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DEVELOPMENT OF SOFTWARE FOR ANALYZING STEP LENGTH COURSES IN SPRINT DASH WITH THE USE OF THE LASER VELOCITY MEASURING DEVICE AND DIGITAL VIDEO CAMERA

Hirofumi Kintaka[1] , Yoshihisa Urita[1], Michiyoshi Ae[2]

[1]Coaching Sciences of Sports and Budo, National Institute of Fitness and Sports in Kanoya, Kanoya, Japan
[2]Faculty of Health and Sport Sciences, University of Tsukuba, Tsukuba, Japan

We have developed software (sprint-performance analyzer: SPA) for estimating step length courses in sprint dash with the use of the laser velocity measuring device and digital video camera. It gives a quick feedback to coaches and athletes and helps to evaluate performance of athletes. In this research, we compared time of analyzing by the SPA with that not utilizing the software. In addition, step length courses estimated in this measuring method were reexamined. A statistical analysis was done between estimated step length (ESL) by SPA and actual step length (ASL) by using Two-dimensional motion analysis method. Time of analyzing by SPA was 10 minutes/trial, which was shorter than 50 minutes/trial of that not utilizing the software. There were very small differences (Δd) between the filtered ESL and the filtered ASL at respective trials (Δd=0.00-0.04m).

KEY WORDS: times of analyzing, estimated step length (ESL), actual step length (ASL)

INTRODUCTION: Recently, the laser velocity measuring device is widely used in applied research to measure velocities of sprint running and approach running of long jump and so on (Korean Society of Sport Biomechanics, 2013). As a strong point in this method, it gives a quick feedback to athletes and coach. The other hand, as insufficient point, it couldn't given feedback of step length courses. Therefore, we developed the estimation of step length courses in sprint dash with the use of the laser velocity measuring device and digital video camera (Kintaka et al.,2004). The measuring system and the procedure of estimating the step length courses in sprint dash were presented in Figure 1. However, time of analyzing in this method was over 50 minutes/trial and it gave a late feedback to athletes and coach.
For a solution to a problem, we have developed software (sprint-performance analyzer: SPA) for estimating step length courses in sprint dash with the use of the laser velocity measuring device and digital video camera. In this research, we compared time of analyzing by the SPA with one not utilizing the software. In addition, step length courses estimated in this measuring method were reexamined.

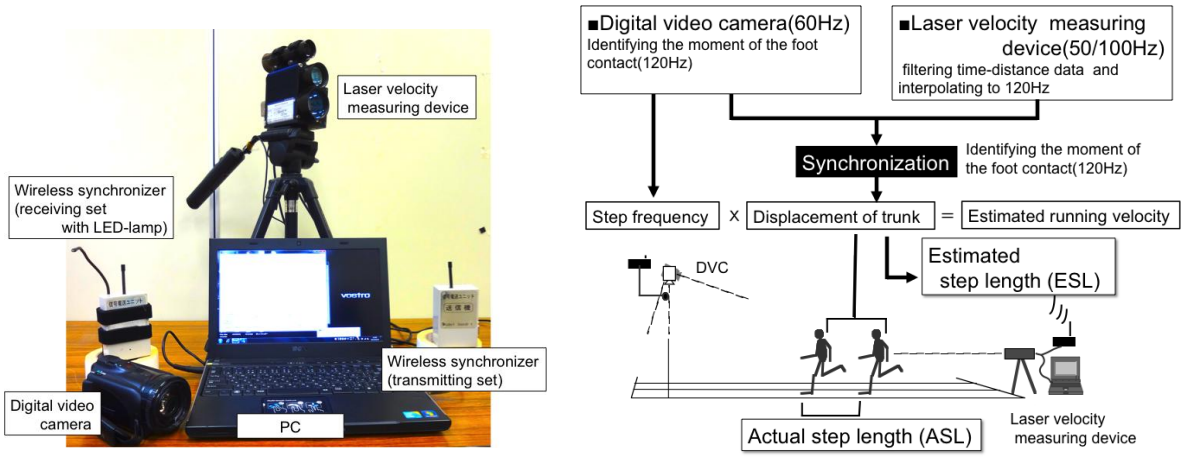

Figure 1: Measuring system with the use of the laser velocity measuring device and digital video camera (L) and the procedure of estimating the step length courses in sprint running (R)

METHODS:

Outline of software (SPA):SPA could run on Windows 7 (Microsoft). SPA was developed in partnership with DKH Co., Ltd. SPA was consisted of three pages. On the first page, time-distance data from laser velocity measuring device could be adjusted by filtering or interpolating process (Figure 2-A). On the second page, the digital video data and time-distance data could be synchronized by the timeline. In addition, the moment of the foot contact could be identified from the picture on digital video data (Figure 2-B). On the third page, courses of step frequency, step length and step velocity could be shown. Those data was filtered by 3-point moving average (Figure 2-C). Data on each page could be exported to a spreadsheet.

