Information Dynamics in Judo

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Abstract:

**Purpose**

The main purpose of this study is to analyze games in the All Japan Judo Championship, held at Nippon Budo-Kan on April 29, 2013, based on information dynamics (Iida et al., Entertainment Computing 2012).

**Method of Analyses**

Fig. 1 illustrates the result of the present analyses on the second game of semi-final in All Japan Judo Championship, Harasawa (winner) vs. Kakita (loser), where the abscissa is normalized game length \( \eta \) or time, while the ordinate is the certainty of game outcome \( \hat{\xi} \). The game history is as follows; \( t=1.25 \) minute, Harasawa is called ‘Shido’, \( t=1.50 \) minute, Kakita gets ‘Wazaari’, \( t=3.18 \) minute, Kakita is called ‘Shido’, and \( t=5.02 \) minute, Harasawa gets ‘Ippon’. The advantage is evaluated in such a way that ‘Shido’ is -0.25, ‘Yuko’ is 0.5, ‘Wazaari’ is 0.75, and ‘Ippon’ is 1.0. Then, certainty of game outcome \( \hat{\xi} \) is derived by \( \hat{\xi} = |\alpha| \) (for \( 0 < \eta < 1 \)), but \( \hat{\xi} = 1 \) (for \( \eta = 1 \)), where \( \alpha \) is the normalized advantage. Sign of the advantage is defined as positive for the winner, while it is negative for the loser.

The information dynamic model \( \hat{\xi} = \eta^m \), where \( \hat{\xi} \) is certainty of game outcome, \( \eta \) the normalized game length, and ‘m’ the positive real number, has been used for interpreting the game. The value of ‘m’ denotes the both players’ strength, strength difference between the two players, game rules and so on. In this figure, three model curves with \( m=2, 3, \) and \( 4 \), respectively, are drawn to model the game, Harasawa vs. Kakita. It may be clear that among the three curves the best fit curve to the game is \( \hat{\xi} = \eta^3 \), with which one can obtain the information velocity, acceleration, or energy for the further discussion.

![Fig.1 The second game of semi-final in All Japan Judo Championship 2013](image)

**Conclusions**

1. Games in All Japan Judo Championship have been analyzed with information dynamic model successfully.
2. It is realized that the proposed method of analyses is quite convenient for interpreting any judo game, and so supervisor as well as players can use the results for improving their performance.