



Chopped: Audio Driven Video Segmentation

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Introduction

High school baseball coaches often spend significant time manually reviewing and editing game footage to analyze player performance. This process is time consuming and inefficient when working with full-length game recordings.

To address this challenge, Chopped is a web application designed to automatically sort and segment game film. The system utilizes multimedia data processing, incorporating both audio and structured data files to identify and organize key moments within a game. The system is hardware-independent, requiring only recorded video and audio input.

Methods

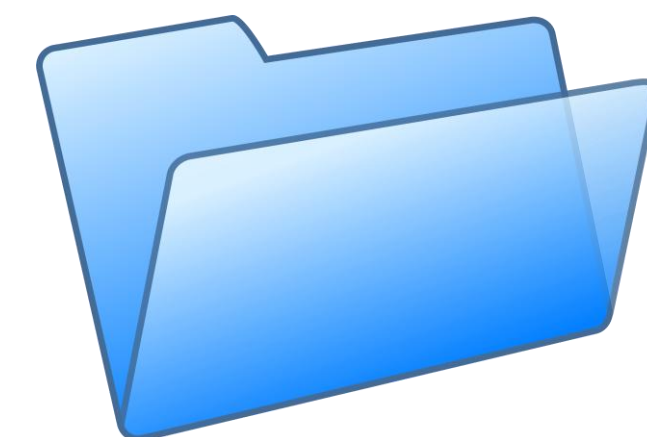
- Web application developed using Python, HTML, and CSS with a Flask-based backend.
- Utilizes integrated libraries for video processing and speech-to-text transcription.
- Users verbally mark key events during recording (e.g. “strikeout”, “double”, “E6”, etc.).
- Spoken keywords are transcribed and mapped to timestamps.
- Uploaded video and audio files are processed together to generate segmented game footage

System Metrics/Summary

- Input: ~2 hour game recording with the option for an additional audio file
- Output: Multiple organized 25-second video clips of key events
- Processing: Fully automated after user upload
- Accuracy: High when keywords are clearly spoken

Data Flow

Step 1: Media Upload



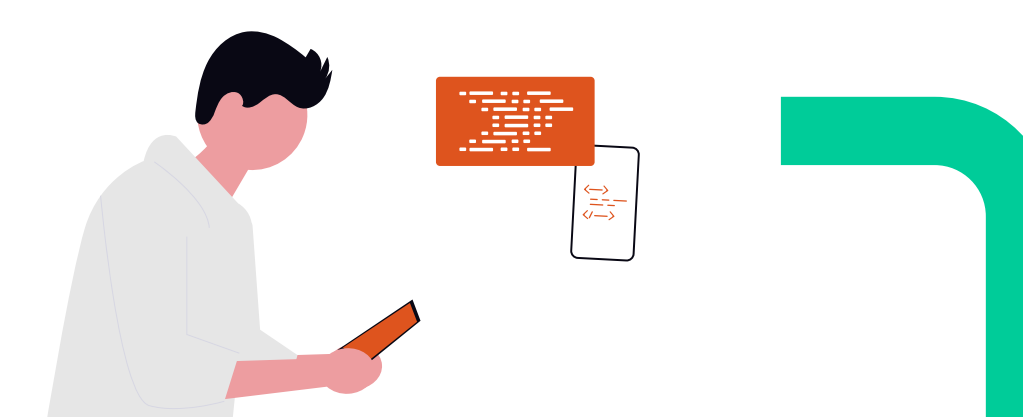
Users upload media in the form of a video file (separate audio file acceptable) which must include the spoken keywords for each play.

Step 2: Media -> Backend



Uploaded files are moved to the backend folder where they are stored and prepared for processing.

Step 3: Extracting Key Events



Detect audio corresponding to keywords and pair them with the timestamp where they occurred.

Step 6: Return Clips to User



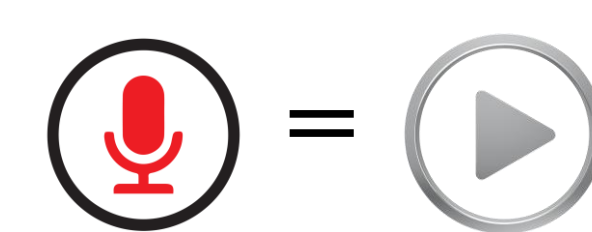
Generated clips are packaged and returned to the user through the web interface.

Step 5: Cut Clips



Segment video into clips based on detected key event timestamps.

Step 4: Match Files



Event data is matched with the corresponding video file to ensure that detected key moments are applied to the correct game footage.

Results

- Tested on full-length (~2 hour) baseball game recordings with live announcer audio.
- System successfully detected and generated clips when relevant keywords (e.g. “double”, “strikeout”) were clearly spoken.
- Performance depended on consistency of spoken cues, with extra clips generated when announcers did not follow expected phrasing.
- Simulated ideal usage by manually creating event data, confirming that clips were generated at correct timestamps.
- Background noise had minimal impact, as the system selectively detects target keywords rather than general speech.
- Repeated keywords at different timestamps result in multiple clips, reflecting direct mapping between detected events and generated segments.

