GNYACSM Abstract

Segment Anything Model (SAM) and Teachable Machine may be useful tools for Identifying Risky Tackle Biomechanics in Still Shot Images of American Football Tackle.

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ABSTRACT

Teachable Machine (TM) is a web-based tool from google that makes creating machine learning models fast, easy, and accessible to everyone. **PURPOSE**: To explore novel AI-based approaches using the Segment Anything Model (SAM) and Teachable Machine to classify still images for identification of tackles with good versus risky biomechanics. SAM provided by Meta AI is a prompt-able, image segmentation system with zero-shot generalization to unfamiliar objects, without the need for additional training. This technology may be a useful tool for identifying and categorizing bad (risky, head down) tackles in screenshot images of American football tackle videos taken when players contacted the dummy. **METHODS**: Twenty-two, still shot images taken at contact were previously rated as either good or bad by an experienced rater. These images were masked using segmentation from the SAM roboflow then code was developed within the Google® teachable AI platform. TM was trained to classify single shot tackle images as “Good” (torso near 45 and no head contact) or “bad” (risky). 100 still shot images taken from tackle drill videos were entered into teachable machine to see how TM classified each image. **RESULTS**: The Segment Anything Model (SAM) using manual bounding boxes on 100 images the model was able to correctly identify isolated objects within the images 92 times out of 100. TM was trained on 22 sample images, 10 good and 12 bad example images. TM was not as successful, as it scored 94 images as bad/risky and only scored 6 images less than 80% bad, it incorrectly classified 13 good tackles in the bad category. **CONCLUSION**: The results of this project indicate the effectiveness of object recognition using SAM with the provided dataset. Results need to be replicated in larger sample sizes. The SAM model could be a useful tool for accurately distinguishing players from objects within select still shots of an action frame. These promising results show that segmented images could be useful in recognizing player contact. Effectiveness of the Teachable Machine was limited by the small sample size of the training images and a complex array of still shot anomalies such as masking teammates, different camera angles and poor resolution of some of the images. Future projects should focus on the application of pose estimation features within the TM platform.