

MOAR: Analyzing the movement of swimmers using an Artificial Intelligence

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ABSTRACT

In recent years, swimming has become increasingly popular in Saudi Arabia, especially in coastal areas. Dedicated swimming pools and sports centers have been established, and national teams and athletic clubs now represent the kingdom in local and international tournaments. To further improve swimming practices, a system has been developed to assist swimmers in accurately performing their exercises. This system uses computer vision and machine learning technology to assess the correctness of swimming techniques by recording and analyzing swimming exercises. We made an important decision when selecting the model for our analysis of swimmer technique movement. After careful consideration, we decided to use the YOLOv8 architecture because it has multiple features, such as improved accuracy, improved speed, and adaptive training. We have tried some different types of object detection models such as YOLOv5 and Mediapipe to detect swimming techniques and identify incorrect movements. The YOLOv8 model achieved an impressive accuracy of 97.8% in detecting swimming techniques and identifying incorrect movements.

OBJECTIVES



Optimize user experience by saving time and effort



Motivate swimmers to deepen their commitment to their swimming workouts



Share exercise analysis findings with users.

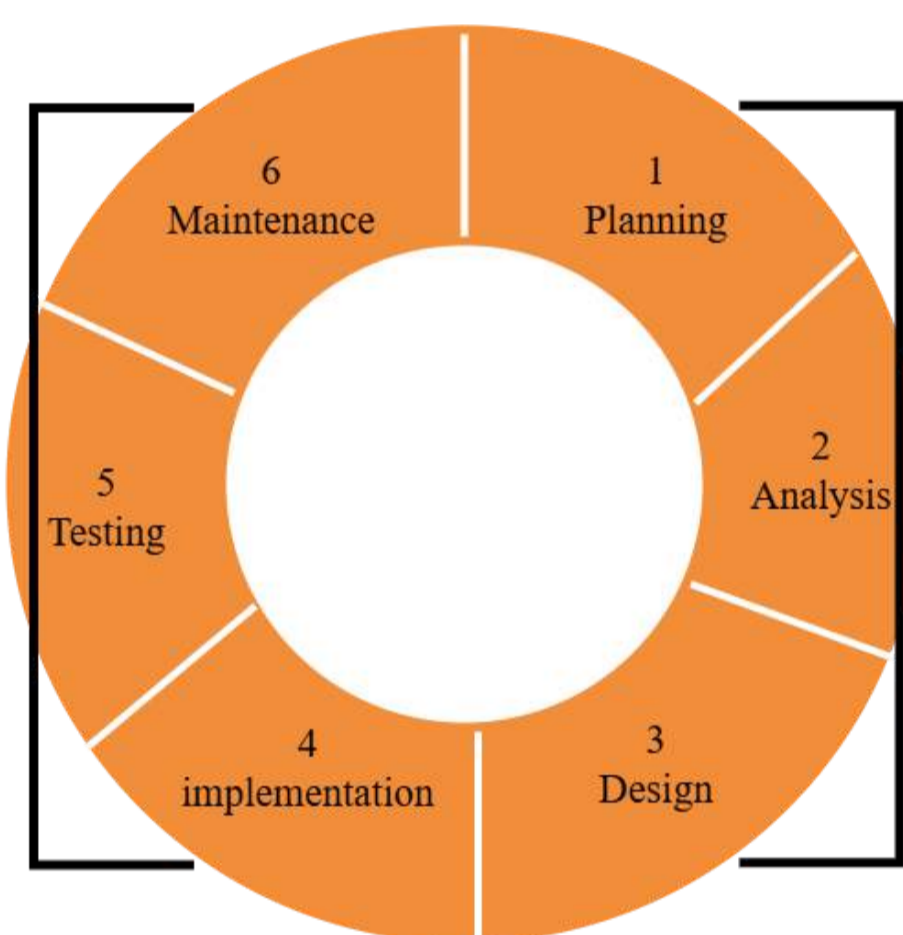


Guide swimmers for precise exercise execution

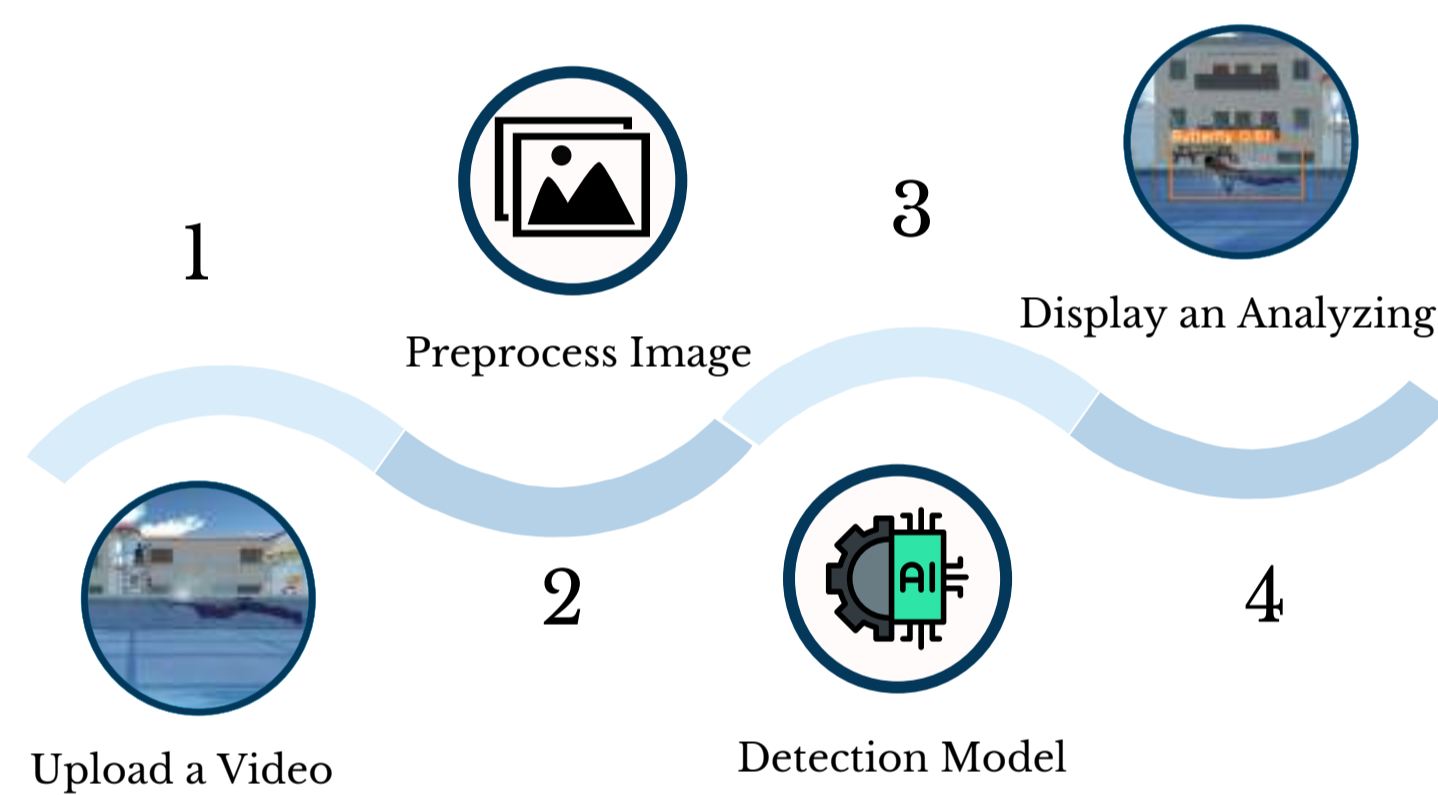
TOOLS



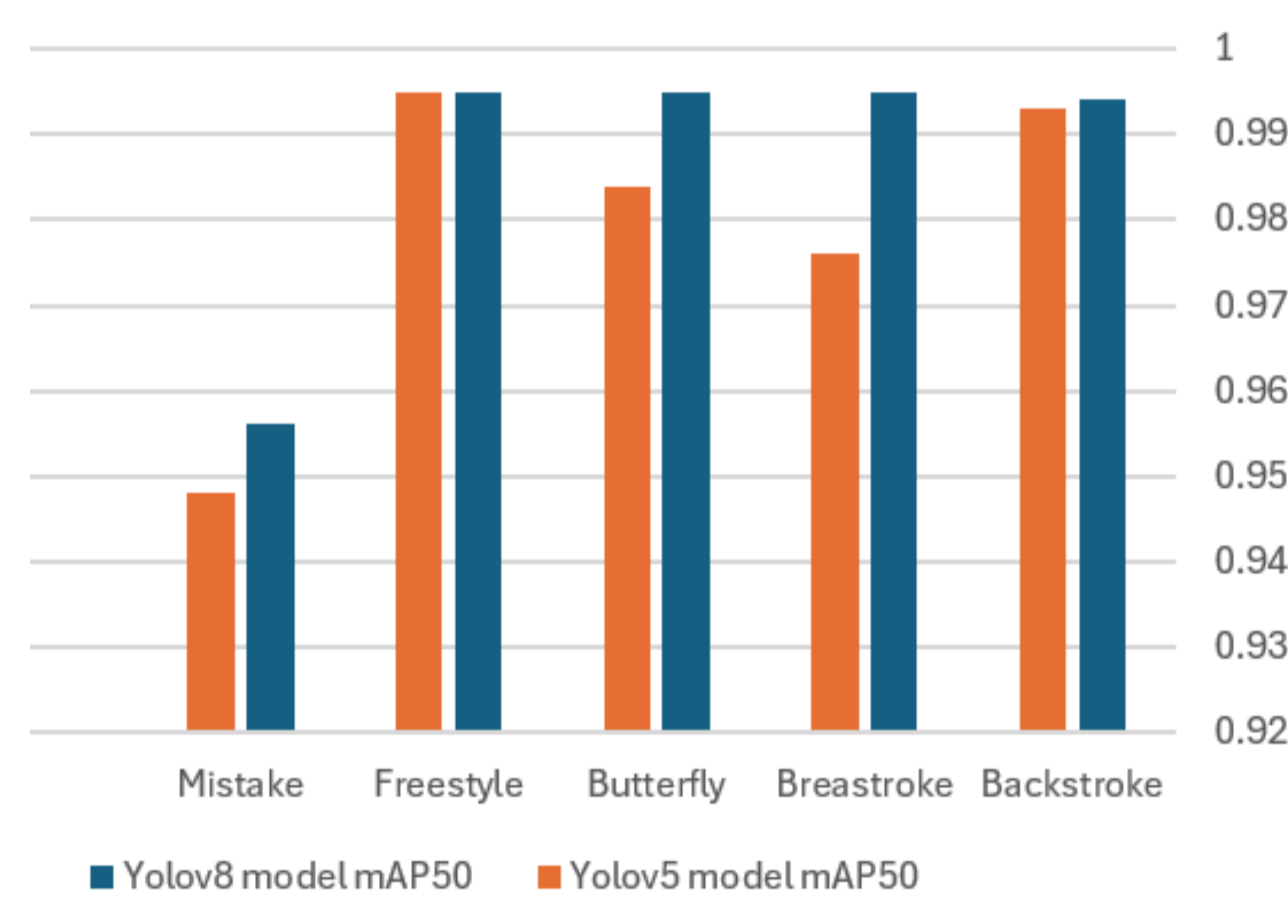
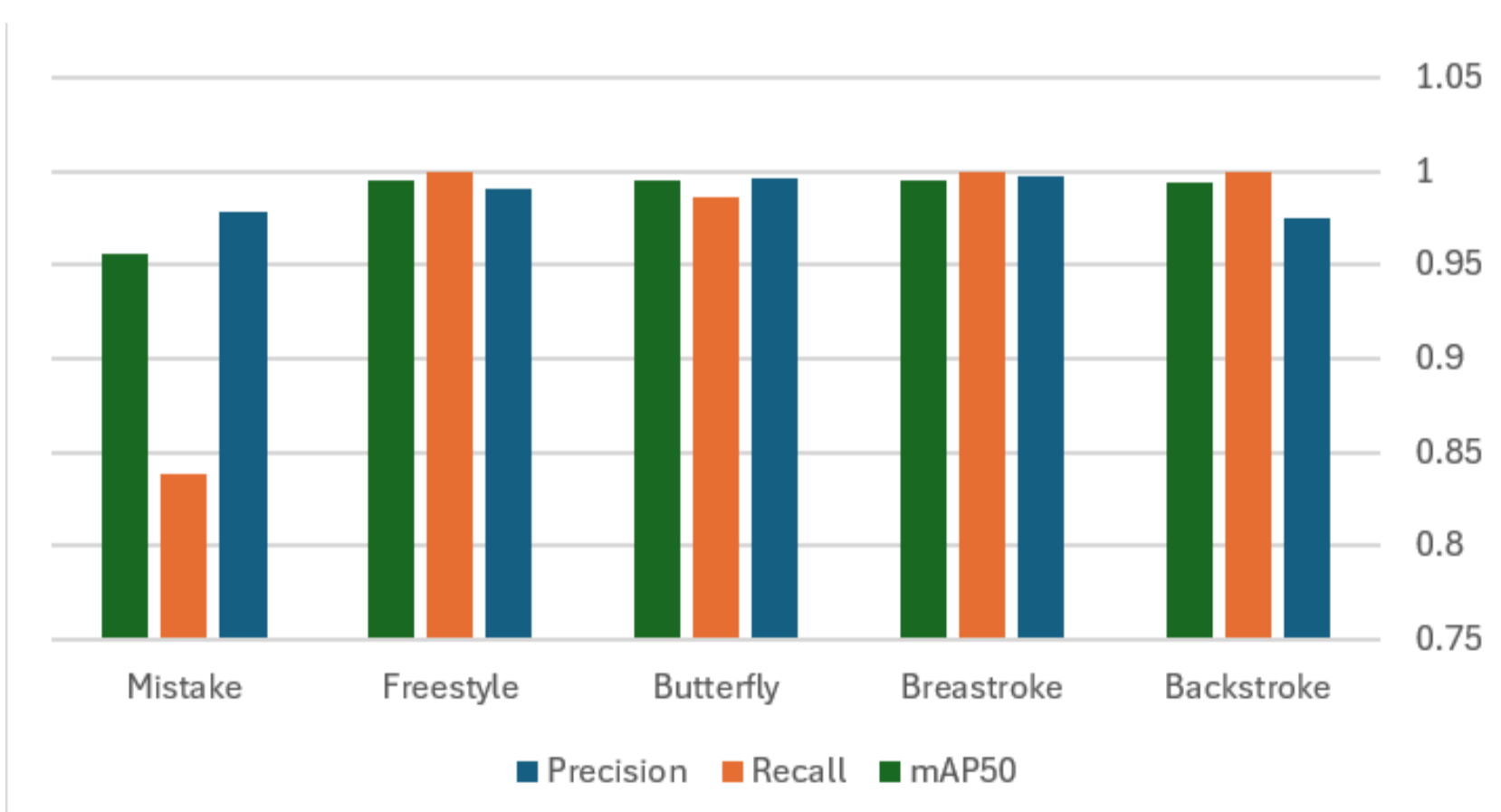
METHODOLOGY



