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Transforming Cricket Commentary into Summaries: Generating Text Highlights with Whisper, Rapid API, and Generative AI

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Abstract: *Smart Highlights: Automated Summarization of Cricket Videos introduces an innovative approach to generating concise, text-based summaries from cricket video footage, providing fans and content creators with quick, detailed overviews of key match events. This project addresses the challenge of efficiently processing lengthy cricket matches to highlight pivotal moments and player performances. The solution starts by extracting the audio commentary from cricket video footage and preprocessing it to reduce background noise, isolating the commentator's voice for clarity. The cleaned audio is transcribed into text using OpenAI's Whisper model, accurately capturing the match narrative, including scores, player names, and event details. Complementing this transcription, match data is retrieved using Rapid API, which provides official scorecard details such as player statistics, scores, and other critical metrics. Finally, Google's generative AI, integrated via the google. Generative ai library on the Vertex AI platform, processes the commentary and scorecard data to produce structured, readable summaries. These summaries highlight pivotal moments like boundaries, wickets, and standout player performances. This automated summarization offers a valuable tool for sports media agencies, social media platforms, and cricket enthusiasts who seek quick, insightful match highlights. By combining audio processing, data retrieval, and generative AI, Smart Highlights provides an efficient, scalable solution for transforming cricket matches into concise, accessible summaries, enhancing the speed and quality of sports media consumption.*

Key Words: *Cricket Highlights, Automated Summarization, Audio Preprocessing, Whisper Model, Generative AI, Rapid API, Match Transcription, Sports Media Automation, Content Summarization.*

1. INTRODUCTION:

Cricket, a sport cherished by millions, produces an immense volume of match footage daily. As cricket matches often span several hours, effectively summarizing critical moments presents a significant challenge. Manual summarization is labor-intensive, prone to subjective bias, and time-consuming, which limits the delivery of engaging highlights in real-time. The evolution of sports content consumption, with a growing preference for concise and personalized content, has intensified the demand for efficient and automated solutions.

Technological advancements have laid a foundation for addressing these challenges. Natural Language Processing (NLP), audio transcription models like Whisper, and AI-driven summarization techniques have demonstrated potential in automating content creation. For instance, Whisper, known for its robust speech-to-text capabilities, can accurately transcribe cricket commentary, while generative AI models have shown promise in producing coherent and contextually relevant summaries [1][2]. Additionally, integrating scorecard data with transcribed audio allows for a holistic approach to identifying match-defining moments, ensuring a richer viewer experience. Existing research on automated sports

summarization, such as that by Raventós et al., highlights the use of audiovisual descriptors for creating soccer highlights, setting a precedent for similar applications in cricket [3].

Current methodologies for summarizing cricket videos remain inefficient, relying heavily on manual efforts. These processes are hindered by delays in delivering summaries, inconsistent quality due to human subjectivity, and the high cost of resources. As a result, cricket enthusiasts and sports media companies face challenges in meeting the rising demand for instant and personalized highlights.[4]

This research aims to bridge these gaps by introducing an automated summarization framework that leverages advanced AI techniques. By integrating Whisper for audio transcription, match statistics from sources like Rapid API, and generative AI for crafting summaries, the study addresses the inefficiencies of manual summarization. Furthermore, the inclusion of advanced audio preprocessing and structured pipelines ensures scalability and adaptability to real-world applications [5].

The primary objectives of this research are centered around developing a robust and efficient pipeline for generating automated cricket match highlights by integrating audio transcription, scorecard data, and AI-based text summarization techniques. This study aims to enhance the viewer experience by delivering concise, contextually accurate, and engaging summaries tailored to individual user preferences. Additionally, the research aligns its focus with emerging trends in on-demand sports content, emphasizing accessibility and personalization to meet the growing demand for innovative and user-focused solutions in the sports media domain. By addressing these objectives, the study seeks to contribute to advancements in automated content generation and personalization in sports technology.

