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Analysis of Performance Parameters of Elite and National Level Women 100 meters Sprinters using Dartfish

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Abstract
The 100m sprint is a highly technical event requiring optimal biomechanical efficiency. Understanding the kinematic and kinetic differences between elite and national-level female sprinters can inform coaching strategies and enhance performance. To investigate and compare the biomechanical characteristics of elite and national-level female sprinters during the 100m dash, identifying key factors contributing to superior performance.
1. Participants: 3 elite (sub-11 seconds) and 3 national-level (11-12 seconds) female sprinters.
2. Height, Stride Count, Speed, Split timings (every 10 meters).
This study will contribute to the understanding of female sprint biomechanics, providing valuable insights for coaches, athletes, and researchers. The findings will inform training strategies, enhancing performance and reducing injury risk.

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Keywords: 100 meters sprint, female athletes, performance analysis, Elite athletes.

1. Introduction

The 100m sprint is one of the quickest event that has lot of combinations of activity to be executed within the time of 10 secs to 12 secs approximately. In this event, the participation of women is not limited and they are having huge impact in these sports as well. This event is most technically demanding and physiologically intense events in track and field athletics. Women's sprinting has gained significant attention in recent years, with athletes continually pushing the boundaries of human performance with the help of minor level corrections and formation or strategies they follow. Even though we have lot of improvement and advantages available to make a successful finish in this event, we often face difficulty in accessing those facilities. In that point of view, the advanced training method and sports science could bridge the gap between the elite and national level athletes. There are lot of reasons that are available in this field that the national level athletes could not afford for this kind of facilities in their training and competition time. In this context, we are defining the word athlete for both men and women. Sports is the area, where it is an applied field of both technology and allied disciples. To understand the characteristics of the athletes we are need of clear picture about the anatomy, physiology, and biomechanical movements of them. Using which, we can optimize the performance and enhance the player to do in a correct way where it can lead to success. In this work, we are about to study the relation between the sprint time, stride count and height of the athletes by comparing the national level women athletes with the elite level women athletes to achieve the maximum performance.

2. Method

In this study, we have downloaded videos from YouTube with higher quality that was available. The videos are for both elite and national competitions in Olympic and Indian national 100m women sprinters. We took these top three players to compare the height and their stride count.

Video analysis of the entire event competed by our Elite and National level 100 meters women sprinters are to be analyzed by tagging events that occurs during the event and the event-wise data will be shared on Dartfish TV and the statistical report for improving the athletes performance will also be generated.

This will be very helpful for the athletes to improve their game and for the coaches to improve and coach on their weak areas and the gaming skills be improved.

2.1. Problem formulation

In this study, we compare both stride count and athletes height which helps our athletes to have an additional insight and develop their performance of national develop athlete when it is compared with the elite level. High-quality video of the season will be downloaded from YouTube and the player-wise data will be analyzed by creating a Tagging panel. The video data will be uploaded to the Dartfish TV.

2.2. Data evaluation

Height Data has been collected from Tamil Nadu Athletics Association (TAA). Remaining Stride count and stride length are measured from Dartfish software by imported YouTube videos.

Tagging panel creation

- **Planning the tagging panel**

To create your tagging panel you need to understand the jargon (Event, keyword, category) and you need to have a clear idea of what you want to tag and how to describe it. Here is a simple methodology to help you.

- **Using the tagging panel editor**

There are many ways in which a tagging panel can be laid out and organized. Here, a simple way to get started is explained using the grouping of buttons by category to ensure that categorization is correct.

a) Add group boxes

Group boxes are used to organize other tools - either physically or by providing the category property.

b) Add event buttons

Because event buttons will usually be clicked first, they will often be placed at the top of the panel. It is important to understand how the duration, pre roll and offset start properties let you decide when to click the button and how much time to include in the event.

c) Add keyword buttons

Keyword buttons let you add further description to the one keyword already added by the event button.

d) Add pages and persistent keyword tools

Persistent keyword buttons add their keyword to consecutive events - either to reduce the number of button clicks required or because you want all events to have the same information e.g. to allow you to distinguish the events of one video file from another when multiple clips or games are loaded.

