Supplementary Materials

Time-weighted motion history image for human activity classification in sports

Sports Engineering

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1 Additional Experiment

We conducted an additional experiment to demonstrate the effects of individual differences in movement in sports. We trained the network model with the players data of the three of four players and test with the remaining one player data on the tennis dataset. We experimented with all combinations of players and calculated the average of the estimation accuracy as the final accuracy.

We show the result in Table 1. In this case, although the amount of training data is more than three times larger than when training and testing using individual player data, the prediction accuracy when training with the three players' data is lower. This result shows that individual differences in movement affect network learning in the field of sports.

Table 1: The results of quantitative comparison of the estimation accuracies between the model training with only individual player data and test with the same player data, and training with group player data and test with another player data.

Method		VGG16 +MHI	Ours (w / heuristic TW-MHI)	Ours (w / auto-generated TW-MHI)
Accuracy (%)	Individual	**89.78**	**91.37**	**90.49**
	Group	82.54	79.94	80.79

Comparison auto-generated temporal importance functions. We compare the auto-generated temporal importance functions for each player to see the difference between each player. We show all auto-generated temporal importance functions in Fig. 1. Player 1 and 2 have similar tendencies, while Player 3 and 4 present unique shapes. We believe that these different shapes of temporal importance functions demonstrate the individual differences in the movements of each player. What functions have in common is that they have higher importance weights at 4-10 frames before the impact timing (excluding 10 frames before the impact timing of Player3). This result matches the timing to which participants pay attention in Section **??**.

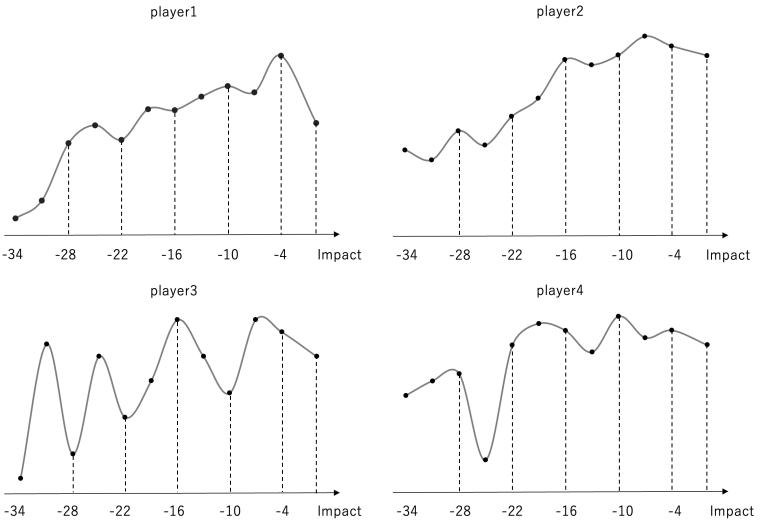

Fig. 1: Auto-generated temporal importance function of each player.