The Relationship between Human Pose and Intention to Fire a Handgun

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Abstract : Gun violence is a significant problem in modern-day society. Early detection of carried handguns through closed-circuit television (CCTV) can aid in preventing potential gun violence. However, CCTV operators have a limited attention span. Machine learning approaches to automating the detection of dangerous gun carriers provide a way to aid CCTV operators in identifying these individuals. This study provides insight into the relationship between human key points extracted using human pose estimation (HPE) and their intention to fire a weapon. We examine the feature importance of each keypoint and their correlations. We use principal component analysis (PCA) to reduce the feature space and optimize detection. Finally, we run a set of classifiers to determine what form of classifier performs well on this data. We find that hips, shoulders, and knees tend to be crucial aspects of the human pose when making these predictions. Furthermore, the horizontal position plays a larger role than the vertical position. Of the 66 key points, nine principal components could be used to make nonlinear classifications with 86% accuracy. Furthermore, linear classifications could be done with 85% accuracy, showing that there is a degree of linearity in the data.

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