Fig 1: Dartfish Tagging Panel

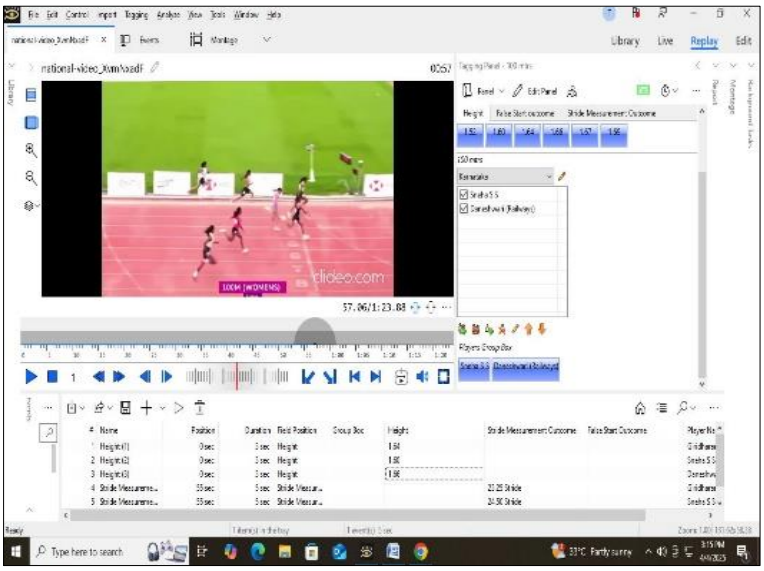

Fig 2: Dartfish Analysis Window

2.3. Data analysis and interpretation

With the help of the tagging panel data collected from Tamil Nadu Athletic Association excel data has been generated and it has been interpreted with the report section of dartfish and python code.

The images are shown below. Florence Griffith Joyner (USA) with the height of 1.69m having stride count of 23.75 approximately. Elaine Thompson Herah (Jamaica) with the height of 1.67m having stride count of 24.75 approximately. Shelly Ann Fraser Pryce (Jamaica) with the height of 1.52m having stride count of 25.20 approximately.

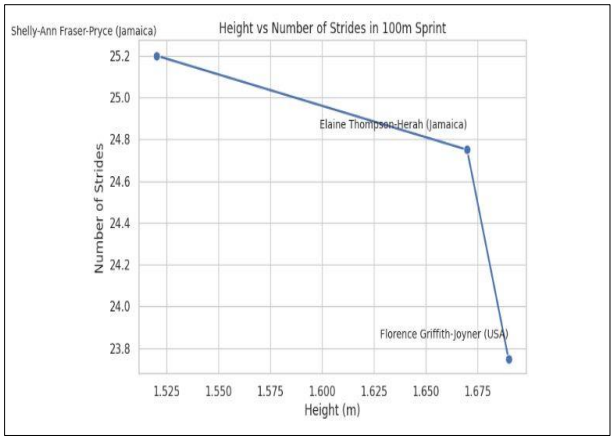

Fig 3: Stride count and Height of elite athlete.

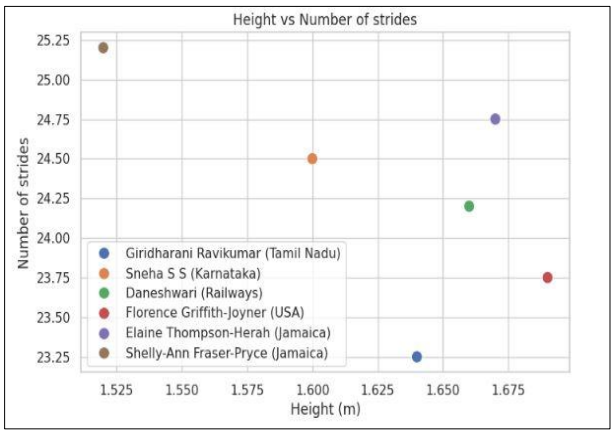

Fig 4: Shows the comparison of women athletes.

Giridharani Ravikumar (Tamil Nadu) with the height of 1.64m having stride count of 23.25 approximately. Sneha S S (Karnataka) with the height of 1.60m having stride count of 24.50 approximately. Daneshwari (Railways) with the height of 1.66m having stride count of 24.20 approximately.

