



ISSN: 2456-0057
IJPNPE 2019; SP2: 51-55
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(Special Issue- 2)

“International Seminar on Application of Engineering in Sports”

(October 11th-12th, 2019)

Implication of GPS, Google earth and GIS on preparation of elite athletes

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Abstract

The aim of this article is to brand definite about the implementation and application of GPS, GIS and Google Earth into sports especially on finding the precise location, monitoring the desirable intensity and accuracy of different sports field and ground markings. Global Positioning Systems have been rising in popularity in team field sports for over a decade. It is assumed that the instruments and software packages like GPS, GIS and Google Earth would comprises a positive upshot on sports field and performances of the athletes and players. An infinite error of construction and marking of different sport and games would generate a negative result for the athletes, players and Officials. There would be a significant contribution of GPS, GIS and Google Earth especially on the above said area and moreover, this sort of equipment would be the constructive for time constraints, opt accuracy, create a positive environment and boost the players mentally in which the performances of athletes will be enhanced. The implications of all these technologies definitely fulfil of gap of current needs and focusing on the futuristic performances at varied capacities.

Keywords: Google earth, positioning, information system, location, enhancement

Introduction

GPS

GPS is the abbreviation given to the Global Positioning System that is now widely used in the area of sports coaching and performance (Garmin, 2014) [3]. Using a Global Positioning System (GPS) to track your movements has numerous applications in the world of sports. The challenge is recognizing that information in order to improve training and recovery of the athlete. Today, runners use wearable technology such as global positioning system (GPS)-enabled sport watches to track and optimize their training activities, for example, when participating in a road race event. For this purpose, an increasing amount of low-priced, consumer-oriented wearable devices are available. However, the variety of such devices is overwhelming. Wearable technology such as global positioning system (GPS)-enabled sport watches, activity trackers, heart rate monitors, or even smart clothing is considered the number 1 trend in 2016 and 2017 according to the world-wide survey of fitness trends.

GPS Technology is just starting to enter the market in football, but many believe it will become more popular in the coming years. It has already significantly influenced the game of football by affecting players, coaches, trainers, and sport performance. For athletes to stay competitive and reach their goals, they have to work harder than their competition. This is becoming easier for all players with the emergence of GPS tracking in football. According to Catapult Sports, GPS technology is used for players' performance and work tracking for several reasons are as follows

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1. Make better use of training time
2. Make training meet game demands
3. Improves clubs' tactical analysis
4. Compare player performance and pick the best players for the team
5. Get players through rehab faster
6. Make periodization model work
(<http://www.catapultsports.com/sports/football>).

Implication of GPS into sports

There are three types of GPS Trackers. Such as

Data loggers: These are of the most use to sports analysis as they record data on an internal memory which can be later uploaded to a computer for further analysis of performance. Data loggers are also used in mobile phones to geo-tag any photographs that are taken.

Data pushers: These are tracking devices that are commonly used to identify location, moving speed and direction. They send signals at quite regular intervals and are commonly used today by taxi companies to check the location and speeds of their drivers at any given time.

Data pullers: These are simply small devices that are continuously working and can be accessed when required. These are commonly used in situations where tracking a stolen object is required. (Kurzawa, 2008) [5].

Basic GPS devices are used to record data that measures an athlete's movement patterns, position and velocity in field sports (Cummins *et al.*, 2013) [2]. This data will include speed, average speed, elevation gain, elevation loss, movement direction and even force of impact in sports such as Rugby League.

GPS devices are currently being manufactured with a 1-Hz, 5-Hz and 10-Hz sampling rate (Cummins *et al.*, 2013) [2]. This simply refers to how many times per second information is received, so for example a device with 5-Hz will gather information five times per second. All the literature surrounding this study suggests that the greater the Hz sampling rate, the more

GIS

The development of this Web GIS application used a geodatabase and Web GIS technology that allows a runner to personally select criteria to find a race that meets their needs, view races and elevation profiles on a map, select a 3D interactive view of the race courses to study the terrain, and

view nearby lodging and dining options. Geospatial technology gives a runner a better understanding of the course and streamlines the travel process, reducing stress and increasing the likelihood of a successful and enjoyable race experience. After careful analysis of a runner's needs and the marathon selection process, and evaluating what techniques and methods should be used, a Web GIS application was developed to help facilitate the process for an enhanced race experience. In addition to providing a valuable tool for runners, this application provides a template for developers constructing a Web GIS application for any athletic or travel based event. Emerging technology will transform the Web GIS application into an even more powerful tool. Utilizing predictive analytics which incorporates data, statistical algorithms and machine learning techniques, patterns from the race course can be modelled and compared with local terrain to create similar courses for training purposes. It's invigorating to think of what effect the amalgamation of GIS technology into the athletic world will have on an athletes' experience.