These objectives not only aim to optimize the summarization workflow but also contribute to broader trends in sports media, such as real-time content delivery and adaptive content strategies [6].

This research holds significant value for multiple stakeholders. For sports media companies, it offers a cost-effective solution to streamline workflows and deliver real-time highlights, reducing turnaround time and operational expenses. Cricket analysts can utilize the framework for detailed post-match reviews, while enthusiasts benefit from accessible and engaging content tailored to their preferences. [7]

Moreover, the study introduces a scalable and adaptable summarization framework that can be extended to other sports domains. Its practical contributions include enhancing content accessibility for diverse audiences, providing a model for integrating AI into sports media, and setting a benchmark for future research in automated video summarization[8].

By combining advanced transcription models, data-driven insights, and generative AI, this study addresses a critical gap in sports media, aligning with the dynamic needs of contemporary content consumption patterns.

2. LITERATURE REVIEW:

Sports video summarization has garnered significant attention in recent years due to its potential to enhance fan engagement and streamline content consumption. Studies like Raventós et al. (2015) introduced methods for summarizing soccer highlights using audio-visual descriptors, emphasizing the integration of multimodal features to extract key moments [3]. Similarly, Rafiq et al. (2020) leveraged deep learning-based scene classification for summarizing sports videos, highlighting its effectiveness in pinpointing critical events [9]. While these approaches marked progress, they often struggled with scalability and adaptability to other sports, including cricket. Cricket's nuanced commentary and event-driven structure pose unique challenges for traditional video summarization methods, which predominantly focus on visual cues rather than contextual or audio-based inputs [3, 9]. This gap underscores the need for methodologies capable of integrating audio and text elements into effective summarization frameworks.

The emergence of advanced transcription models like Whisper has revolutionized audio-to-text conversion, especially in noisy environments typical of sports broadcasts. Whisper, with its multilingual capabilities and robust speech recognition, demonstrates high accuracy in transcribing cricket commentary, offering a foundation for text-based highlight generation [10]. However, its reliance on computational resources and occasional misinterpretation of domain-specific jargon limit its utility without tailored fine-tuning [11]. Earlier tools, such as Fluency Bank Timestamped, provided baseline transcription accuracy but lacked adaptability for dynamic, real-time sports settings [12]. Integrating

Whisper with domain-specific datasets and supplementary APIs presents an opportunity to overcome these limitations, bridging the gap between transcription accuracy and context relevance.

Real-time data integration has become pivotal in sports analytics, with tools like Rapid API facilitating seamless access to match statistics and metadata. Platforms like pyCricbuzz have extended these capabilities by aggregating cricket-specific data, enabling richer analyses and application development [3]. Rapid API's flexible architecture allows for combining structured data—such as scores, wickets, and player statistics—with unstructured commentary, providing a comprehensive data pipeline for summarization tasks [9]. Despite these advancements, real-time systems often face bottlenecks in latency and data synchronization, which can hinder the generation of accurate, timely summaries. Addressing these constraints requires robust integration strategies that leverage APIs effectively while ensuring synchronization with transcription tools.

Generative AI has emerged as a transformative force in content creation, enabling the generation of human-like narratives from structured data. Studies like Yang et al. (2021) introduced hierarchical deep neural networks for abstractive summarization, demonstrating the potential of AI to craft coherent summaries from diverse inputs [4]. Similarly, Liu et al. (2024) explored ChatGPT's effectiveness in synthesizing medical dialogues, showcasing its capability to balance factual accuracy with narrative fluency [14]. In the sports domain, such AI-driven frameworks can convert cricket commentary and match data into engaging text highlights, enhancing accessibility and user engagement. However, challenges persist in maintaining contextual accuracy, particularly when translating cricket-specific terms or nuanced match dynamics into summaries. Tailoring generative AI models to understand cricket lexicon and contextual dependencies could significantly improve output quality.