Comparison of analyzing time and reexamination : We compared time of analyzing by the SPA with that not utilizing the software. Nineteen male college students participated in this study. All subjects train of their specialty on a routine basis. Each subject was fully informed of the procedures to be used as well as the purpose of the study and gave informed consent. The subject performed 60-m sprint running from a standing position on an all weather track. The time-velocity courses were measured using laser velocity measuring device (LDM301, JYNOTIK Co., Ltd.). A statistical analysis was done between estimated step length (ESL) by SPA and actual step length (ASL) by using Two-dimensional motion analysis method.

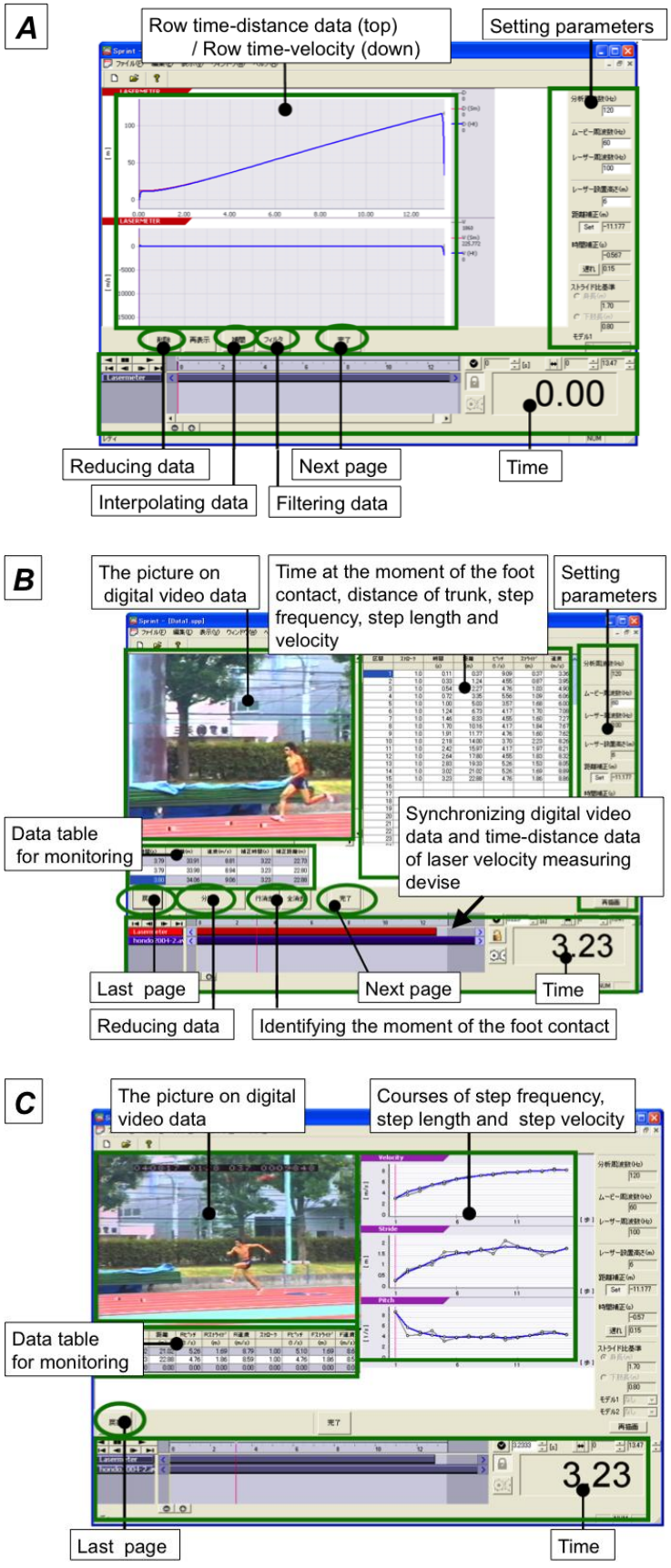

Figure 2: Outline of SPA

A: Filtering or interpolating page

B: Synchronizing and identifying page

C: Result page

RESULTS and DISCUSSION: A time of analyzing by SPA was 10 minutes/trial, which was shorter than 50 minutes/trial that not utilizing the software. It gives a quick feedback to coaches and athletes and helps to evaluate performance of athletes.
