GATHERING OF KINEMATIC DATA OF SPORT EVENT BY TELEVISING THE WHOLE PITCH AND TRACK

Wlodzimier S. Erdmann

Department of Biomechanics, Academy of Physical Education,
Gdansk, Poland

INTRODUCTION

Analysis of a sport event for many years has been based on "observation sheets" filled in during the match. Film was used only for analyses of short events. In the 1980's modern ways of movement's analysis were developed. They were performed with the help of video recordings.

For soccer match analysis Defour (1991) and Hughes (1991) used special tablets with drawn in pitch and with drawn in keys labeled with palyers' numbers and technical actions. By monitoring video picture every situation joined with the ball's movement and players engaged were placed in the tablet with the help of pen-like rod. The tablet was connected to the computer so the kind and the number of actions and spots where they were performed were stored in the computer's memory.

Ohashi (1991) applicated for observation of one player two tv cameras placed on potentiometers which measured angles of their rotation. During the whole match cameras were pointed at one player. Computer analysed position of the player from angle data and then calculated his displacement and velocity.

TELEVISING OF THE WHOLE STADIUM'S FIELD

The aim of the registration of the whole stadium's field was receiving an information on: a) every object moving in the pitch (palyers, ball, referee) or track (runners), b) during every instance of time, c) in every place of the pitch or track.

In order to meet the demands of such registration, it was necessary to place the tv camera high above the stadium's field and in some distance of it. Camera was equipped with a wide-angle (130") lens (half-fish-eye) and was not allowed to move during the whole televising process - Fig. 1

For competitor's displacement during a game side lines of the pitch played a role of a reference system - Fig. 2. Half-fish-eye lens gave irregular shape of the pitch on the monitor's screen, so the white tape was put before the event in a position of every 1 m as longitudinal as transversal to the pitch. Every position of the tape was then transferred from tv monitor on to the transparent foil so the reference grid was obtained. On other foil the position of the competitor's were marked. By matching two foils their displacement (Fig. 3) was calculated and then their velocity and acceleration.

APPLICATION IN SPORT GAMES

Erdmann and Czerwinski (1989) presented application of the described method in the team hand ball. During the whole match (2x30 min) a wing player covered the distance of about

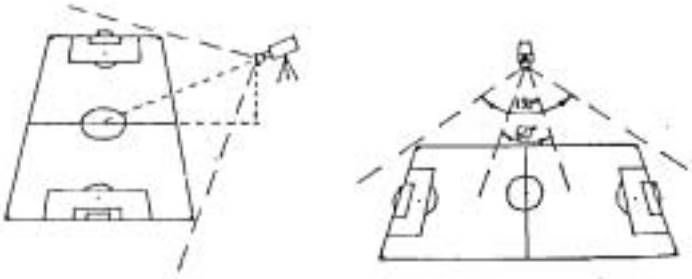

Figure 1 - Placing of the camera with wide-angle lens.

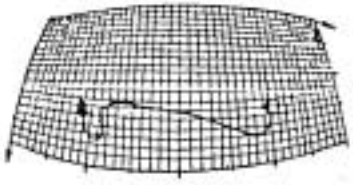

Figure 2 - Side lines as a reference system.

Figure 3 - A grid of lines matched with a displacement of a player.

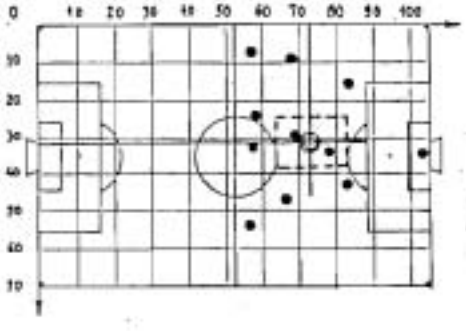

Figure 4 - Team point of position.