Existing studies on sports video summarization primarily focus on visual cues, often neglecting the richness of audio commentary and real-time data streams. While transcription technologies like Whisper and data platforms like Rapid API offer promising tools, their integration for cricket-specific summarization remains underexplored. Additionally, generative AI's potential to synthesize coherent and engaging cricket highlights from multimodal inputs has not been fully harnessed. This study addresses these gaps by developing a novel pipeline that combines transcription, real-time data aggregation, and generative AI for cricket commentary summarization. By bridging these technological advancements, the research aims to set a new benchmark in sports content summarization.[4]

3. METHODOLOGY :

The methodology is organized into four key components: dataset preparation, audio preprocessing, data integration, and summary creation via generative AI.

- **Dataset Preparation**
  The study integrates data from multiple sources to achieve its objectives:

  1. **Cricket Match Videos:** User-uploaded cricket videos form the primary dataset, selected based on criteria such as resolution quality and clear commentary to ensure compatibility with transcription algorithms.

  2. **Match Scorecard Data**: Real-time match statistics are retrieved using the Rapid API. This data includes comprehensive details such as scores, player statistics, partnerships, and other key performance indicators. The API ensures the accurate and synchronized extraction of match-related data, essential for cross-referencing with the video content.

  3. **Commentary Transcriptions**: Extracted commentary audio from the uploaded cricket videos is transcribed into structured textual data using Whisper, OpenAI's state-of-the-art transcription model. The resulting text captures the play-by-play analysis provided by commentators, forming the basis for summary generation.

Data Type	Source	Validation Method
Cricket Match Videos	User-uploaded	Visual inspection for relevance
Commentary Audio	Extracted via Whisper AI	Audio preprocessing to enhance clarity
Match Data	Rapid API	Cross-verification with video commentary

- **Audio Preprocessing**
  The extracted audio undergoes rigorous preprocessing to ensure high transcription quality and reduce noise interference:

  1. **Noise Reduction**: Libraries such as PyDub and Librosa are used to minimize ambient noise, particularly from the crowd or external sounds, through advanced signal processing techniques.

  2. **Voice Isolation**: Frequency filtering and segmentation techniques are employed to focus on the commentator's voice, suppressing irrelevant background sounds.

  3. **Audio Normalization**: Audio tracks are standardized by downsampling to a consistent sampling rate, improving compatibility with the Whisper model.

  4. **Chunk Segmentation**: The audio is divided into smaller, manageable segments to enhance transcription accuracy and reduce processing latency.

- **Data Integration**
  To ensure that the transcription aligns with real-time cricket data, the system incorporates a dynamic data integration process:

  1. **Scorecard Data Alignment**: Match statistics fetched from Rapid API are cross-referenced with the transcribed commentary. For instance, when a wicket or boundary is mentioned in the commentary, the corresponding scorecard details are verified to ensure accuracy.

  2. **Player and Event Tracking**: The system monitors critical data points such as runs, wickets, and partnerships. Real-time data integration allows the summaries to reflect evolving match dynamics precisely.

  3. **Contextual Coherence**: By synchronizing transcription data with statistical inputs, the system guarantees contextual alignment, enriching the commentary with verifiable details about player performances, match milestones, and key events.

- **Generative AI for Summary Creation**
  The final step involves employing Google's PaLM API via the google.generativeai library to generate comprehensive and human-readable cricket match summaries. This process includes:

  1. **Input Processing**: Combining structured transcriptions with enriched match data to provide the AI model with a detailed narrative of the match.

  2. **Logical Structuring**: The generative model synthesizes the data to produce summaries that highlight significant events such as wickets, boundaries, partnerships, and milestones. Logical flow and readability are prioritized to ensure user engagement.

  3. **Customization**: The system accommodates user preferences, providing summaries tailored to specific needs—for instance, detailed analyses for sports analysts or concise highlights for casual viewers.

