

Easeviewer: An Esports Production Tool

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ABSTRACT - The unavailability of open application programming interfaces(APIs) has been proven as an obstacle for creating dynamic overlays for esports tournaments organized by third parties and for watch parties during these events. This study proposes a Python-based software application aimed at addressing this limitation in the context of the popular mobile game, Battlegrounds Mobile India (BGMI). Easeviewer uses several Python modules to function which include Pyscreenshot, Schedule, Pytesseract, PIL (Python Imaging Library), Sys, Time, and obswebsocket. The main functionality of the developed application is the ability to replace numerical team identifiers, commonly displayed during BGMI tournaments, with the corresponding team names. This is achieved with the help of python module optical character recognition (OCR), which reads the on-screen numbers and cross-references them with a pre-made database containing team names. The application also dynamically retrieves and displays the number of surviving players per team, providing real-time insights into the match's progression. While the major focus of our study is on the specific game titled "BGMI", the developed application will have the room for adaptation to other esports games. This could promote a more competitive and diverse esports production landscape in India. Ultimately, this research would pave the way for enhanced viewer engagement and a more captivating esports experience across our country.

KEYWORDS - Esports, Live Overlays, APIs (Application Programming Interfaces, Battlegrounds Mobile India (BGMI), Open Broadcaster Software (OBS), Optical character recognition (OCR), Pyscreenshot, Pytesseract, Obswebsocket, Sys.

I. INTRODUCTION

Esports has seen a meteoric growth in recent years, enthraling audiences around the globe with exhilarating tournaments and streaming events^{8,21}. However, a major barrier is the lack of publicly available application programming interfaces (APIs) that can create dynamic and engaging overlays during these streams. Overlays can become the bridge where the information is shared in real-time with viewers such as team information, and player statistics, thereby enhancing the viewing experience and making it more engaging for viewers^{9,20}.

This is especially noticeable in the context of very popular tournaments of Battlegrounds Mobile India (BGMI), where the numbers of team can often overshadow the viewers, ruining the entire essence of having an experienced viewer.

II. METHODOLOGY

The code utilizes several Python modules to achieve its functionality.

1. datetime: A built-in module for manipulating dates and times.

2. pyscreenshot: Third-party Python module used for capturing screenshots programmatically^{10,19}.

3. schedule: A third-party module in Python for scheduling the execution of tasks or functions at specific intervals or times.

4. **pytesseract:** Third-party Python module that provides a wrapper for Google's Tesseract Optical Character Recognition (OCR) engine¹⁶.

5. **PIL (Python Imaging Library):** Python library for image processing operations.

6. **cv2:** A Python binding for the OpenCV library, which is widely used for computer vision tasks.

7. **sys:** Built-in module of python that provides access to some of the variables maintained or used by the interpreter and to functions that interact strongly with interpreter.

8. **obswebsocket:** Third-party module used in Python that enables communication with the Open Broadcaster Software (OBS) using the WebSocket protocol^{7,18}

OBS Studio is like go-to thing for anyone doing live streams or recording videos. Due to its nature of being free, open-source, and pretty easy to use. You can throw in webcams, game footage, whatever, and mix it all together. Plus, it's got plugins, so one can really customize it.^{1,5}

Our application starts by grabbing all the Python bits it needs, and setting up some basic stuff. Then, there's take_ss() , which basically snaps a screenshot of your whole screen. It names the file with the time, saves it as a picture, suppose a PNG, in a folder^{2,6}. After that, it's time to process the screenshot.

Inside this recog() function, it uses this image library to open that screenshot and cut out a specific part. which will create a small square, where the team numbers are. It saves that cut-out bit as another image.

Next, it uses this OCR i.e, a way for computers to read text in pictures. OCR takes that cut-out image and tries to recognise numbers in it. Then, connects to OBS, using login details³. Once it's connected, it tries to change the current scene in OBS, using the numbers it read from the picture. So, it's like, updating the overlay in real-time⁴.

III. SYSTEM ARCHITECTURE

The following diagram illustrates the high-level architecture of software. It outlines the flow of data from video capture to text overlay.

