

Beyblade Battle Results			
Battle Data			
Type 1	Type 2	Winner	Game Over Time
Dran Buster 1-60A	wizard rod 5-70db	wizard rod 5-70db	18.5
Winner Spinning Time	Win Reason	Collision Count	
18.566666666666666	Opponent stopped spinning	8	
Analysis			
<p>This was a close battle that went down to the wire. The two beyblades, Dran Buster 1-60A and Wizard Rod 5-70db, were evenly matched in terms of spinning time, with both beyblades spinning for 18.5 seconds. However, the win reason shows that the Wizard Rod 5-70db stopped spinning before the Dran Buster 1-60A, giving Dran Buster the victory.</p> <p>Here's a breakdown of the battle:</p> <ul style="list-style-type: none">Dran Buster 1-60A: This beyblade is known for its high attack power and stamina. It features a strong, heavy attack ring, a balanced, weight-distributed, and aggressive frame, and a powerful 1-60A bottom that provides excellent stability and stamina. This combination allowed Dran Buster to withstand the attacks of Wizard Rod and eventually knock it out of the stadium.Wizard Rod 5-70db: This beyblade is known for its balanced attack and stamina properties. It has an attack-oriented attack ring and a balanced frame for good defense and attack power. It also has a 5-70db bottom that provides decent stamina and stability, but not as strong as the 1-60A bottom of the Dran Buster. <p>The battle log reveals the following:</p> <ul style="list-style-type: none">The beyblades were evenly matched in the first half of the battle, with numerous collisions and no clear advantage for either beyblade.However, around frame 100, Dran Buster begins to gain an edge, pushing Wizard Rod around the stadium.The turning point occurs at frame 189, where Dran Buster lands a strong hit on Wizard Rod, knocking it off balance.From this point on, Dran Buster continues to dominate, with Wizard Rod struggling to stay upright.The final blow comes at frame 565, where Dran Buster's attack ring makes contact with Wizard Rod's, causing the latter to stop spinning. <p>Overall, the battle was a close fight, but Dran Buster's superior attack power and stamina ultimately proved to be the deciding factor. The consistent pressure from Dran Buster's attack ring, coupled with the power of the 1-60A bottom, proved too much for Wizard Rod to handle, resulting in its defeat.</p>			
Upload another video			

The Beyblade Battle Analysis System is designed to analyze and interpret Beyblade battles using advanced computer vision techniques. This system captures video of battles, detects and the Beyblades, and provides detailed insights through a user-friendly dashboard.

<https://github.com/sayyidan-i/Beyblade-Analytics-Flask>

- **Flask:** A lightweight web framework used to build the dashboard and handle video uploads and user interactions.
- **OpenCV:** Used for image processing and video analysis.
- **YOLOv10:** A state-of-the-art object detection model utilized to detect and track Beyblades in the video.

- **Gemini:** An advanced generative AI model used to analyze battle logs and provide insights based on the results.
- **Roboflow:** A tool used for manual labeling of training data.

Model Selection

The Beyblade detection model chosen for this project is the YOLOv10 (You Only Look Once version 10) model. This model was selected due to its real-time object detection capabilities, high accuracy, and efficiency in processing video frames.

The training data for this model was sourced from YouTube videos of Beyblade battles, where key frames were extracted and manually labeled using Roboflow.

Youtube Video Link: <https://www.youtube.com/watch?v=QdhF3GMv778>

Roboflow Dataset Link: <https://universe.roboflow.com/test-ioja3/beyblade-battle-detection/dataset/2>

Model Performance

The performance of the Beyblade detection model is as follows:

- **Precision:** 97.88%
- **Recall:** 94.04%
- **mAP50:** 98.15%
- **mAP50-95:** 84.12%
- **Fitness:** 85.53%

Installation

1. Clone the repository:

```
git clone https://github.com/sayyidan-i/Beyblade-Analytics-Flask
cd Beyblade-Analytics-Flask
```

2. Install the required packages:

```
pip install -r requirements.txt
```

Usage

1. Prepare the video file of the Beyblade battle. You can get the video from [Google Drive](#).
2. Run the Flask app:

```
python app.py
```

3. Open the browser and go to <http://http://127.0.0.1:5000/>
4. Upload the video file and wait for the analysis to complete.

Features and Logic

1. **Beyblade Detection:** The system employs the YOLOv10n model to identify different types of Beyblades and utilizes the BotSORT algorithm to assign unique IDs for tracking. This allows the system to distinguish between two Beyblades, even if they are of the same type, preventing any confusion during battles.
2. **Collision Detection:** The system measures the distance between the centers of detected Beyblades. A collision is detected if the distance between the centers of their bounding boxes is less than the threshold. The collision_active flag resets to False when the distance exceeds this threshold. Tracking the collision count is crucial for analyzing battle dynamics and evaluating Beyblade performance.
3. **Stop Detection:** The program utilizes optical flow techniques to monitor the movement of the Beyblades. Optical flow is a computer vision technique that estimates the motion of objects between consecutive frames in a video by analyzing changes in pixel intensity. If the motion falls below a specified threshold for a set number of frames, the Beyblade is marked as "stopped" and the opponent is declared the winner.
4. **Out of Arena Detection:** The system tracks the number of frames a Beyblade goes undetected. If a Beyblade is missing for a certain duration, it is considered "out of the arena," and the opponent is declared the winner.
5. **Game Over Time :** The system calculates the time taken for the game to end. The game ends when one of the Beyblades is declared the winner due to a stop or out-of-arena event.
6. **Winner Spinning Time:** The system calculates the total spinning time of the winning Beyblade during the battle until it stopped or the video ended.
7. **Battle Analysis:** The battle logs, which contain frame-by-frame data on the positions and statuses of the Beyblades, are analyzed using Gemini. This analysis provides a detailed report on the battle, including insights on the performance of each Beyblade and the overall outcome.

Output

1. Battle_data_result.csv : this file contains the result of the battle, which include the beyblade type, beyblade id, game over time, winner spinning time, win reason and the collision count.
2. Battle_log : this file contains the frame by frame data of the battle, which include the frame number, beyblade type, beyblade position, collision, and status of the beyblade.
3. result.mp4 : video file that detects the beyblade.
4. highlight.mp4 : video file that highlights when the game is over.