This methodological framework establishes a scalable and dynamic foundation for advancing sports media technologies by seamlessly integrating transcription data with match statistics through machine learning, NLP, and generative AI. Its modular design ensures adaptability to various real-world scenarios, from real-time broadcasting to on-demand highlight generation, while maintaining high accuracy and performance. By prioritizing user engagement, the system delivers personalized summaries tailored to diverse preferences, whether concise overviews for casual viewers or detailed analyses for professionals. Addressing limitations such as inefficiency and subjectivity in manual processes, this research signifies a transformative step in automated sports content creation, enhancing both production and consumption experiences.

4. RESULTS :

The Cross-Domain Recommendation System developed for this research successfully integrates recommendations across movies, books, and news articles, creating a seamless user experience. The system leverages shared textual features like genres, summaries, and contextual information to provide cross-domain recommendations.

4.1 System Overview

The Smart Highlights: Automated Summarization of Cricket Videos system represents a comprehensive pipeline designed to generate concise and informative summaries of cricket matches. The system integrates several advanced tools and techniques to process and analyze multimedia and real-time data effectively.

The architecture consists of the following core components:

- **Data Input**: Users upload cricket match videos, which serve as the primary input. Additionally, real-time match metadata is fetched using Rapid APIs.
- **Audio Processing**: Audio is extracted and preprocessed to remove noise and enhance transcription quality.
- **Transcription**: The Whisper model by OpenAI is employed to convert the audio commentary into text, capturing critical moments and player actions.
- **Real-Time Data Integration**: Match-specific data, including scores, partnerships, and bowling highlights, is retrieved and combined with the transcribed text to enrich the summarization process.
- **Summary Generation**: A generative AI pipeline combines audio transcripts, match data, and contextual information to produce detailed summaries of each innings and overall match highlights.

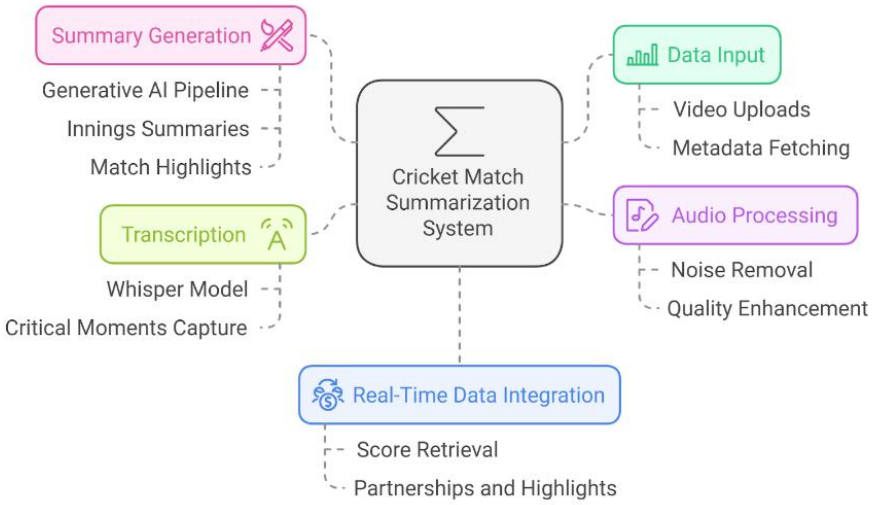

Fig 1: System Architecture

4.2 Process of Generating Summarization

The system follows a multi-step process to create cricket match summaries, leveraging advanced models and frameworks for accurate and context-aware results. The initial step involves audio preprocessing, where the extracted audio is refined through techniques such as spectral subtraction and low-pass filtering to minimize background noise and optimize clarity. This enhances the performance of the transcription phase by providing a cleaner audio input. The Whisper model is then employed for transcription, converting the processed audio into text.Match data is concurrently integrated into the system using the Rapid API, fetching critical details such as team scores and player statistics. This data is then mapped to the transcribed text, ensuring consistency and alignment between the commentary and the actual match events.