Google Earth

Google Earth is a computer program that renders a 3D representation of Earth based primarily on satellite imagery. The program maps the Earth by superimposing satellite images, aerial photography, and GIS data onto a 3D globe, allowing users to see cities and landscapes from various angles. Google Earth is able to show various kinds of images overlaid on the surface of the earth and is also a Web Map Service client. In addition to Earth navigation, Google Earth provides a series of other tools through the desktop application. A flight simulator game is also included. Other features allow users to view photos from various places uploaded to Panoramio, information provided by Wikipedia on some locations, and Street View imagery.

Implication of GIS and Google earth into sports

This Web GIS application helps runners to find the right race by allowing them to view races on a map that includes pertinent race information, customize race selection based on personal criteria, view selected races on a map interactively including 3D visualization of routes, elevation profiles, projected temperature, street view, terrain and nearby lodging and dining options.

For example, if you were to type into Google, "How to plan to run a marathon," you would get the following return, shown in Figure 1.

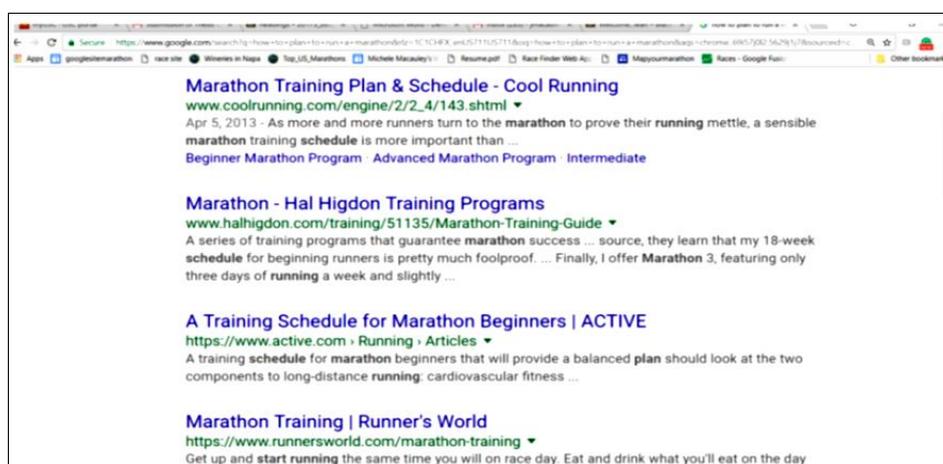


Fig 1: Screenshot of Google search "How to plan to run a marathon" results

“Planning” in the athletic community clearly refers to the physical planning involved and not planning for the logistics of the race. Trying another technique, entering “Find and plan

a marathon race” yields the following results, shown in Figure 2.

