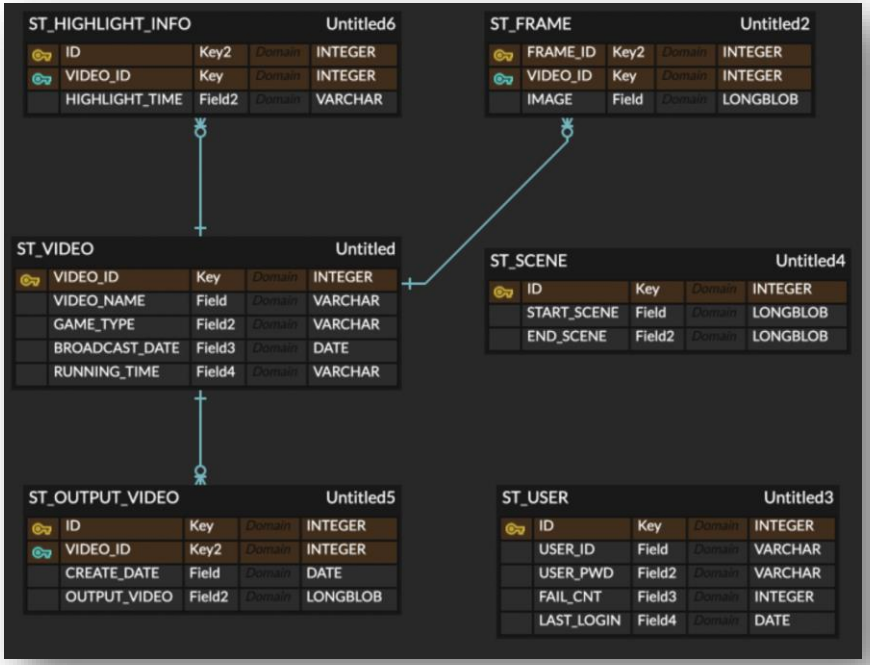
Improvements

- Deploy existing python programs to the web version to improve user convenience.



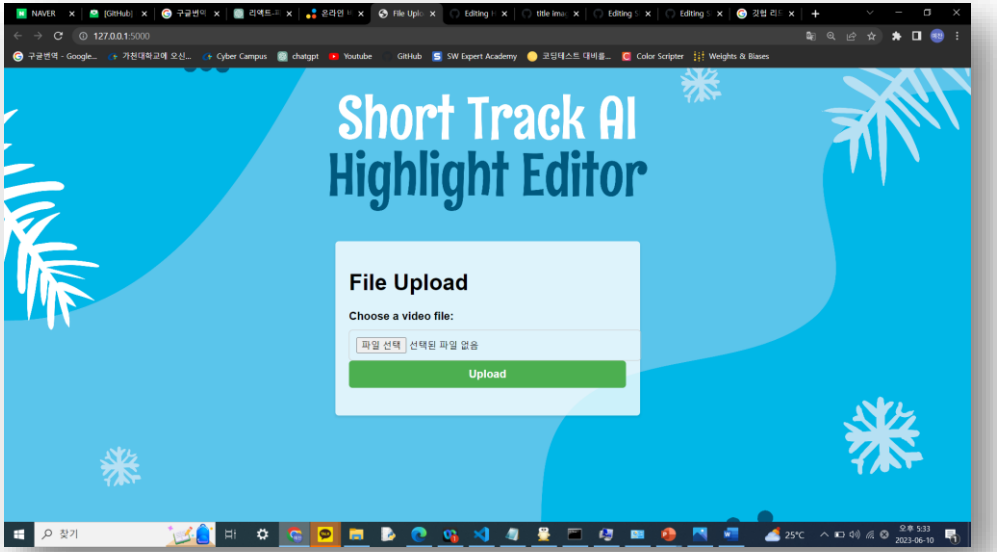
Improvements

- The database was constructed using mySQL with the following structure.



Improvements

- Currently using local server due to cost.
- The web page was created in conjunction with js to configure the web page so that it could be operated on the local server.



Improvements

- Two versions were created so that users could use the desired type according to their preference.

