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TheTeqBoxer : BOXING TECHNIQUE ANALYSIS SYSTEM WITH POSE ESTIMATIONS AND DEEP NEURAL NETWORKS

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Abstract

The world of technology is growing rapidly. Artificial intelligence (AI) is a revolutionary technology that has significantly advanced data analytics in a variety of industries, including sports science. Because of its capacity to manage complicated and time-consuming analytical operations, Machine Learning (ML) and Computer Vision algorithms have grown to favor evaluating and analyzing data. However, the use of these trending technologies in the sport of boxing, especially in evaluating punching techniques in boxing, remains relatively unexplored. The aim of this research is to investigate the effectiveness of using Convolutional Neural Networks (CNNs) and posture estimation models in analyzing boxing approaches.

Using CNNs and posture estimation methods, the research overcomes the lack of extensive datasets to analyze the punching techniques in boxing. To address this problem, a new dataset was created. The proposed approach employs CNNs for real-time pose estimation, allowing boxers to analyze and adapt their techniques on their own without the need for a physical trainer. Furthermore, coaches also can use the system to identify and rectify technical flaws, therefore improving the effectiveness of their training techniques.

It is important to note that most existing boxing models are mostly involved in evaluating punch power and other kinetic characteristics, therefore the proposed boxing technique analysis approach represents a significant advancement for the sport. However, there are certain things that might be improved. Improving the system's capacity to handle low-quality footage would be helpful, as lower-tier boxers may lack access to high-quality camera equipment. Furthermore, developing software that can evaluate complicated scenarios with several actors would be a game changer. Future studies might involve broadening the area of analysis to include other aspects of boxing, such as other punching and defensive skills, and exploring its use in other sports.

Overall, this research project contributes towards the developing field of analytics automation in sports, especially in analyzing punching techniques in boxing. The findings demonstrate the potential upside of CNNs and posture estimation methods for improving training and performance evaluation in sports. With additional developments and modifications, the analytical system has the potential to change sports training and performance evaluation across multiple fields.

Keywords: Boxing Technique Analysis, Jab, Deep Neural Networks, Convolutional Neural Networks, Artificial Intelligence, Pose Estimation, Machine Learning, Computer Vision.