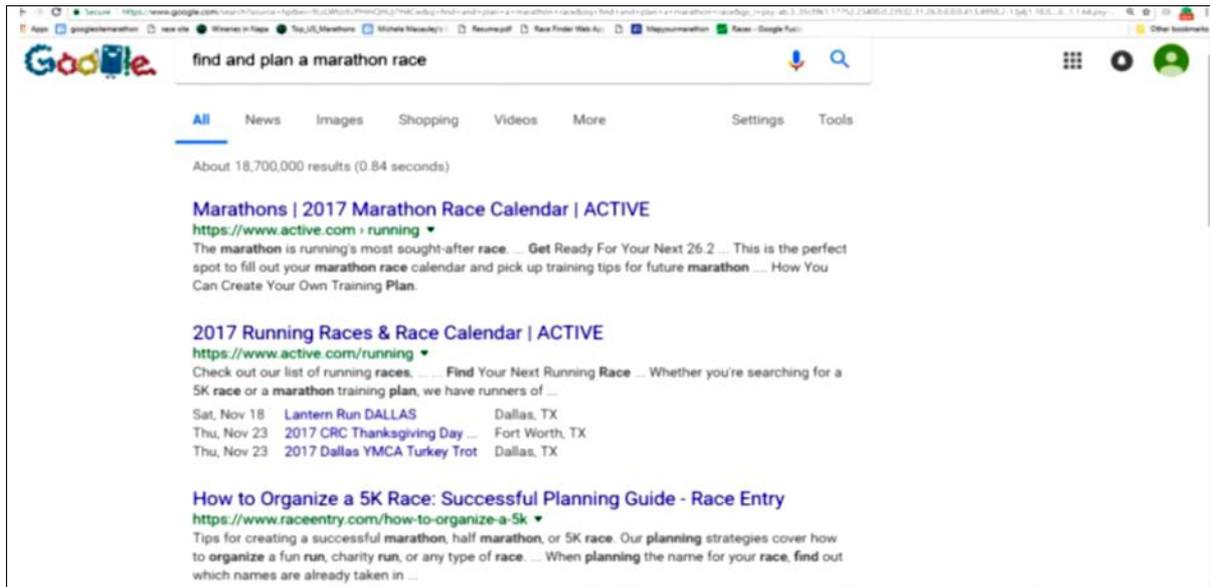


Fig 2: Screenshot of Google search, “Find and plan a marathon race” results

After an analysis of the marathon selection process and current technology available, how does the development of a Web GIS application aid in this process? This Web GIS application helps runners to find the right race by allowing them to view races on a map that includes pertinent race

information, customize race selection based on personal criteria, view selected races on a map interactively including 3D visualization of routes, elevation profiles, projected temperature, street view, terrain and nearby lodging and dining options.

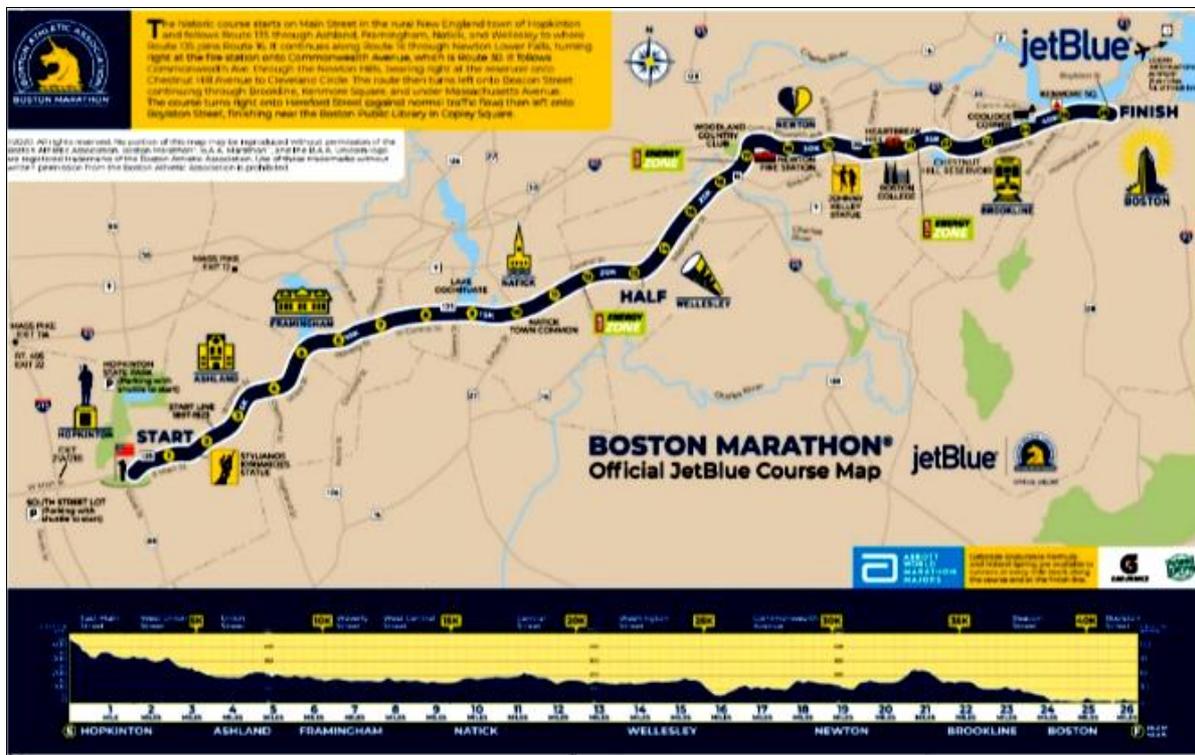


Fig 3: Route map of boston marathon

GIS mapping development in sports

One of the main goals is to develop a Web GIS application that would be available to as many users as possible on any

device and with any browser. Determining which technology to use in the course of developing GIS maps for this web GIS-app involved analyzing and testing purpose.

