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## 1 Litratue Review

AI-powered automated commentary has advanced significantly, offering substantial benefits over traditional manual commentary. These systems provide real-time, accurate, and engaging narration, enhancing the viewer experience while reducing reliance on human commentators. By leveraging large language models and machine learning, automated commentary ensures consistent and efficient coverage, making it a valuable tool in today's sports broadcasting domain. Alec Cook and Oktay Karakuş (2024) explores fine-tuning large language models (LLMs) for football commentary, highlighting the Mixed Immediately (MIM) strategy's promise in managing complex tasks on consumer-grade hardware. They introduce the LLM-Commentator system, which fine-tunes open-source LLMs to generate football commentary on standard hardware. The study evaluates three fine-tuning methods: Layered Mixed Sequentially (MSM), Mixed Immediately (MIM), and a base model (LM). The MIM model achieves a notable 0.91 F1 score, demonstrating efficiency in task management and mitigating catastrophic forgetting. Despite these advancements, challenges in real-time data acquisition and implementation persist, underscoring the MIM model's potential for future research in real-time generation and fine-tuning of smaller LLMs.[2]

Peter Andrews et al. (2024) introduced the AiCommentator system, featuring dual AI commentators for both non-interactive and interactive football commentary to enhance viewer engagement. Their review covers the evolution from basic play-by-play to sophisticated color commentary, emphasizing the roles of both commentator types. The AiCommentator system utilizes computer vision (CV) and natural language processing (NLP) to analyze video sequences and provide real-time commentary, employing models like FootyVision for multi-object tracking, the Hungarian algorithm for tracking, GPT-3.5 for commentary generation, and Azure TTS for nuanced speech. Previous systems such as SCoReS and Chitrakala et al. (2023) have aimed to assist human commentators with recommendation systems. The review notes that embedded visualizations, or emphasizing, enhance viewer understanding, and conflicting commentary is found to be more engaging. Despite limitations like preprocessing delays, lack of strategic understanding, miswording issues, and mixed feedback on visualiza-

tions, the AiCommentator system demonstrated real-time capability of 194.34 FPS, suggesting potential for effective, resource-efficient operation. [1]

Jakub Kościotek (2024) focuses on reducing commentary delays in soccer video games using SVM and NN models, detailing the evolution and challenges of live commentary generation. The literature review addresses foundational works on automated commentary, including issues like repetitive commentary and limited comment scope. It explores event prediction and classification in soccer games, referencing studies that use various techniques to predict game events and outcomes. A significant challenge noted is the delay in commentary due to the overhead of large language models (LLMs) and Text-to-Speech algorithms, with delays averaging 6 seconds. The Google Football Environment is highlighted as a valuable tool for data extraction, with research leveraging this environment to train the GPT-3.5 model. Machine learning models such as SVM and ANN are evaluated, with SVM achieving an F1-score of 79% on balanced data but dropping to 69% on imbalanced data. Limitations like data preparation and model enhancement are noted, with future research focusing on improving prediction performance and commentary realism. [3]

The studies collectively demonstrate significant progress in AI-driven sports commentary. The fine-tuning of large language models (LLMs) shows promising results in managing complex tasks and improving performance on standard hardware. The integration of computer vision (CV) and natural language processing (NLP) enhances real-time commentary capabilities. Additionally, advancements in machine learning models address challenges such as commentary delays and prediction accuracy, highlighting both the potential and the need for continued research in optimizing AI for sports commentary.

## References

- [1] Peter Andrews, Oda Elise Nordberg, Njål Borch, Frode Guribye, and Morten Fjeld. Designing for automated sports commentary systems. In *Proceedings of the 2024 ACM International Conference on Interactive Media Experiences*, IMX '24, page 75–93, New York, NY, USA, 2024. Association for Computing Machinery.
- [2] Alec Cook and Oktay Karakuş. Llm-commentator: Novel fine-tuning strategies of large language models for automatic commentary generation using football event data. *Knowledge-Based Systems*, 300:112219, 2024.
- [3] Jakub Kościotek. Enhancing live commentary generation in soccer video games through event prediction with machine learning methods, June 2024.