Chopped Web Application Interface Input and Output



Upload My Profile About Log Out

Upload your Video (and Audio) Files

Max File Size: 15.0 GB

Acceptable VIDEO FORMATS:

.mp4, .mov, .webm, .mkv

Choose File BHS Boys Baseball...WCPeTg3fXQJ.mkv

☐ Includes Audio File

UPLOAD VIDEO

Select Upload Style

Encoding Method - PLEASE READ DESCRIPTION

NOT meant to reduce the clips/zip file.
NOT necessary for the program to work, hence default=None
-This is if you want to keep the original file but compress it because it's way too big and you want it smaller.
-Small files may not work well with Hardware Encoding.
-If encoding creates larger file, it will revert to original file uploaded.
-CPU is slower but better, and GPU is faster but poorer at compressing.

☒ None

☐ CPU

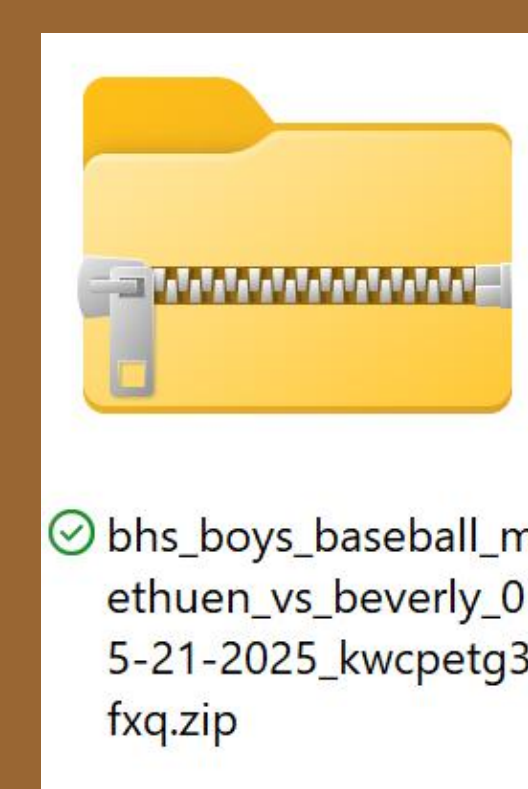
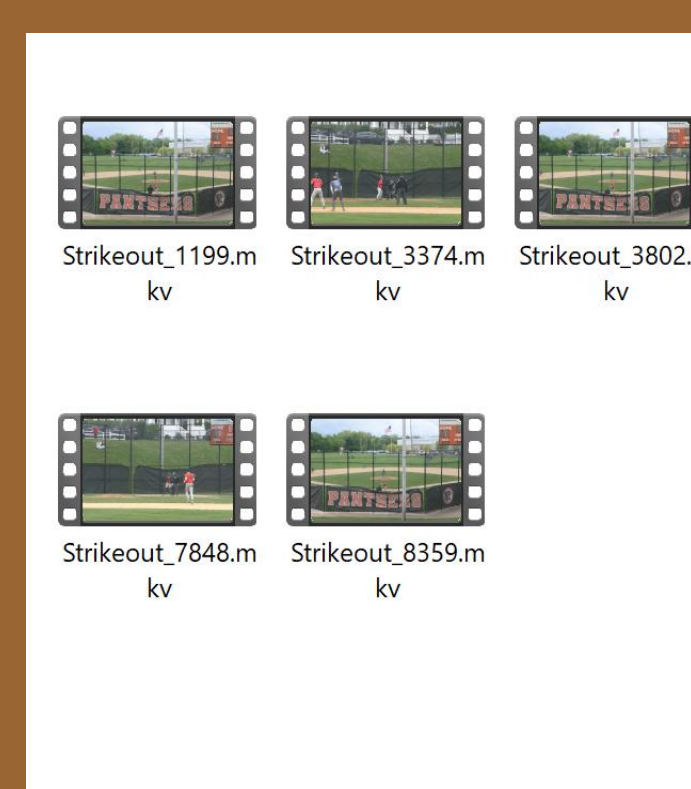
(Slower)

☐ GPU

(Faster)

```
{
  "type": "out",
  "timestamp": 214,
  "label": "Strikeout"
},
{
  "type": "hit",
  "timestamp": 433,
  "label": "Double"
},
}
```

bunts
errors
hits
outs
pickoffs



Future Steps/Implications

- Transition to a hybrid architecture, where video processing runs locally while a web platform stores and organizes generated clips.
- Improve system robustness to background noise and inconsistent spoken input.
- Enable real-time or near real-time clip generation, accounting for hardware and streaming constraints.
- Expand keyword detection to support a broader range of events and sports.
- Develop an interactive interface for reviewing, searching, and organizing clips.