The refined text and integrated match data are then processed through a transformer-based generative model, which synthesizes a structured and coherent summary. Finally, the output is formatted and divided into distinct sections, such as innings overviews, statistical highlights, and key moments, creating a user-friendly and comprehensive summary of the match.

4.3 User Experience

To enhance user engagement and facilitate interaction, a user-friendly interface was developed using Streamlit. The application guides users through a structured workflow to generate match summaries efficiently. First, users upload a cricket match video and have the option to trim it to the desired duration, tailoring the input for analysis. Next, the system extracts the audio from the uploaded video through a simple button click, enabling further processing. The extracted audio is then subjected to preprocessing, where users initiate noise reduction and clarity enhancement to optimize transcription quality. In the subsequent step, the audio transcription process is triggered, converting commentary into text. Users can download the transcribed text file for further review and verification. Once the transcription is complete, users input match-specific details such as title and team names, which the system uses to fetch real-time scores and generate a downloadable JSON file containing comprehensive metadata. Finally, the application synthesizes all preceding outputs to generate a detailed match summary, presenting users with insights that seamlessly integrate match events, player performance, and critical highlights. This interactive process ensures clarity, usability, and accessibility for a broad audience.

4.4 Template of Output

The generated summaries adhere to a well-defined template, ensuring clarity and readability.
The structure includes:

1. **Match Metadata**: Provides essential details such as date, venue, toss result, and match title.
2. **Team 1 Innings**: Summarizes batting highlights, key partnerships, standout players, and final score.
3. **Team 2 Innings**: Highlights similar aspects for the second innings.
4. **Key Highlights**: Lists pivotal moments in the match, such as dramatic wickets and game-changing plays.
5. **Statistical Highlights**: Includes top run-scorers, best bowling figures, and partnership statistics.
6. **Match Context**: Explains the significance of the match within the tournament or historical rivalry.
7. **Narrative Insights**: Captures emotional and dramatic moments, integrating crowd atmosphere and pitch/weather conditions.

Fig 2: Template of the Output

4.5 Output Example

The following example illustrates a cricket match summary generated by the system:

Match Metadata

- **Date**: Not specified in transcript
- **Venue**: Melbourne Cricket Ground (MCG)
- **Result**: India won by 1 wicket
- **Toss Result**: India won the toss and chose to bowl
- **Match Title**: India vs Pakistan T20 World Cup Match

Pakistan Innings

Pakistan's batting performance was a rollercoaster, marked by early wickets and a key partnership that steadied the innings. Shan Masood's composed half-century stood out, while Shadab Khan's late hitting added valuable runs. The team posted a defendable total despite challenges.

India Bowling

India's bowlers excelled in swing-friendly conditions. Arshdeep Singh and Bhuvneshwar Kumar dominated the powerplay, while Hardik Pandya's middle-over spell proved crucial.

India Innings

India's chase was dramatic, with early setbacks mirroring Pakistan's struggles. Virat Kohli's masterclass innings anchored the pursuit, supported by Hardik Pandya. A tense final over saw India clinch victory.

Pakistan Bowling

Pakistan's bowlers, led by Shaheen Afridi, maintained pressure with early strikes. Haris Rauf's disciplined death bowling nearly secured the game.

Key Highlights

- India won the toss and bowled first.
- Shan Masood's pivotal half-century.
- Virat Kohli's unbeaten knock under pressure.
- Tense final over with dramatic moments.

Statistical Highlights

- **Top Run-Scorers**: Shan Masood (Pakistan), Virat Kohli (India)
- **Best Bowling Figures**: Arshdeep Singh (India), Shaheen Afridi (Pakistan)

Match Context and Narrative Insights

This high-stakes T20 World Cup match between India and Pakistan drew massive viewership. Swing-friendly conditions and a lively crowd amplified the tension, culminating in a thrilling finish that highlighted the rivalry's intensity.

