AiCommentator: A Multimodal Conversational Agent for Embedded Visualization in Football Viewing

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Abstract

Traditionally, sports commentators provide viewers with diverse information, encompassing in-game developments and seasonal performances. Yet young football viewers increasingly use mobile devices for deeper insights during football matches. Such insights into players on the pitch and performance statistics support viewers' understanding of game stakes, creating a more engaging viewing experience. Inspired by commentators' traditional roles and to incorporate information into a single platform, we developed AiCommentator, a Multimodal Conversational Agent (MCA) for embedded visualization and conversational interactions in football broadcast video. AiCommentator integrates embedded visualization with an automated non-interactive or responsive interactive commentary mode. Our system builds upon multimodal techniques, integrating Computer Vision (CV), Deep Learning (DL), and Large Language Models (LLM), to demonstrate ways for designing tailored, interactive sports-viewing content. AiCommentator's event system infers game states based on a multi-object tracking algorithm and computer vision backend, facilitating automated responsive commentary. We address three key topics: evaluating young adults' satisfaction and immersion across the two viewing modes, enhancing viewer understanding of in-game events and players on the pitch, and devising methods to present this information in a usable manner. In a mixed-method evaluation (n=16) of AiCommentator, we found that the participants appreciated aspects of both system modes but preferred the interactive mode, expressing a higher degree of engagement and satisfaction.

Research questions

1. Which mode of AiCommentator, non-interactive or interactive, offers the user a higher level of engagement and satisfaction?

2. How can the two alternative modes of AiCommentator, non-interactive and interactive, support young adult viewers' knowledge of players on the pitch and their performance?

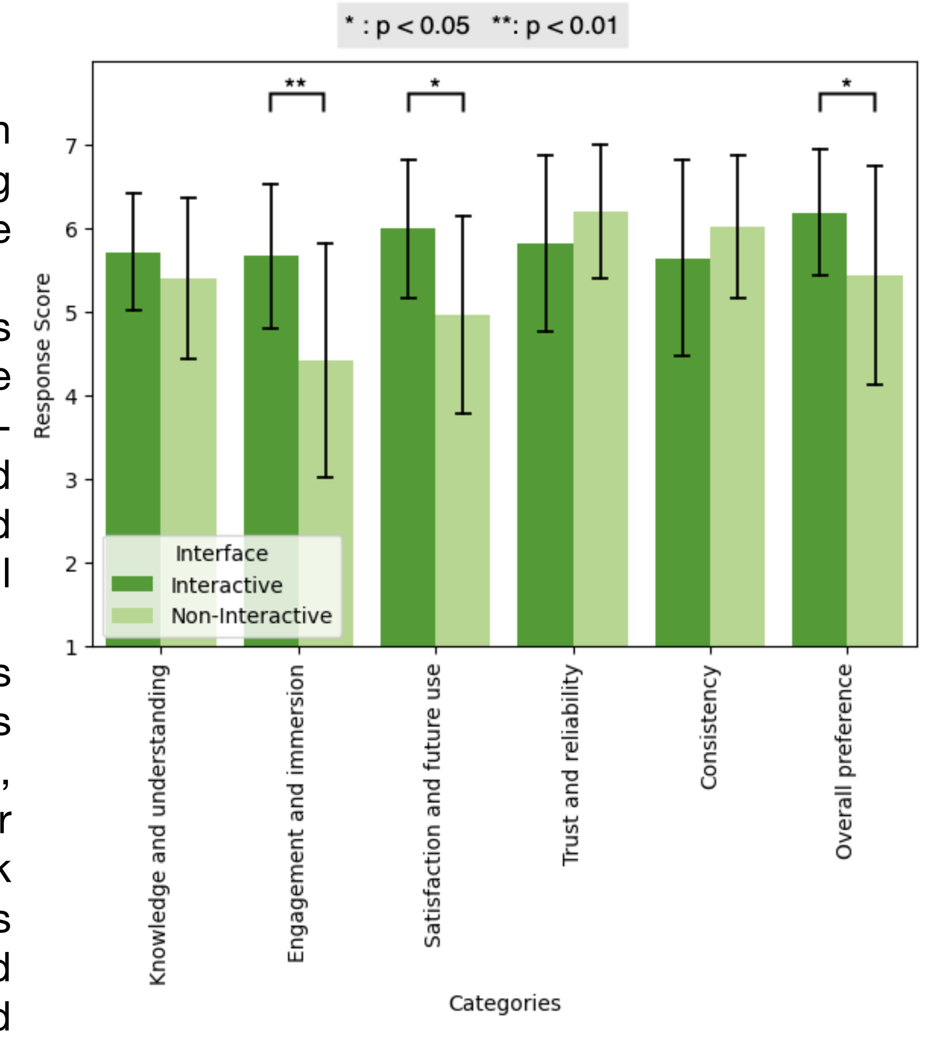
3. How do young adults perceive the usability of the interactive mode of AiCommentator?