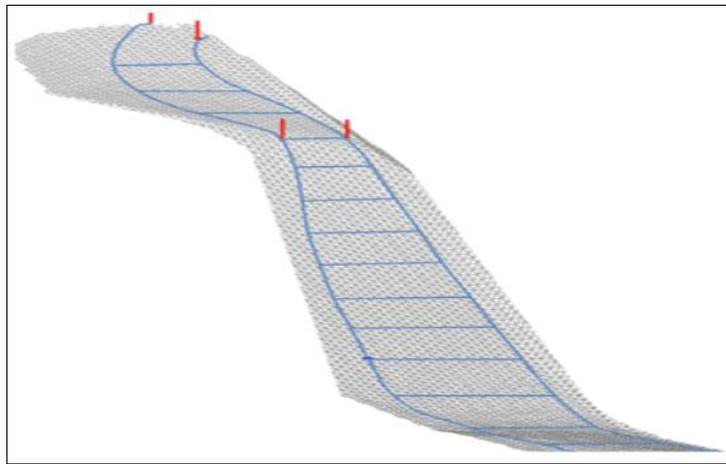


Fig 4: GIS provides detailed information of course route

• It has been proven that non-acclimatized athletes tend to under-perform when exposed to extremely high temperatures and high humidity levels.

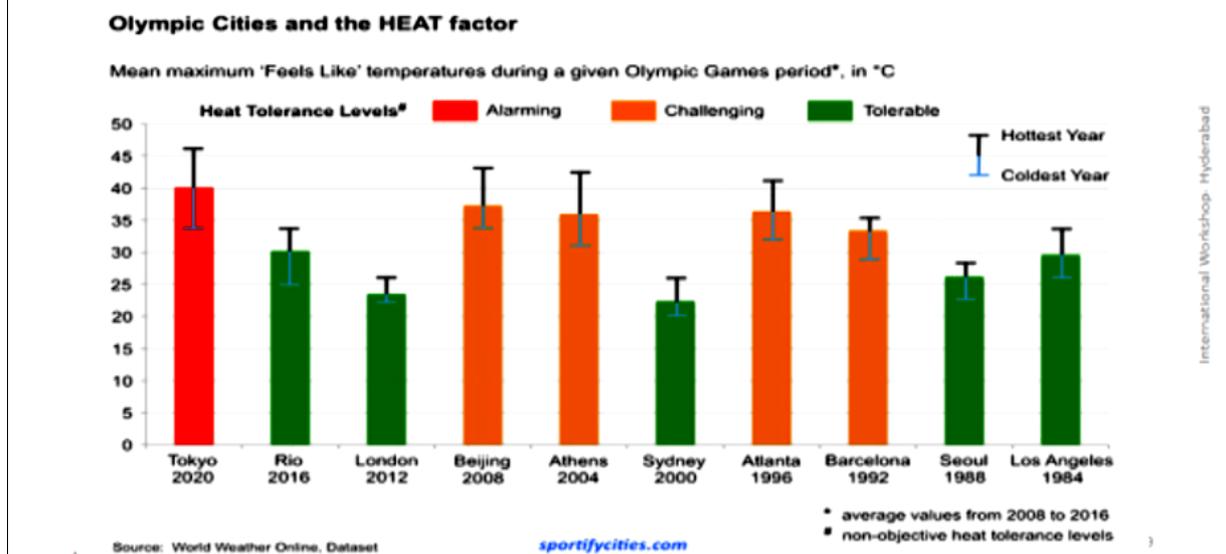


Fig 5: Tokyo's climatic condition-2020 (Challenges)