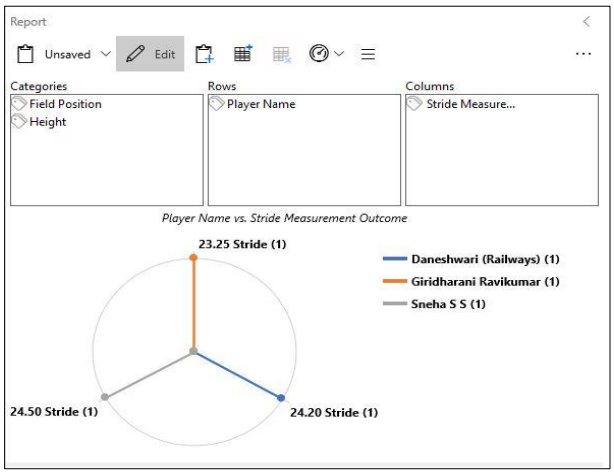

Fig 5: Shows the name of the player and stride count

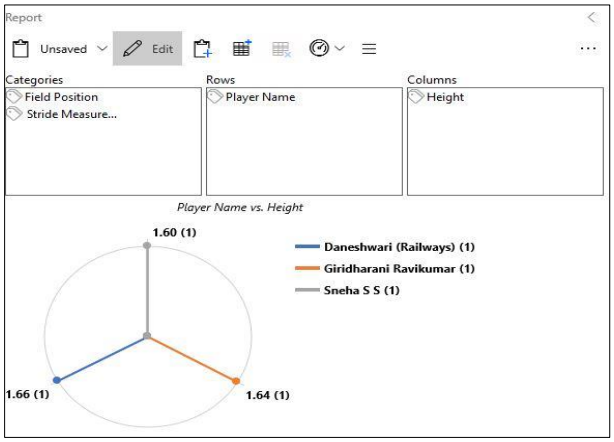

Fig 6: Shows the height of national athletes.

The reports that are shown in the images are generated with the help of excel data that are generated while tagging the events that took place during the player performance. Using this data, the comparison among the women athletes in national and elite level depicted clearly.

With the help of these insights, the players can have a proper understanding about their performance in real time with evidence of their video.

3. Results and Discussion

3.1. Results

This analysis report shows us the dependency among the stride count and player height. In this study, we took six women athletes in total. Out of which three athletes are from elite level and three athletes are from national level. The name of the athletes we have taken from elite level are 1. Florence Griffith Joyner (USA) with the height of 1.69m having stride count of 23.75 approximately, with timing of 10.49sec. 2. Elaine Thompson Herah (Jamaica) with the height of 1.67m having stride count of 24.75 approximately, with timing of 10.54sec. 3. Shelly Ann Fraser Pryce (Jamaica) with the height of 1.52m having stride count of 25.20 approximately, with timing of 10.60sec.

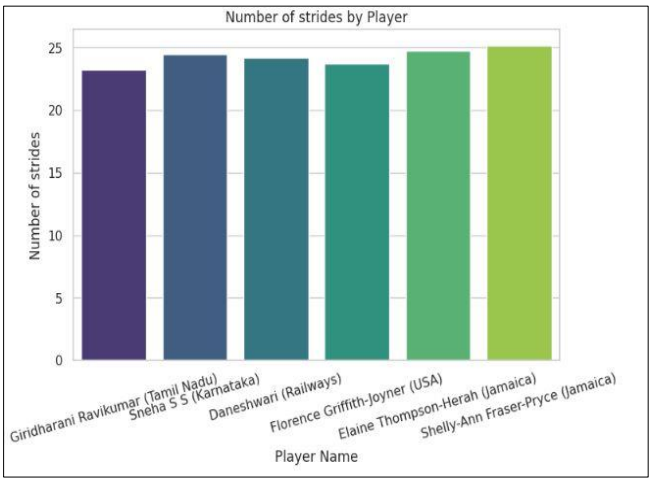

Fig 7: Shows number of strides by the each player

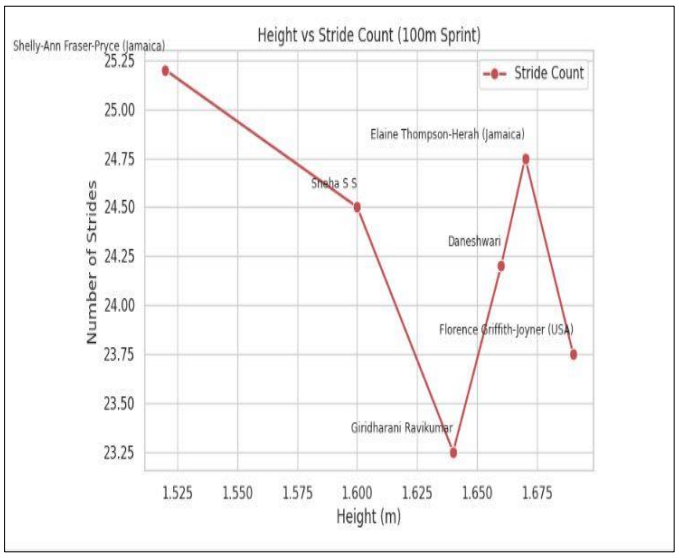

Fig 8: The above graph represents relation between stride count and height of the Elite and National level women athlete.