HOW MOAR WORK



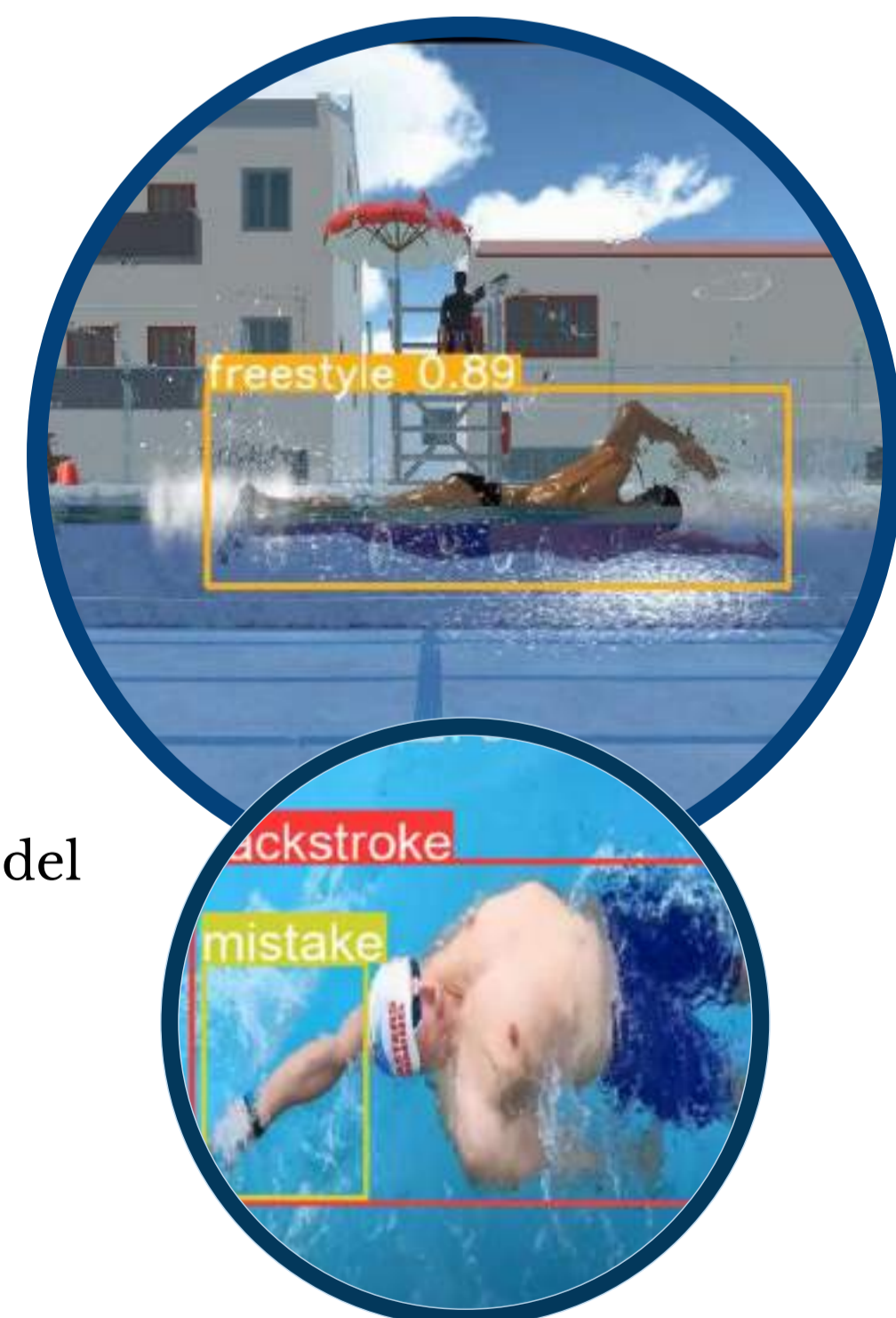
RESULTS



• Precision, Recall, and Mean Average Precision 50 (mAP50) for each class

• Mean Average Precision 50 (mAP50) for each model

our YOLOv8 model the best in the accuracy and interface time, with achieved a mAP of 0.987 and 7.8 ms of interface time



FUTURE WORK

- implementing real-time analysis of swimmers' movements
- detecting suspicious activities related to drowning
- educational videos for correct swimming techniques.

CONCLUSION

This project presents a system for analyzing swimmer movement, using computer vision and deep learning techniques. The system, developed using the YOLOv8 algorithm and object detection algorithms, succeeded with 97.8% accuracy in detecting swimming techniques and identifying incorrect movements, which is crucial for developing swim training technology and shaping the future of swimming in line with Vision 2030.

CONTACT

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