International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 6 Issue 01, January-2017

Big Data in Sports

Leverage Big Data in Sports: An Insight using SAP HANA

Ruth Dmonte
Department of Computer Science
California State University, Fullerton
California, USA

Asher Dmello
Developer at Tata Consultancy Services
Mumbai, India

***Abstract*— One of the trending topics in the IT field is Big data. What we do with this data is what matters. It is extremely important to analyze it, gather valuable information and use it for smart decision making and efficient functioning. Big data has countless number of applications. It is used almost everywhere in education, banking, shopping, agriculture, healthcare, e-commerce, IT firms, enterprise, security, etc. One such field which Big Data has revolutionized is sports industry. Sports are associated with large amounts of data and in the past, it could not be processed in a meaningful way but thanks to big data. Big data has affected everyone, from the players to the viewers. This paper majorly explains big data along with the SAP HANA platform that has benefitted different sports. Case studies on football and basketball are discussed.**

Keywords*— Sports, Big data, SAP HANA, German Football Association, National Basketball Association.

INTRODUCTION

It is estimated that 2.5 quintillion bytes of data are generated daily. The massive amount of data that we create is Big Data. The posts on social media, the pictures, and videos we take, everyday transactions, data files, etc is what accounts for big data. The voluminous data produced needs to be analyzed to get significant value from it. Many organizations are embracing Big data technologies and are achieving real results with this approach. It helps them to find patterns, trends in the customer behavior and provide more customized services, to predict and make smart and fast decisions, for security and fraud detection purposes, to make the profit. Big data is changing the way we look at the world.

I. BIG DATA IN SPORTS

Sports produce large amounts of data related to the players, team performance, and audience. With Big Data, it is possible to analyze large amounts of this data and utilize it. Since there is a higher demand for the sports statistics, big data is the ideal technology for sports. Big Data is creating more excitement in the field of sports. It is taking sports to a higher echelon. Michael Lewis's book "Moneyball" (2013) introduced the concept big data in sports long before it was actually used. It showed that data can be used to make important decisions.

IBM (2015) has called Big Data as the game changer. Soccer is the sport that has made enormous and effective use of it, especially German Football Association. Germany's win in the 2014 world cup is credited to Big Data technology that used SAP HANA. Similarly, National basketball association (NBA) have used SAP HANA for its big data analytics.

II. BIG DATA IN PROCESS

There are three important steps that show how big data works:

a) Collection of data:

This is the first step of big data technology. Immense data is generated in the field of sports. This data is captured by various sensors, on-field cameras, trackers. Also, data is collected using the internet of things.

b) Analysis of data:

The data collected should be analyzed for to reap the benefits of big data. In sports, data analysis can help to make better business decisions, improve team performance and so on. Data mining, data visualization tools are used for analysis.

c) Applying the knowledge:

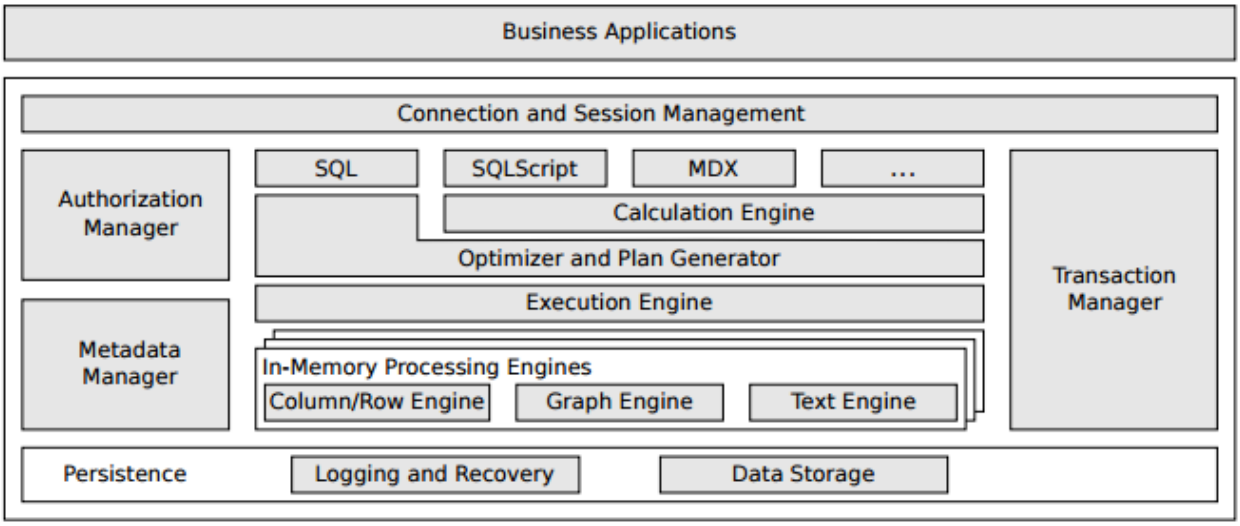
After analyzing the data, it should be used for prediction, for the better understanding of the other data. Based on the available data, the result of the matches can be predicted.