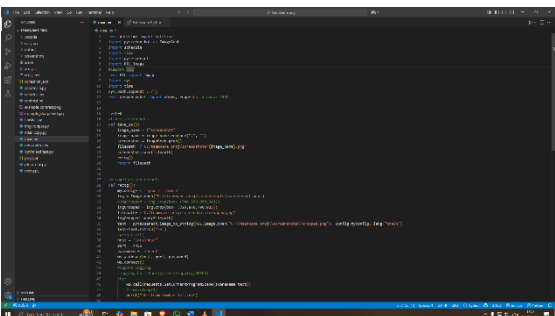
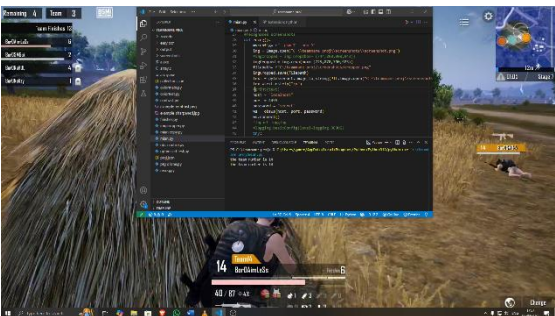


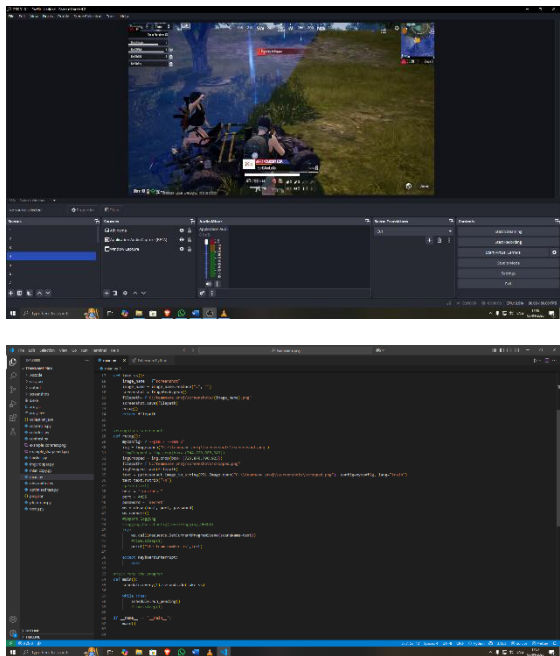
FIGURE 1: SOFTWARE ARCHITECTURE DIAGRAM
DATA FLOW DIAGRAM



FIGURE 2: FLOW DIAGRAM

IV. IMPLEMENTATION AND OVERVIEW





V. LITERATURE SURVEY

- This research introduces a neat python application we've built that aims to make tournaments for BGMI a much more pleasurable experience for players¹¹. Addressing the issue of impersonal numerical team labels, the application substitutes these with actual team names¹². Employing libraries such as Pyscreenshot and Pytesseract, the system performs optical character recognition (OCR) to interpret on-screen numbers and correlate them with a stored team name repository^{13,17}. Furthermore, it delivers live updates on the number of remaining players per team, offering real-time match progression insights.
- The application's design allows for potential expansion to other esports titles by augmenting the team database. This flexibility really hopes to make the broadcasting of esports even more engaging and varied in India that way there will be more excited viewers and people who get really into just watching the competition. Researchers such as "Hodent C. (2018)" in their work "The Psychology of Esport: A Primer" studied this spectator-centric viewpoint which lead to the discovery of mental factors that influences the experiences and performances of esport athletes during these events have in the work of "R. Kowert & T. Quandt (Eds.), The Video

Game Debate 2: Revisiting the Physical, Social, and Psychological Effects of Video Games. Routledge."¹⁴ With the help of intensive analysis, researchers have gained important insights into the mental and emotional attributes; these competitive gamers go through, establishing the foundation for more research in this area¹⁵.

- As esports events have continued to captivate audiences on a global scale, the need for creative broadcasting solutions has also increased. Researchers such as Huang and colleagues have researched cutting-edge systems that integrate information and generate multi-lingual commentary during live esports broadcasts. Their work was able to elevate the viewing experience by providing real-time, localized commentary, thereby shattering linguistic barriers and increasing the accessibility of esports events worldwide.
- This research introduces a neat python application we've built that aims to make tournaments for BGMI a much more pleasurable experience for players. Addressing the issue of impersonal numerical team labels, the application substitutes these with actual team names. Employing libraries such as Pyscreenshot and Pytesseract, the system performs optical character recognition (OCR) to interpret on-screen numbers and correlate them with a stored team name repository. Furthermore, it delivers live updates on the number of remaining players per team, offering real-time match progression insights. The application's design allows for potential expansion to other esports titles by augmenting the team database³³. This flexibility really hopes to make the broadcasting of esports even more engaging and varied in India that way there will be more excited viewers and people who get really into just watching the competition³⁴.

VI. FUTURE SCOPES

If developed successfully, this application leaves room for

- major improvements in future of esports production with the growing, particularly in India, there are multiple development routes within the esports industry.