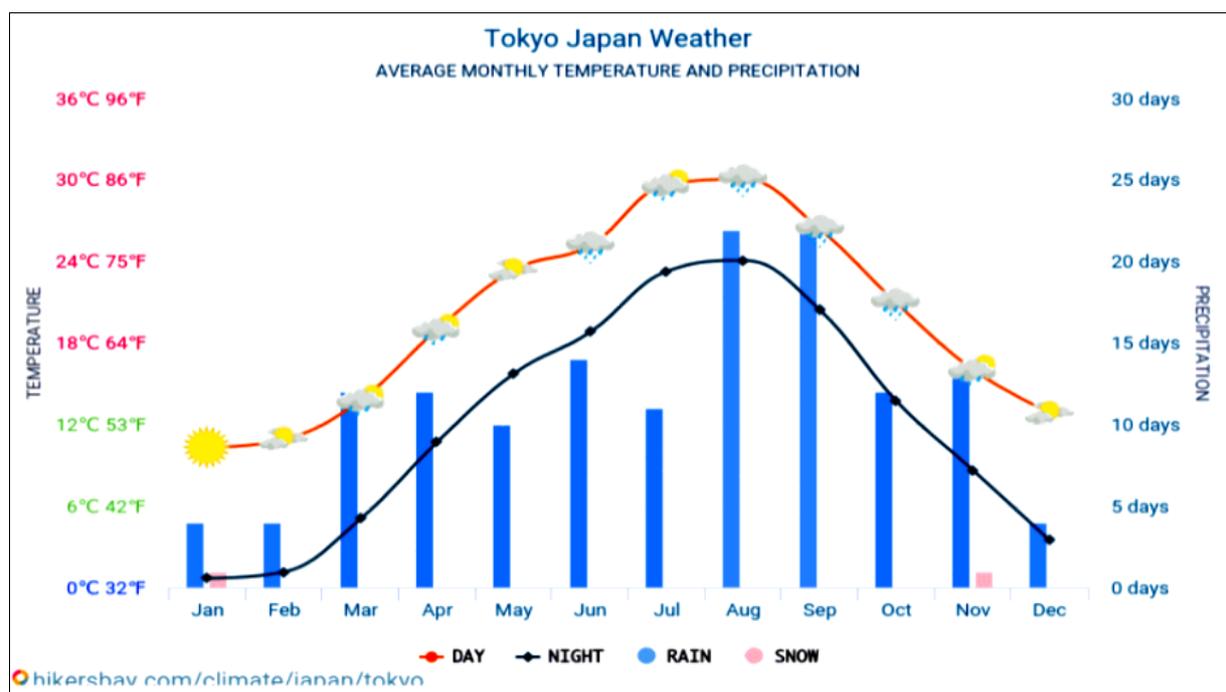


Fig 6: GIS Provides information of Tokyo 2020 climatic conditions

GIS and Google Earth are the frequent information providers in which an athlete and the coach could well planned about the competition venue, time of competition, topography of the venue, slopes, ups and downs, inclinations, wind speed, temperature, solar radiation Humidity and etc. This sort of actions are highly essential in the performance sports when compete in the international arena.

Conclusion

The nature of sports lies in its unpredictability. Sports today, is moving away from being 'just a game' to being a business worth billions. It is, therefore, no surprise that all over the world, elite teams are experimenting with new technology. The tactical work today is being done by these new 'gadgets', helping define the intricate strategies that often decide the winners of the game. These technologies as futuristic or do we simply accept that the time has come when GIS, GPS, and Drones have actually taken over the sports industry.

References

1. Catapult. Indoor GPS for the Lions, GPS Plays Important Role in Preventing Injury As Well As Helping with Players Rehabilitation, 2014. Available: <http://www.catapultsports.com/category/indoor-gps/>
2. Cummins C, Orr R, O'Connor H, West C. Global Positioning Systems (GPS) and Microtechnology Sensors in Team Sports: A Systematic Review' Sports Medicine. 2013; 43(1):1025-1042.
3. Garmin. What is GPS? 2014. Available: <http://www8.garmin.com/aboutGPS/>.
4. Jennings D, Cormack S, Coutts AJ. The validity and reliability of GPS units for measuring distance in team sport specific running patterns' International Journal Sports Physiology Performance. 2010; 5(3):328-341.
5. Kurzawa DA. GPS in Sport: Analysis and Determination of Fitness Levels. Final Year Thesis. University of New South Wales, 2008.
6. <http://believeperform.com/performance/the-effects-of-heat-on-sport-performance/>
7. <https://runnersconnect.net/running-in-windy-conditions/>
8. <http://www.wunderground.com/history/>
9. [http://www.catapultsports.com/sports/football. Strength and Conditioning Journal. 40\(3\):83-94, June 2018. DOI: 1519/SSC.0000000000000386](http://www.catapultsports.com/sports/football. Strength and Conditioning Journal. 40(3):83-94, June 2018. DOI: 1519/SSC.0000000000000386).