Through the statistical analysis (Figure 3), there were large differences (Δ d) between the row ESL and row ASL (Δd=0.05-0.20m). The other side, there were very small differences (Δd) between the filtered ESL and the filtered ASL (Δd=0.00-0.04m). Those results were smaller than that of our previous study (Kintaka et al, 2004). It was considered that the filtered ESL by SPA was very similar to the filtered ASL. Consequently, APA was accepted as very utility software.

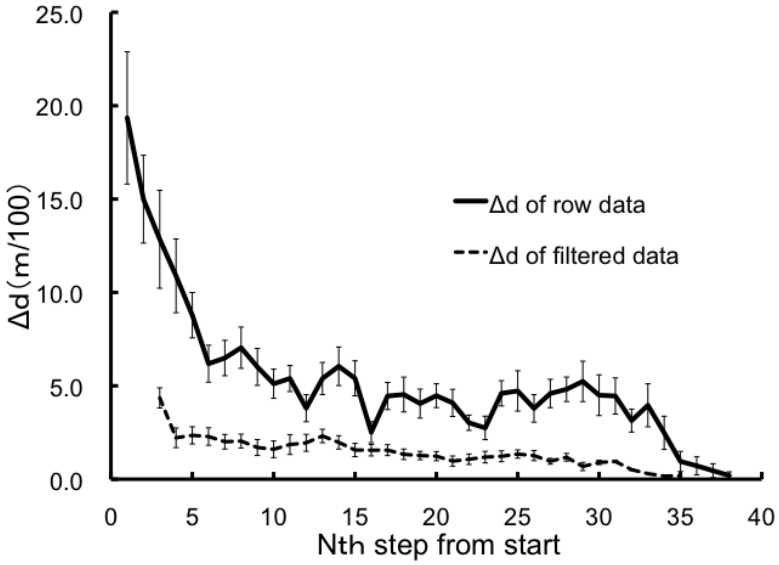

Figure 3: Differences (Δd) between the ESL and the ASL

CONCLUSION: In this research, we compared time of analyzing by the SPA with that not utilizing the software. In addition, step length courses estimated in this measuring method were reexamined. As a result, SPA was accepted as very utility software. For example of using with SPA, we had presented that the mode of step length courses during acceleration phase in sprint dash for the schoolchild and sprinters (Figure 4).

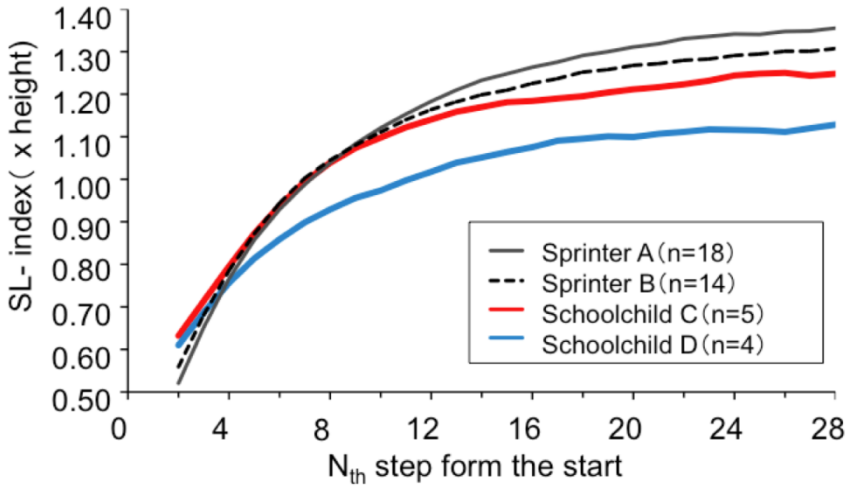

Figure 4: The mode of step length courses during acceleration phase in sprint dash for the schoolchild and sprinters (kintaka et al.,2013)

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