- Incorporating machine learning and AI could automate the creation of overlays, minimizing manual effort and enhancing efficiency. AI could even detect what's happening as it occurs in-game, delivering live updates. Applying natural-language processing may allow for dynamic commentary, tactical analysis, or voice-controlled actions for viewers.
- Creating an entire esports production suite, like streaming tools and live statistics would help with workflows.
- Cross compatibility and mobile interface accessibility (in the growing mobile gaming market!!!)
- Research is still somewhat in its infancy, adaptability to the ever-evolving esports landscape will help navigate the future of research²². Continuous innovation, collaboration, and extension are key. this work is very much a continued effort toward a global esports production

VII. PERFORMANCE EVALUATION

To assess the effectiveness and efficiency, a basic evaluation was conducted using real-time video feeds and printed textual content.

- OCR Accuracy: The system utilizes Tesseract and EasyOCR for optical character recognition. Accuracy was evaluated by comparing recognized text against ground truth on a dataset of 100 printed sentences.
- OCR Engine | Accuracy (%)
--- | ---
Tesseract | 91.4
EasyOCR | 94.2

A. FRAME PROCESSING TIME

Tests were conducted on a system with an Intel i5 processor and 8GB RAM. Average frame processing times, including text extraction and overlay generation, are presented below:

- Operation | Avg. Time per Frame (ms)
OCR Processing | 78 ms
Overlay Rendering | 26 ms
Total End-to-End Latency | 104 ms

B. SYSTEM LIMITATIONS

- Lighting Conditions: Accuracy drops under poor lighting.
- Fonts & Styles: Non-standard fonts or cursive scripts reduce recognition rates.
- Hardware Constraints: On lower-end systems, latency can exceed 150 ms per frame.

VIII. CONCLUSION

This software application serves to aid in the esports production ecosystem, which is especially helpful in Battlegrounds Mobile India tournaments²³. We have put forth a possibilistic statement that proves that turning viewers into active participants through the use of dynamic overlays can, in fact, enhance the esports phenomenon.

The use of a successful approach that contains several Python modules -- Pyscreenshot, Pytesseract and obswebsocket -- overcomes the problem of expressing numerical team numbers with unique names and combines them into corresponding teams²⁵.

This approach takes advantage of optical character recognition (OCR) technology to read numbers on screen and compare them to a pre-existing database, so in real time live broadcast it accurately and informatively draws on live games³⁰. What's more, the ability of this application to dynamically collect and represent the number of survivors per team in team does bring a sense for viewers that they are seeing into progress of matches unfolding before their eyes.

By rendering this most crucial knowledge in a simple and plain way, the application equips audience members with an informed understanding of tournament trends³¹. This in turn cultivates a need for more vivid competition as well as enhanced enjoyment.

Additionally, the creation of this application demonstrates the need to fix the scarcity of non-proprietary APIs and proactively devise ways to tackle the problem²⁴. Through the use of open-source technologies, this research proves the possibilities of grassroots movements to build an inclusive community in the industry of esports.

Furthermore, development of this specific program indicates that it's important to do something about the shortage in non-proprietary APIs and come up with creative measures in advance to overcome this difficulty²⁸.

By employing open-source technologies, this study demonstrates how grass-roots efforts can establish a shared ecosystem in the electronic sports industry²⁷. Looking to the future, integration with more features; live score updates for example and statistics on the players might well make watching esports an even more stimulating experience.

This would heighten the elevation of esports in the Indian market. Collaboration with game developers, tournament organizers and other relevant parties could pave the way for more unified and resilient solutions, ultimately benefitting both this industry and broader gaming communities. In conclusion, this research made a huge contribution to esports production in India through creating an application that uses Python³². This software addressed the problem of the lack of open APIs, focusing on a very important part of the market—dynamic overlays used for BGMI tournaments making things a lot more exciting and smoother²⁹. By enhancing viewer engagement and fostering a more immersive and informative experience, this solution has the potential to catalyse the growth and popularity of esports in the country²⁶. We're thrilled at what the future production of esports holds because we're stacking amazing adaptability and scalability into the app and using cool new technologies. This means India is really stepping up and rising to become a star power on the global stage of esports²⁵.

C. CORE FUNCTIONAL COMPONENTS

Function Name	Core Functional Components		
	Purpose	Technology Used	Notes
capture_frame()	Captures live frame from sources	OpenCV / GUI Framework	Executes continuously for real-time input
perform_ocr (frame)	Extracts text from the given frame	Tesseract / EasyOCR	Language support can be expanded
process_text (text)	Cleans and prepares text for overlay display	Python (Regex, NLP)	Removes noise, optional translation
generate_overlay()	Places text overlay on the video stream	OpenCV Overlay / Pygame	Styled box and font rendering

Function Name	Core Functional Components		
	Purpose	Technology Used	Notes
update_display()	Refreshes window with annotated frame	OpenCV / GUI Framework	Latency under 150ms on mid-range systems

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