1. Python program with GUI

2. Web version

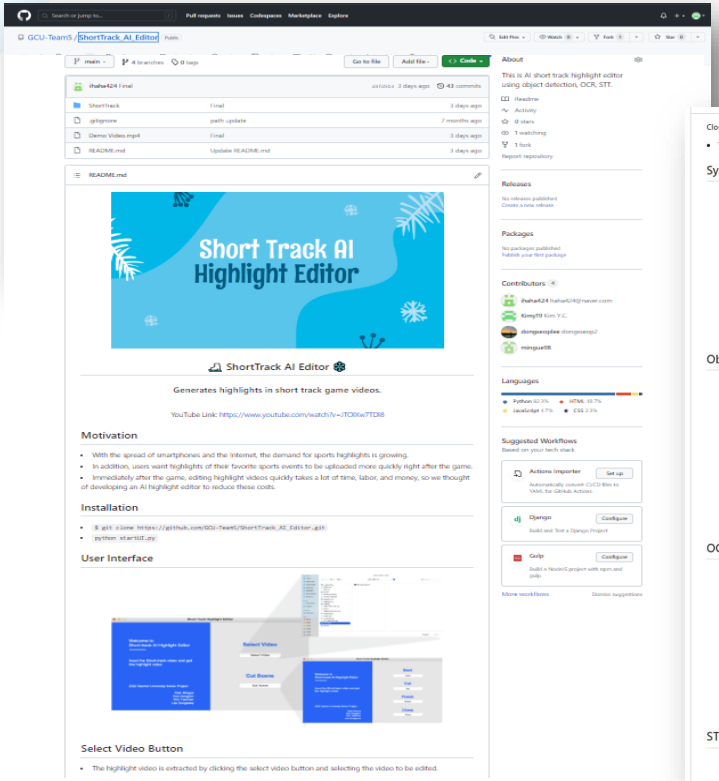
Demonstration video

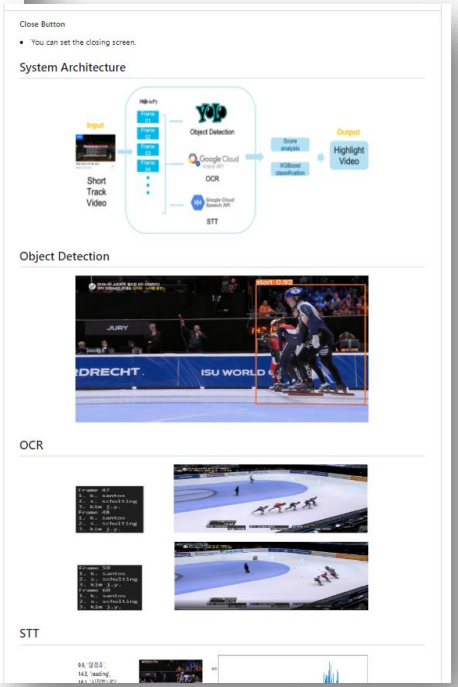
03

Github

Github Readme

Link: https://github.com/GCU-Team5/ShortTrack_AI_Editor





Github WIKI

Home

Kim Y.C edited this page 6 minutes ago · 15 revisions

Edit | New page

Welcome to the ShortTrack AI Editor Wiki!

Abstract

With the spread of smartphones and the Internet, the demand for sports highlights is growing. In addition, users want highlights of their favorite sports events to be uploaded more quickly right after the game. Editing highlight videos immediately after the game takes a lot of time, labor, and money, so we thought of developing an AI highlight editor to reduce these costs. We've devleoped the program within 3 modules which are Object Detection, STT, OCR.

Team Structure

Total Team Size: [4 members]