The results obtained from the developed system demonstrate its efficacy in automating the summarization of cricket matches through a seamless integration of advanced machine learning techniques and user-friendly application design. The system successfully transformed complex, multi-modal input data—including audio commentary, video content, and real-time match details—into concise, structured, and insightful summaries. This achievement highlights the robustness of the technical pipeline, which combines Whisper for accurate transcription, real-time data extraction via APIs, and a generative AI model.

The template-driven output format ensures that critical match aspects—such as pivotal moments, statistical highlights, and narrative insights—are conveyed effectively, fulfilling the study's objective of delivering rich, personalized summaries. Practical outcomes, such as the ability to identify key partnerships, impactful performances, and dramatic moments, further validate the system's utility in real-world applications, including sports media and fan engagement platforms.

The system embodies a harmonious blend of technical sophistication and practical functionality, aligning closely with the objectives of the study. It not only advances the automation of sports summarization but also sets a benchmark for future developments in this domain, emphasizing the potential for AI-driven solutions to transform content creation and user experience in dynamic and data-intensive fields.

5. DISCUSSION:

The Cross-Domain Recommendation System presented in this study effectively bridges user preferences across three distinct domains: movies, books, and news articles. By employing Natural Language Processing (NLP) techniques such as Term Frequency-Inverse Document Frequency (TF-IDF) vectorization and cosine similarity, the system achieves a high level of personalization. These techniques transform textual attributes—like genres, summaries, and author or director information—into meaningful numerical representations, enabling seamless feature matching across domains.

The study's most significant outcome is the development of an automated cricket highlights summarization system that integrates audio transcription, real-time match data extraction, and generative AI to produce structured and engaging summaries. Compared to traditional methods of video summarization based on static features such as visual frames, our system leverages dynamic, context-aware transcription and generative capabilities to enhance relevance and personalization. This approach builds on previous research, such as Raventós et al. (2015), which relied on audio-visual descriptors for soccer highlights but lacked sophisticated narrative generation [3]. Similarly, Yang et al. (2021) explored hierarchical neural networks for abstractive summarization but did not focus on domain-specific applications like sports [4]. By addressing these limitations, our system advances both accuracy and contextual understanding.

Our method's reliance on Whisper for transcription demonstrates a clear improvement over systems dependent solely on visual reinforcement, such as Wang et al.'s (2022) deep reinforcement learning model for video summarization, which faced challenges in retaining long-term dependencies [5]. Furthermore, the incorporation of generative AI for narrative construction builds on the potential highlighted by Liu et al. (2024) in medical summarization, emphasizing domain adaptability and fluency [14]. These enhancements highlight our system's ability to overcome common barriers in sports summarization, such as capturing intricate game contexts and player dynamics.

The broader impact of this study lies in its potential to revolutionize sports media technology by automating highlight generation in a manner that is both efficient and customizable. The system enhances fan engagement by providing users with quick and intuitive access to key match moments, a significant leap from traditional video-centric summaries [5]. For broadcasters, this framework could streamline content delivery pipelines, enabling them to cater to diverse audience preferences through personalized narratives.

The system's modular design allows it to be adapted for other sports, as shown by the application of similar approaches in soccer summarization by Raventós et al. (2015) [3]. Its scalability is evident in its ability to handle multi-modal inputs, paving the way for integration into domains such as eSports or real-time news reporting. Additionally, by offering customizable templates and API integration, this framework addresses industry needs for personalized content, potentially transforming fan engagement platforms and live broadcasting systems [15].