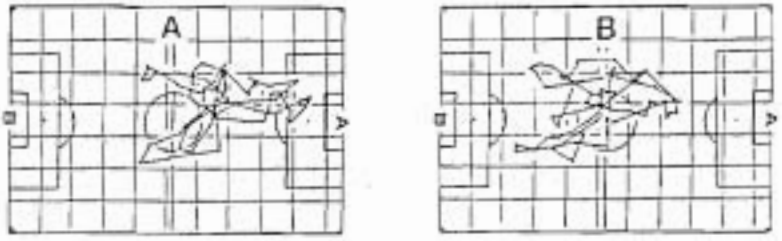

Figure 5 - Displacement of the team point of position of the team A and B in 5 minutes.

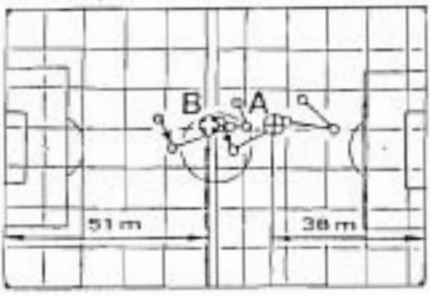

Figure 6 - Mean positions for every minute and for five minutes for the teams A and B.

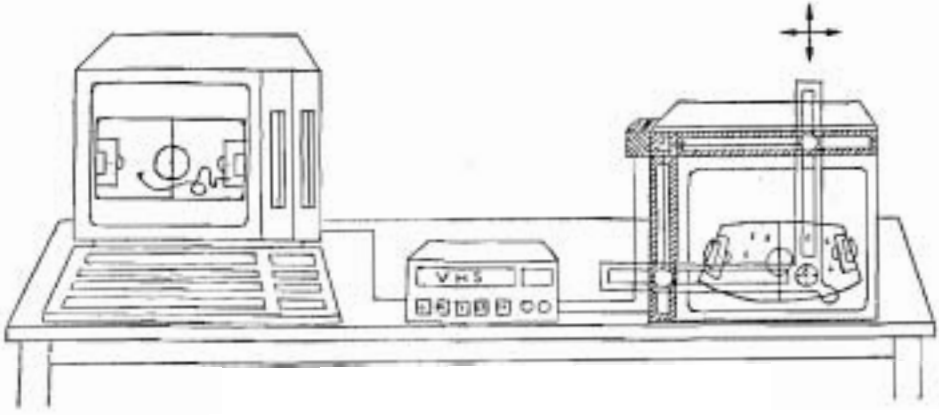

Figure 7 - Computerised desk top notational analysis.

4.5 Km using walking, jogging, medium and fast running. Because during a game many standings existed, though mean velocity equaled about 1.5 m/s for longer periods of the match.

Erdmann (1991) introduced the method to the soccer match analysis. During the first 5 min. of the match a striking (left wing) player run 741 m with a mean velocity of 2.5 m/s and maximal velocity of 7.8 m/s. For the analysis of kinematic quantities for the group of players isochrons, i.e. lines connecting positions of players at the same time were used. For describing a position of the whole team on the pitch, a mean value and its standard deviation of every team member's position (team point of position) were used - Fig. 4. The mean point of position of the whole team A moved 404 m, while of the whole team B it moved 426 m. Team A attacket twice on the wings (Fig. 5A), while team B attacked twice through the center of the pitch (Fig. 5B). During the first 5 min. of the match team A was 38 m from its own goal (mean value), and team B was 51 m from its own goal (Fig. 6). There were also similar mean velocities, i.e. 1.3 m/s for team A and 1.4 m/s for team B. The maximal velocities were 3.5 znd 4.2 m/s respectively. The score for the first 5 min. of the match was 1:0 for team

APPLICATION IN TRACK AND FIELD

The method described here can also be used for the track and field competitions. For example, for running events positions of hurdles for 400 m distance can serve as a reference system. In this way tactic of running of mid-and long-distance races can be described.

COMPUTERIZED DATA PROCESSING

In order to speed-up the analysis the computerized data processing was developed (Dargiewicz 1992). Special set of sliders was put over the video monitor - Fig. 7. The set was equipped with a coursor. With the help of the coursor one could follow a change of position of a competitor. Coursor was connected to the rotating mechanism of computer's pointing device - mouse. Every shifting of an arm along X and Y axis caused proper number of impulses to the pc-class computer. Special software developed enabled obtaining of all kinematic data.

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