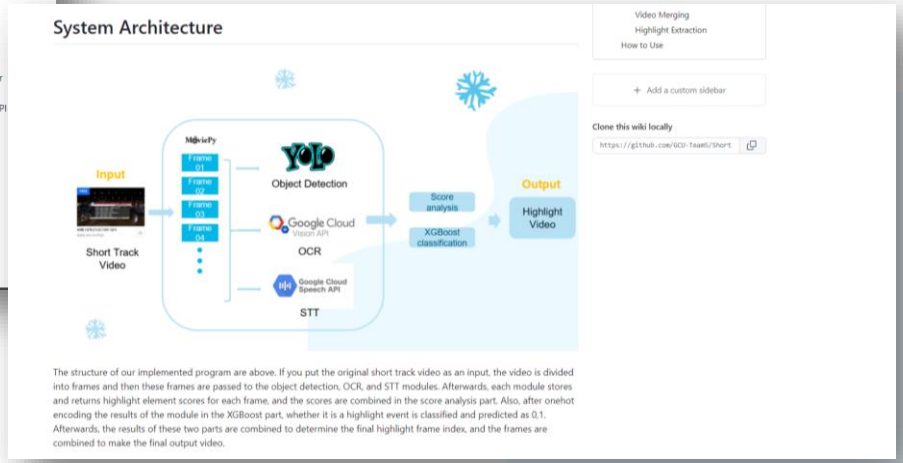
Role	Name	Email
Frame edit, GUI	Dong Min Kim	ihaha424@gachon.ac.kr
Object Detection	Yae Chan Kim	yckim19@naver.com
STT module	Min Gue Park	kokocom0113@gachon.ac.kr
OCR module	Dong Seop Lee	dongxieli@kakao.com

System Architecture

Pages 1

Find a page...

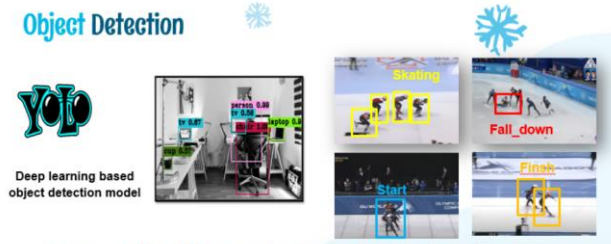
- Home
  - Abstract
  - Team Structure
  - System Architecture
  - Used technologies
  - 1. Object Detection
    - Prerequisites
    - Installation
  - 2. OCR (Optical Character Recognition)
    - Google Cloud Vision API
  - 3. STT
    - Required Libraries
    - Functions
    - Main Function (STT_detection)
  - 4. Frame editing
    - Video Division
    - Video Merging
    - Highlight Extraction
  - How to Use



Github WIKI

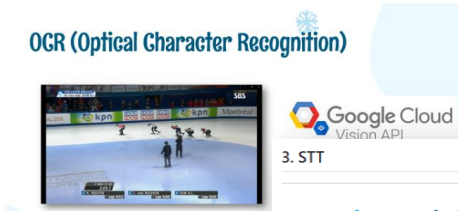
Used technologies

1. Object Detection



The object detection is used to detect specific objects(Skating/
model. This code allows you to specify a target object to detect
Torch library for deep learning and image processing.

2. OCR (Optical Character Recognition)

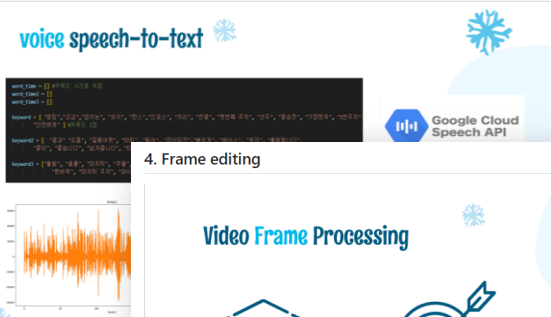


Google Cloud Vision API

OCR (Optical Character Recognition) using the Google Cl
images and analyzes the extracted text to find specific ke
libraries are imported:

- 'glob' for file handling.
- 'cv2' for image processing.

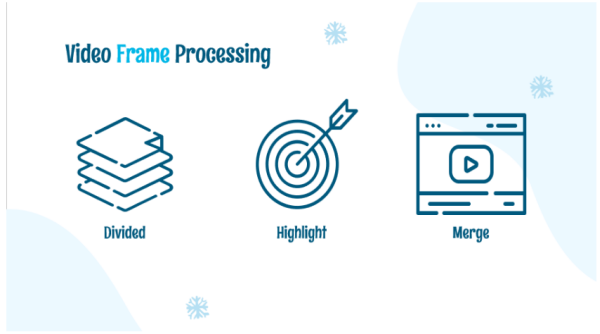
3. STT



Required Libraries

The code imports the following nec

4. Frame editing

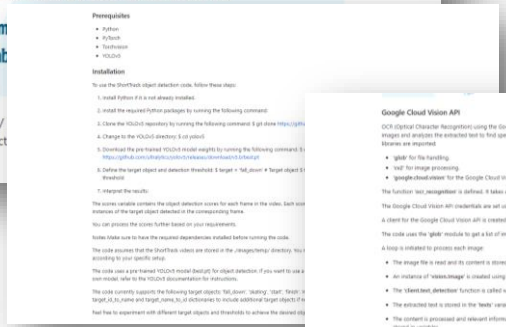


Video Divided, Merge, and Highlight Extraction

Frame editing part divides a video into frames, merges the frames back into a video, and extracts highlights from the video.