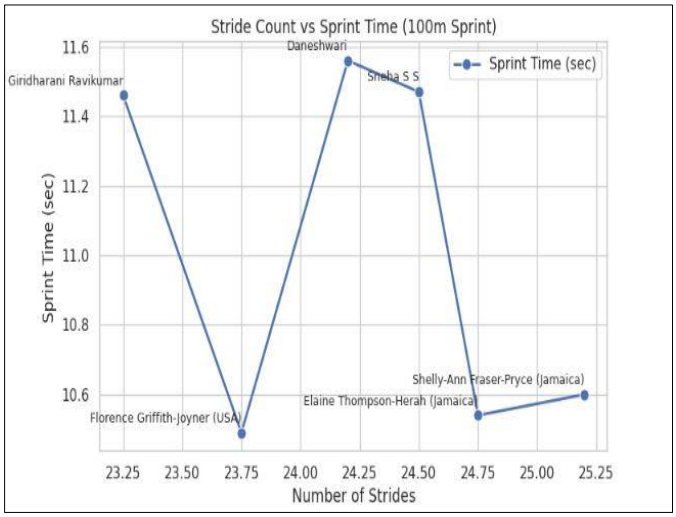

Fig 9: the above graph represents sprint times and number of strides of all players.

The name of the athletes we have taken from elite level are 1. Giridharani Ravikumar (Tamil Nadu) with the height of 1.64m having stride count of 23.25 approximately, with timing of 11.46 sec. Sneha S S (Karnataka) with the height of 1.60m having stride count of 24.50 approximately, with timing of 11.47 sec. Daneshwari (Railways) with the height of 1.66m having stride count of 24.20 approximately, with timing of 11.56 sec.

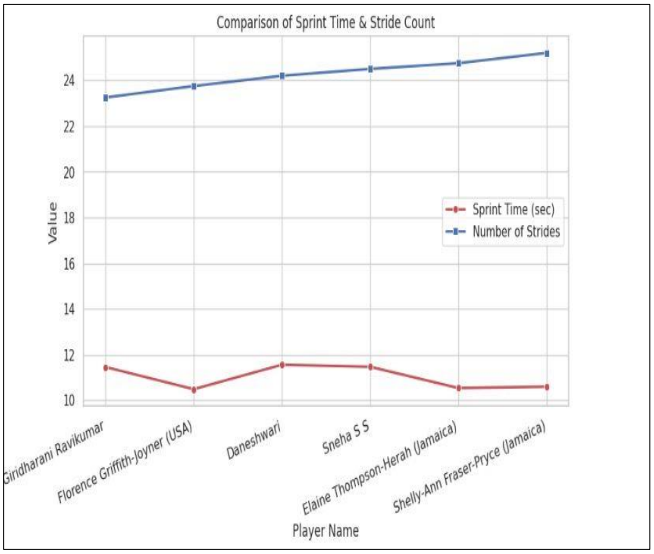

Fig 10: The above graph represents sprint time and stride count of all players.

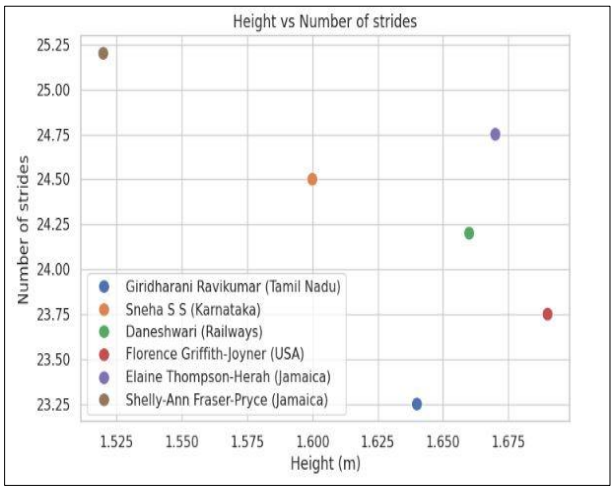

Fig11: The above image shows number of strides and height of both elite and national level women athlete.

4. Discussion

With this study, it shows that there is a relationship between the stride count and height of the players. In most cases, the athlete who is having higher height is having the lesser stride count and the athlete who is having lesser height is having the higher stride count comparatively. However, we are not measuring the exact length of the stride to have the exact result in real time. In such cases, usage of sensors and other advanced equipment that are powered with AI solutions can give more accurate results to take this study to the next level. In addition, we have found that the athlete with lesser height is lesser timing with the higher number of stride counts, which is not only, depends on particular metrics. It could cover other aspects like body weight, training program agenda and other factors also included, that will be covered in the future study with the help of advanced technology.

5. Conclusion

Through the findings of the study, we conclude that the height is having a huge impact in having lesser stride count that could have an added advantage to the athletes. However, it is not applicable to all the athletes. The performance of the player is mainly depends on the training programme and nutritional intake and strategies they are forming to achieve the results. In addition, this study only two the parameters of stride count height and timing. It will be more helpful if we could measure all the parameters like body weight, training programme they have taken and their stride length and frequency using the advanced technology will definitely help the athletes to achieve better timing.

6. Thank-You Note

Tamil Nadu Athletic Association for sharing the details for our study purpose.

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