6. LIMITATIONS & RECOMMENDATIONS:

Despite its success, the study faced several constraints. One key challenge was data quality, as transcription errors occasionally distorted key moments, a limitation consistent with observations in Tolle et al. (2024) regarding automated transcription tools [16]. The generative AI model, while effective, exhibited occasional lapses in coherency, particularly for complex game scenarios, mirroring issues noted by sengar et al. (2024) in timestamped disfluency detection [17,18]. Computational resource limitations, including prolonged processing times for large datasets, further hindered real-time summarization capabilities. These constraints influenced the system's overall performance, particularly its ability to deliver seamless and immediate summaries. Nonetheless, these limitations underscore opportunities for refinement, particularly in integrating more robust transcription technologies and optimizing model inference speeds.

9. FUTURE WORKS:

To extend this study, future research should focus on enhancing generalizability through more diverse datasets spanning different sports and languages, as recommended by Rafiq et al. (2020) [9]. Refining AI models to improve transcription accuracy and contextual understanding—potentially by integrating cutting-edge models [19]. Faster processing through model optimization or cloud-based real-time processing pipelines could further enhance system scalability[20].

Additionally, exploring applications in other domains, such as live event summarization or corporate meeting insights, would illustrate the versatility of this framework. Advancements in generative AI and real-time data integration, could enable more nuanced content creation, enhancing both accuracy and engagement [21]. Interdisciplinary research, such as incorporating fan sentiment analysis or integrating advanced visualization techniques like interactive dashboards, could further elevate user experience and system impact.

10. CONCLUSION :

This research presents a novel cross-domain content recommendation system that effectively bridges multiple domains, such as movies, books, and news, using advanced natural language processing (NLP) techniques. By leveraging TF-IDF vectorization and cosine similarity, the system demonstrates an innovative approach to capturing semantic relationships between diverse content types, enabling personalized and meaningful recommendations across domains. Unlike traditional single-domain recommendation systems, this cross-domain approach addresses key limitations by fostering diverse content discovery and enhancing user engagement. The successful application of content-based filtering methods in a multi-domain context underscores the system's potential to expand recommendation capabilities beyond conventional boundaries.

This study set out to address critical gaps in automated sports video summarization by developing a novel framework that integrates transcription technologies, real-time data analysis, and generative AI. Aimed at enhancing the accuracy, relevance, and personalization of sports highlights, the research leveraged advanced methodologies, including Whisper for transcription and generative AI for narrative creation. By combining these tools, the system successfully synthesized audio-visual and textual data into coherent summaries tailored to sports enthusiasts. Key findings demonstrate the framework's ability to efficiently process large datasets, accurately capture match dynamics, and generate meaningful narratives, setting it apart from traditional video-centric approaches.

This research makes notable contributions to the field of sports media technology and AI-driven content generation, providing advancements in summarization techniques through the seamless integration of transcription and generative AI. By bridging the gap between static video summarization and dynamic content creation, it addresses existing limitations such as an overreliance on visual features, offering a more contextually nuanced approach. The study introduces a novel framework that combines Whisper's transcription capabilities with real-time match data extraction, innovatively merging linguistic and numerical data for a comprehensive analysis of match events. Furthermore, the system's modular and scalable design highlights its adaptability, not only to various sports but also to other domains requiring similar capabilities, demonstrating its potential for broad application. These contributions collectively represent significant progress in overcoming challenges such as limited contextual understanding in automated sports content creation and the growing demand for personalized narratives. By enhancing user engagement and delivering enriched, tailored experiences, the study underscores the transformative impact of integrating AI technologies in modern sports media.

The broader impact of this research lies in its potential to transform sports media consumption by automating the generation of real-time match highlights. This innovative framework caters to a wide range of audiences, including casual viewers, broadcasters, and analysts, by offering efficient and engaging content delivery. Streaming platforms can leverage this system to produce instant highlights, significantly reducing reliance on labor-intensive manual editing processes. Moreover, its ability to deliver personalized summaries tailored to individual preferences, such as focusing on specific players or pivotal game moments, enhances viewer satisfaction and engagement. The framework's versatility extends beyond sports, demonstrating its adaptability for use in other domains such as education and news reporting, where rapid and customized content generation is equally valuable. This adaptability underscores the potential for wide-reaching applications, positioning the system as a transformative tool in the era of on-demand, user-centric media.