Video Division

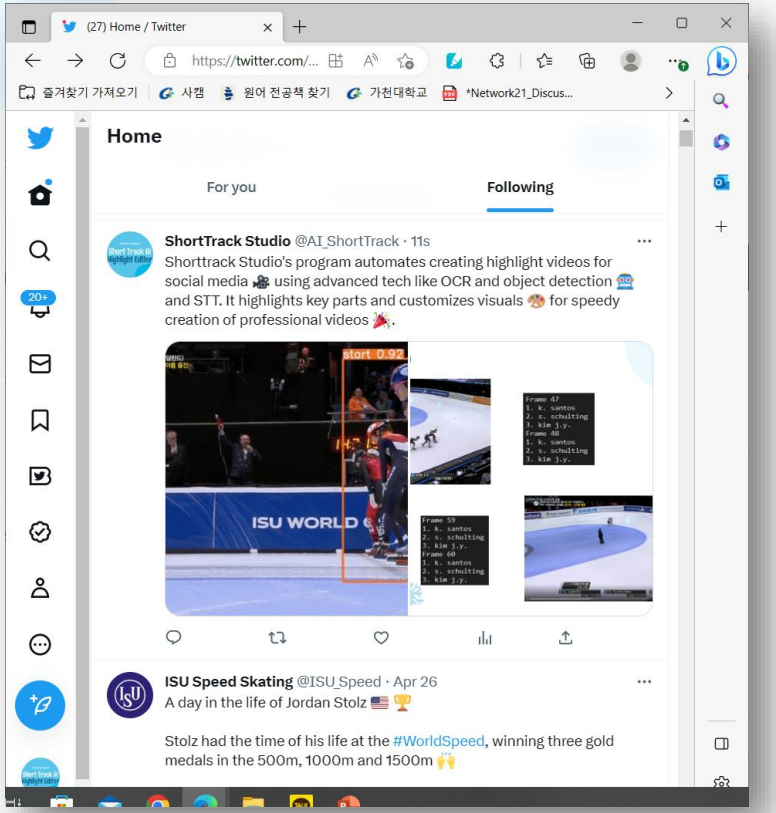
The first step is to divide the video into frames. This is done by calling the `divide_video()` function. The `divide_video()`