Results

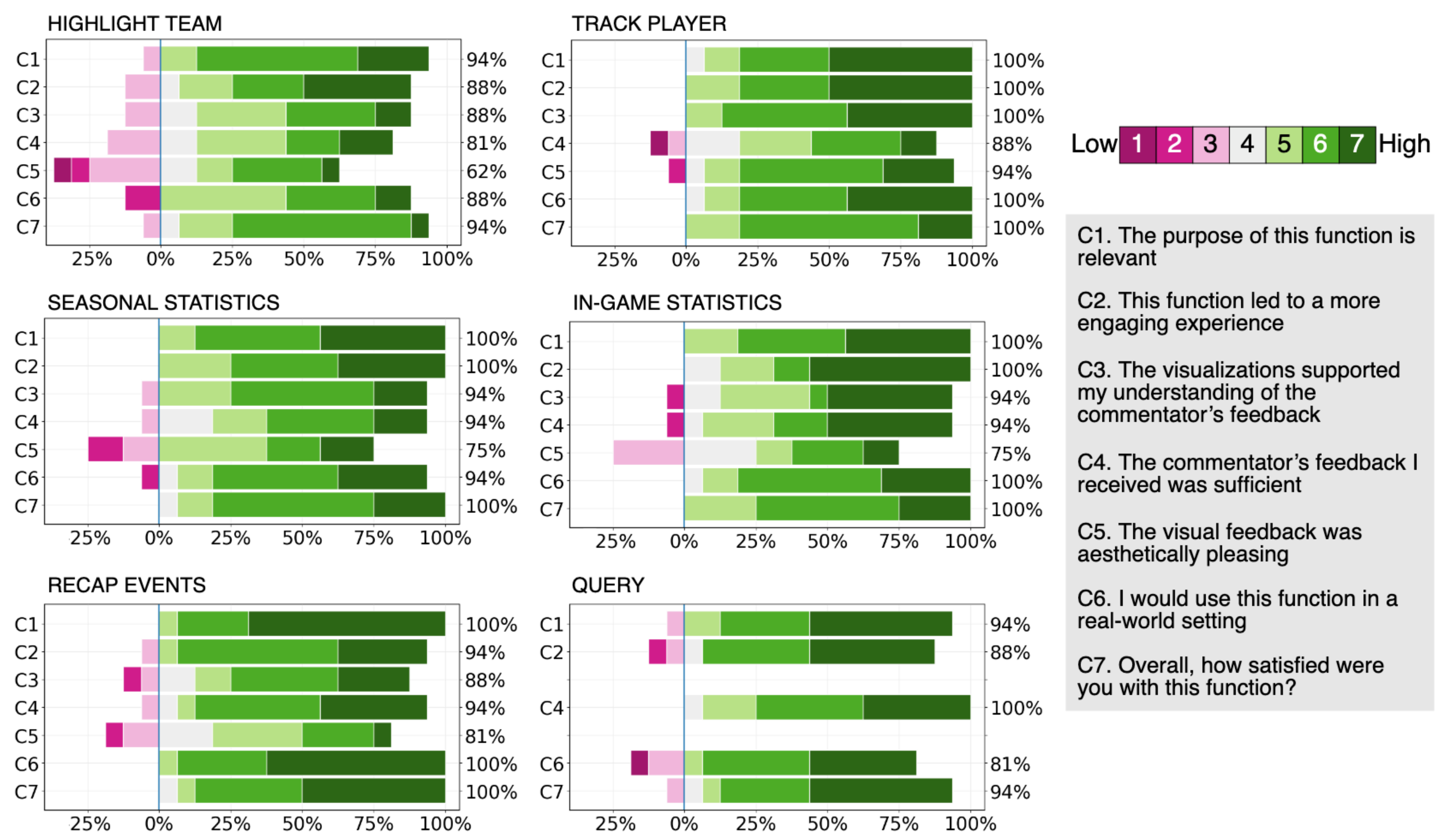
The study followed a within-group design (AB), with all participants (n=16) engaging in interactive and non-interactive sessions.

Paired T-tests between the two modes revealed that the interactive mode significantly outperformed the non-interactive mode in "Engagement and immersion" (p=.008), "Satisfaction and future use" (p=.011), and "Overall preference" (p=.041).

System evaluation questionnaires indicated the interactive system was superior in information presentation, content delivery, and clarifying player performance. Qualitative feedback supports these findings, with participants stating the combination of embedded visualizations with commentary enriched their understanding of teams and players, deepening their knowledge about individual players' performance.



The interactive mode received a mean SUS score of 70.52, which is considered "GOOD". Participants rated various interactive functions on a 1-7 scale, with 4 being neutral. While C3 and C5 were excluded from the "Query" function, most functions received a positive rating of five or above. "Highlight Team" had the lowest rating, whereas "Track Player" was the highest-rated function.



Conclusion

Our work provides a foundational analysis of both non-interactive and interactive MCA for sports commentary, setting a benchmark in the domain and highlighting areas for advancement. Our AiCommentator prototype uses cutting-edge CV, DL, and LLM to introduce two innovative commentary styles, interactive and non-interactive, revolutionizing traditional sports commentary. Users can engage through natural language or menu-driven options via a Discord bot, blending AI commentary with synchronized multimodal feedback known as "italicizing." In our assessment, AiCommentator's interactive mode was preferred by participants, offering a more engaging experience with high satisfaction. Qualitative and quantitative feedback supported our design approach, with some participants expressing a desire for such a system and others suggesting a potential hybrid model. Future studies should focus on personalization and making embedded visualizations more adaptable. Our work will benefit sports broadcasters, analysts, and academic researchers.

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