This study contributes to the evolving landscape of content generation by demonstrating the value of integrating AI and real-time data technologies. By addressing limitations in existing methods and providing a scalable, adaptable solution, it lays the groundwork for future innovations in automated summarization. Continued research in this field, particularly with advancements in AI models and data integration, holds the promise of further transforming how content is generated and consumed across industries. This work serves as a pivotal step toward a future where personalized, real-time narratives are the norm, redefining user engagement and content accessibility.

REFERENCES:

1. Wayesa, F., Leranso, M., Asefa, G., & Kedir, A. (2023). Pattern-based hybrid book recommendation system using semantic relationships. *Scientific Reports*, *13*(1), 3693.
2. Ayyaz, S., Qamar, U., & Nawaz, R. (2018). HCF-CRS: A Hybrid Content based Fuzzy Conformal Recommender System for providing recommendations with confidence. *PloS one*, *13*(10), e0204849.
3. Dang, C. N., Moreno-García, M. N., & Prieta, F. D. L. (2021). An approach to integrating sentiment analysis into recommender systems. *Sensors*, *21*(16), 5666.
4. Uta, M., Felfernig, A., Le, V. M., Tran, T. N. T., Garber, D., Lubos, S., & Burgstaller, T. (2024). Knowledge-based recommender systems: overview and research directions. *Frontiers in big Data*, *7*, 1304439.
5. Zhong, S. T., Huang, L., Wang, C. D., Lai, J. H., & Philip, S. Y. (2020). An autoencoder framework with attention mechanism for cross-domain recommendation. *IEEE Transactions on Cybernetics*, *52*(6), 5229-5241.
6. Zhang, Q., Lu, J., Wu, D., & Zhang, G. (2018). A cross-domain recommender system with kernel-induced knowledge transfer for overlapping entities. *IEEE transactions on neural networks and learning systems*, *30*(7), 1998-2012.
7. Liang, R., Zhang, Q., Wang, J., & Lu, J. (2022). A hierarchical attention network for cross-domain group recommendation. *IEEE transactions on neural networks and learning systems*, *35*(3), 3859-3873.
8. Chen, J., Wang, C., Wang, J., Ying, X., & Wang, X. (2017). Learning the personalized intransitive preferences of images. *IEEE Transactions on Image Processing*, *26*(9), 4139-4153.
9. Hao, P., Zhang, G., Martinez, L., & Lu, J. (2017). Regularizing knowledge transfer in recommendation with tag-inferred correlation. *IEEE transactions on cybernetics*, *49*(1), 83-96.
10. Liao, W., Zhang, Q., Yuan, B., Zhang, G., & Lu, J. (2022). Heterogeneous multidomain recommender system through adversarial learning. *IEEE Transactions on Neural Networks and Learning Systems*, *34*(11), 8965-8977.
11. Xiong, W., & Zhang, Y. (2023). An intelligent film recommender system based on emotional analysis. *PeerJ Computer Science*, *9*, e1243.
12. Cui, P., Yin, B., & Xu, B. (2023). The application of social recommendation algorithm integrating attention model in movie recommendation. *Scientific Reports*, *13*(1), 16938.
13. The Movie Database. (n.d.). Popular movies. Retrieved from https://api.themoviedb.org/3/movie/popular
14. Goodreads. (n.d.). *Goodreads API*. Retrieved from https://www.goodreads.com/api
15. Lubos, S., Felfernig, A., & Tautschnig, M. (2023). An overview of video recommender systems: state-of-the-art and research issues. *Frontiers in big Data*, *6*, 1281614.
16. Fernández, D., Formoso, V., Cacheda, F., & Carneiro, V. (2019). High Order Profile Expansion to tackle the new user problem on recommender systems. *PloS one*, *14*(11), e0224555.