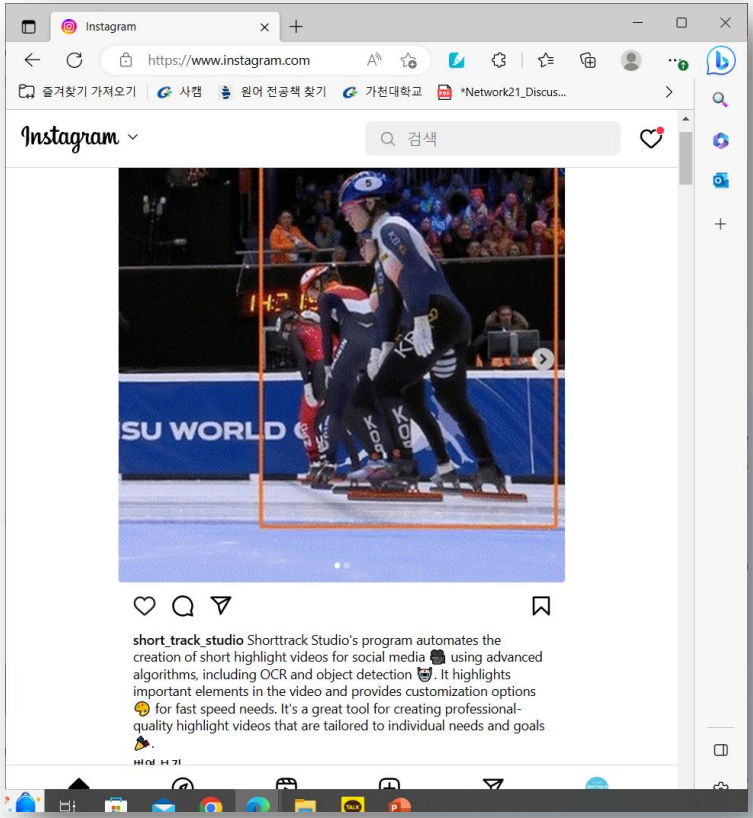


04

Marketing plan

SNS Marketing





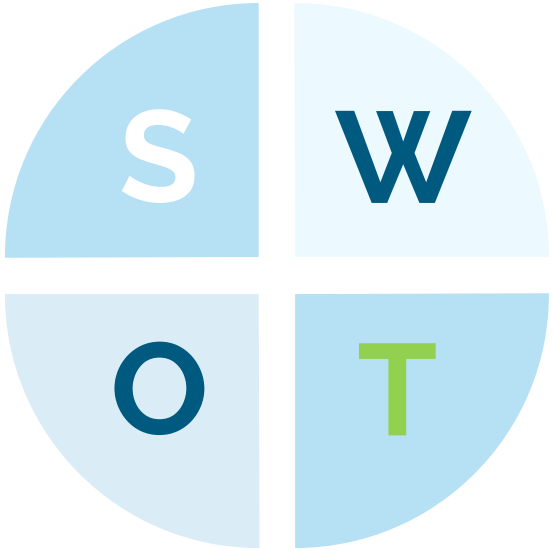
SWOT Analysis

STRENGTHS

Similar program X
Low price

WEAKNESSES

Incomplete accuracy
Highlight extraction time



Monopoly on the market

Iceberg Federation Marketing

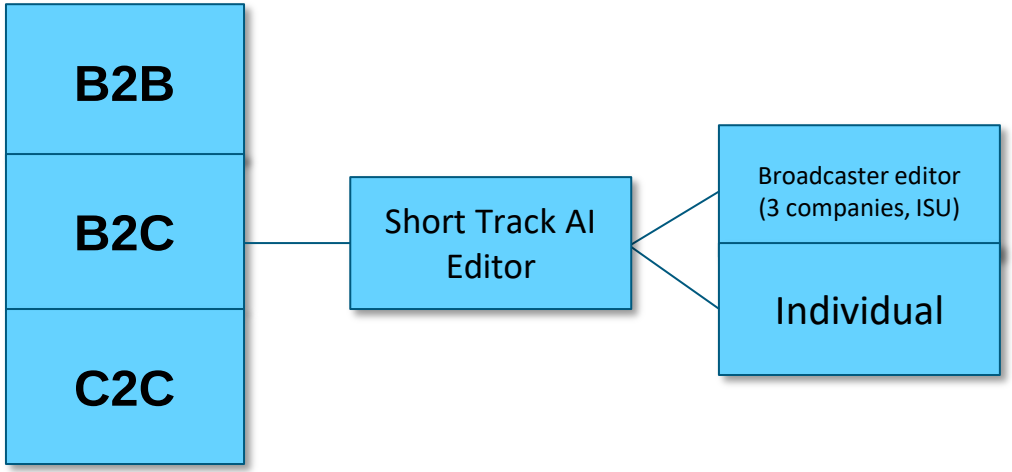
OPPORTUNITIES

Copyright infringement

illegal sharing

THREATS

STP : Segmentation



STP : Targeting

Short track editor
“Tired of too many video editing”

Athletes and fans who want
Highlight videos

STP : Positioning

Individual & Athlete

"My own video"

- Edit and extract videos that I want
- Edit and extract your own video

Broadcaster editor

+

YouTube editor

“Get various videos quickly and cheaply."

- Edit and extract videos quickly at an affordable price
- Editing and extracting many videos during the Olympics

Member Role

김동민

UI,
Frame split/merge
Backend
Marketing
Github-wiki

김예찬

Object Detection
Frontend
Server
Github-wiki

박민규

Speech To Text
Frontend
Marketing
Github-wiki

이동섭

OCR
Backend
Database
Github-wiki

Thank You!

Do you have any questions?

Senior project Team 5

https://github.com/GCU-Team5/ShortTrack_AI_Editor