Title: KickSense: A Specialized Computer Vision System for Soccer Biomechanics Analysis

Name: Angela Li

Introduction and Background: Soccer is played by over 265 million people worldwide, yet advanced training remains inaccessible to many. Inspired by talented underdog nations in the 2026 FIFA World Cup, I created KickSense to make professional-level soccer analysis more affordable and accessible.

Innovation: KickSense is an affordable AI-assisted computer vision system using OpenCV and MediaPipe to analyze soccer shooting biomechanics. It uses an ordinary camera and tracks 33 body landmarks, measuring factors such as knee angles, torso lean, plant-foot placement, and impact point. Each shot is compared against a preset baseline to generate targeted feedback.

Procedure: Development began by collecting over 100 accurate shots to establish a reference dataset. I then developed body and ball tracking, followed by contact and follow-through detection. Biomechanical measurements were compiled into a preset baseline used to evaluate new shots and generate feedback. Finally, all components were integrated into a live-recording system and refined for accuracy and reliability.

Preliminary Results: Initial testing showed promising performance, with the prototype successfully completing analyses and producing specific feedback after recorded attempts. Performance was strongest with a clear side view and stable lighting, while motion blur and partial body obstruction were the primary sources of tracking error.

Conclusion: KickSense will make advanced soccer training both accessible and affordable.

References

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