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INTRODUCTION

Performance analysis, as related to sport, can be defined as the analysis of data or information to help in the acceleration of athlete performance. The identification of performance indicators, repeatable methods for collection of data and the manner in which the information is analyzed, are all key factors to a successful performance analysis.

This poster will describe and discuss:

- 1) Methods for collection of performance data on athletes
- 2) Implementation of technologies
- 3) Extraction and analysis of data
- 4) Centre for Video and Performance Analysis (CVPA)

DATA COLLECTION

Information can be collected with regards to athlete performance using many different technologies. Video is a technology that is becoming commonplace in the sports world. Video is used to gather information on athlete techniques during training or team play during competition. The video camera is also known as a "camcorder" and is defined as a portable device capable of recording video and audio. Figure 1 below shows an image of a typical camcorder available on market. The market is moving towards the offering of "Hi-Definition" (Hi-Def or HDV) as the standard.

Video is collected on the camcorder and is stored either on digital tape or on the memory (hard disk) on the video camera. The storage format will depend on the type of camcorder that coach is using. Video footage can be downloaded to a computer for better viewing and analysis. Computer software that is specifically designed for analysis of sports movements can be used to view and perform analysis of the video. One such software package for analysis of sports is called Dartfish. Figure 2 below shows an image of Dartfish Software.



Figure 1: Image of Hi-Definition video camera that can be used by a coach to collect video of his/her athletes.



Figure 2: Screenshot of Dartfish video analysis software showing video of sprinter being analyzed.

Video provides information related to the movement of the athletes. However, video does not provide information on the forces exerted on or by the athlete. Technologies such as force sensors, pressure sensors and muscular measurement devices can provide insights into the forces that are produced and act on the athlete. Figure 3 below illustrates some examples of how force sensors can be used to measure forces that the athlete is producing during movements.

FORCE PLATFORMS



Figure 3: Examples of force measuring technologies that can be used to measure forces exerted by the athlete.

Other technologies that have been used to measure athlete performance include:

- 1) Accelerometers
- 2) Timing Lights
- 3) Radar Guns
- 4) GPS

These technologies can be used to collect immediate and accurate information related to how an athlete is performing. For example, the accelerometer is a small device that can be attached to a body part or piece of equipment to measure acceleration or velocity. Similar information (velocity) can be obtained by using timing lights, radar guns or GPS technologies. Figure 4 shows examples of these technologies.



Figure 4: Examples of technologies that can be used to measure acceleration, speed and time.

TECHNOLOGY IMPLEMENTATION

The implementation of a technology into sport for use in assessment and improvement of performance is not as trivial as one might think. Many technologies exist; however, technology must provide simple and quick information. If it is too complex and cumbersome to use, there will be immediate failure within the execution and can impact success in the overall program. An example of implementation of technologies might be the setting up of a video and timing system that will collect simultaneous video and performance time information at an indoor training venue. Figure 5 below presents the layout of such a system.

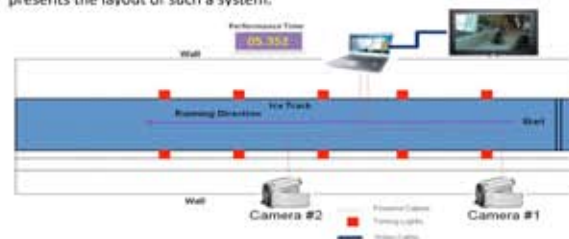


Figure 5: Layout of technology implementation for Bobsleigh/Skeleton.

ANALYSIS OF PERFORMANCE DATA

Once technology has been implemented and data collected on athletes, how is a coach to analyze the performance? The performance criteria (i.e., time, score, speed...) must be collected for every trial that the athlete performs. Then, the coach can look at explanatory variables (i.e., video, force...) to identify key differences between poor and good performances.



Figure 6: Data analysis of starts in Bobsleigh. Performance times and video data is presented.

CENTRE FOR VIDEO AND PERFORMANCE ANALYSIS

EDUCATION

- Professional training on the newest software technologies related to video analysis in sport
- Practicum's (60 Hour), Internships (2 months) and Training Seminars (shorter durations)
- Training provided ranging from simple Videography to Advanced Performance Analysis
- Training on technologies and tools available for web-based distance analysis and virtual coaching
- Performance and Video Analysis seminars to coaches, athletes, high performance directors, MD's and sport administrators

RESEARCH

- A location for the gathering and dissemination of knowledge related to the practical and latest technologies for video analysis and sport
- Development of methods and techniques for the analysis of data related to the enhancement of athlete performance
- Research and development of methods for long distance video analysis related to storage, archiving and retrieval of videos
- Newsletters and publications on new technologies and methods of video and performance analysis in sport

SERVICES

- Video hardware and software system set-ups and on-site training
- Videography services for the collection and storage of videos for events, training and testing sessions
- Performance Analysis services for the analysis of biomechanical and other sport specific data
- Data management services for the coordination of biomechanical and other (e.g., physiological, medical) sport specific data
- Virtual conferencing and virtual training technologies and facilities available