III. LITERATURE REVIEW

1) SAP HANA Overview: (SAP High-Performance Analytic Appliance.)

SAP HANA is a relational database management system developed by SAP SE that deals with real-time data. It is in-memory and column oriented. SAP HANA is designed in such a way that it handles transactions and query processing simultaneously. It acts as a single environment by providing data processing, data integration, and application services. Thus, large amounts of data can be managed. It is written in C++. It also supports programs written in R programming.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 6 Issue 01, January-2017



2) SAP HANA Architecture:

The SAP HANA system is designed to provide speedy, real-time processing and analytics of data for the business applications.

The in-memory processing engine is the most important part of the SAP HANA. It stores different data in its engines. The row column engines wherein the relational data exists. Graph data in graph engine and text data in text engine.

SAP HANA provides languages like SQL, SQLScript, and MDX. The plan generator translates the queries in the execution plan which is then executed by the execution engine. The queries in another language are first described by the calculation engine.

The session manager acts as the middle tire. It connects the front-end to the database. Authorization manager checks for the authorized user. The transaction manager implements snapshot isolation or weaker isolation levels – even in a distributed environment. The metadata manager is a storehouse that stores the data that describes the tables and other data structures in the system. In the case of the system crash or failure, the backup data needs to be stored in the persistence layer.[4]

3) Applications

a) Football:

German Football Association adopted the latest technology and teamed up with SAP. It used Big Data which played a major role in the 2014 football world cup. SAP created an application called Match Insights and a mobile app called SAP team one app that used SAP HANA platform. It helped the coaches to analyze their own and their opponents' performance. The passes, kicks of every player were studied. Also, the data points per second (position, speed, possession time) from various on-camera videos were collected. All this data went into the SAP HANA which then analyzed it in real time and helped the team members and coaches to assess each player. The SAP team one app was used for communication between the team members by transferring images, audios, videos. It allowed the coaches to determine the performance of each player, which they could then send to players' mobile devices. The team was able to analyze such massive data because SAP HANA stores, processes, and analyzes transaction, spatial, and text data on a single platform. Big Data helped to the team to better understand their factors for success. Ultimately Big Data helped Germany lift the world cup. The wall street journal called Big Data as Germany's 12th man in the world cup [1][3].

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 6 Issue 01, January-2017

Figure 2: Match Insights Application use

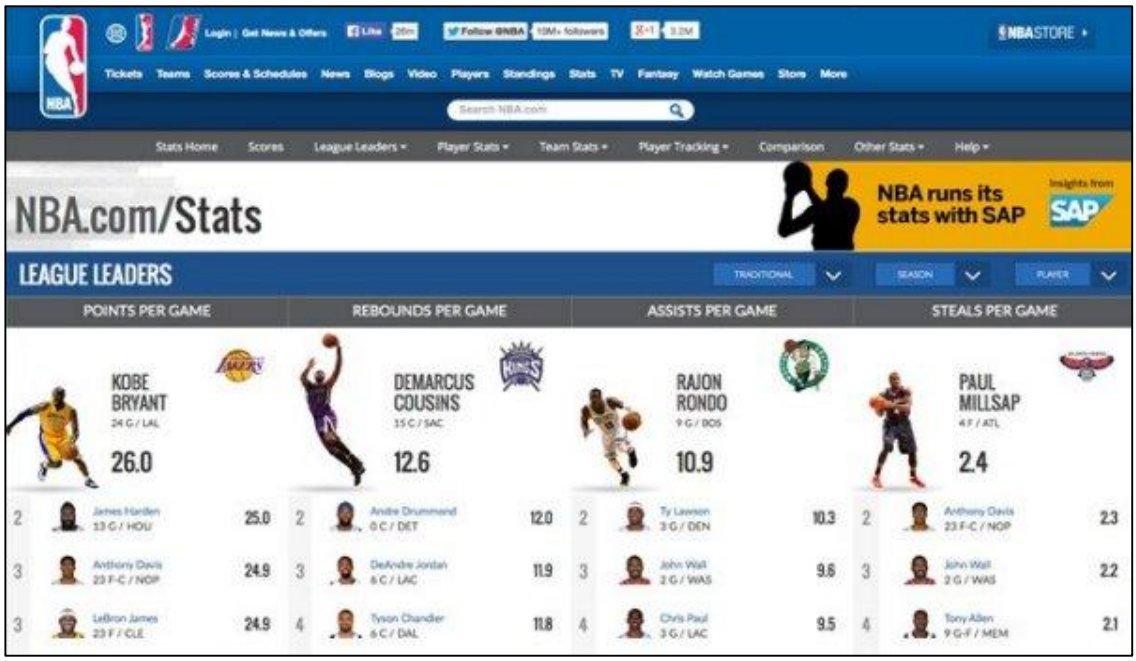


Figure 3: NBA Website showing Statistics

b) Basketball:

The national basketball association has its basketball statistics site called NBA.com/stats that provides access to the fans, players, and other users. This site is introduced by Big data powered by SAP HANA that provides more than 50 years of statistics and also the real-time data which helps to understand the game much thoroughly. All the videos and data captured goes into the SAP HANA database where it's stored. Users can then use refer the NBA.com/stats website to track every amazing point, rebound, and blocked shot in near-real time. This is a good advantage for statistic enthusiasts. SAP HANA makes the data available in its memory and the users are able to place query. This is engaging fans because everything that a fan wants to know about his favourite team or player is readily available. Also, media uses the website to build up their articles, story lines. NBA.com/stats is considered as one of the best websites in sports. Along with SAP, NBA is trying to create more innovative solutions. The website is available on smartphones and tablets as well. [9]

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 6 Issue 01, January-2017

DISCUSSION

1) Applications of big data in sports

Big data is advancing sports by taking it to the next level. It has firmly established itself in various areas. Some of the applications of big data in sports are mentioned below:

a) Prediction of match results: Big Data could help to interpret better match results. The founder of Advanced NFL Stats website, Brian Burke (2015) states that using big data coaches and players can predict the results of the match and take proper decisions.

b) Analyzing team performance: Big data analyzes the various factors of the players that give an insight to the players to analyze their own strengths and weaknesses as well as that of the competitors thereby improving the team's performance.

c) Understanding the viewer's preferences: Viewers play one of the most significant roles in sports and hence, concentrating on viewer's preferences is a priority. Big data sustains the viewer's interest in the game by providing them real-time statistics, more data sharing capacities and so on.

d) Improved decisions: Umpires have a very important decision to make during the matches and one wrong decision by the umpire can change the entire game. Big data is very convenient to use during such times. It provides real-time data to the umpires which help them in making correct decisions.

e) Giving out statistics: Deeper understanding of the game is possible than before because of the enormous amounts of information available today. Big Data products such as IBM's Slam Tracker provide point-by-point analytics of tennis matches from every stroke and point.[6]

2) Challenges and Solutions for Big Data in Sports

Big data technology though very useful and advanced has some challenges that need to be overcome.

a) Data security: It is essential to preserve the confidentiality of the data. Data should be secured. Big data can adopt various solutions to do it. Several encryption algorithms can be used. Steganography or other hardware solutions can also be implemented.

b) Data transfer: Another major challenge in big data is moving large amounts of unstructured data. Organizations need to transfer the data quickly and easily over the globe. This can be done with the help of internet. Also, cloud computing technology can be used through which the data can be accessed easily.

c) Lack of talent: Organizations are finding it difficult to find data scientists, analysts who are capable of working on this new technology. We do not have enough skills to use the technology efficiently. People must be made aware of this emerging technology and encouraged to work with such exciting technology and expand it.

CONCLUSION

With the data towering around us every day, ignoring Big data technology is idiotic. So it is necessary to gain knowledge from it. The sports industry is already doing it. Big data has affected sports industries to a large extent. From players to fans to media, everyone is experiencing its benefits. Players can analyze themselves, coaches can get the right players, umpires can make proper decisions, and mainly it is driving fans into the game. The technology is emerging rapidly and in the future sports industry will be utilizing it more efficiently. Big data is digitalizing sports rapidly and enabling it to march forward. Big data is a blessing for sports and other industries too. But along with that, there are many challenges that need to be taken into consideration. When all these things balance and we are able to use the technology efficiently, having the best future sports industry will soon be a reality.

REFERENCES

[1] N. J. Kim and J. K. Park, "Sports analytics & risk monitoring based on hana platform: Sports related big data & IoT trends by using HANA In-memory platform," *2015 International SoC Design Conference (ISOCC)*, Gyungju, 2015, pp. 221-222.

[2] Irena Bojanova, "IT Enhances Football at World Cup 2014", *IT Professional*, vol. 16, no. , pp.12-17, July-Aug. 2014.s R. Brunel *et al*., "Supporting hierarchical data in SAP HANA," *2015 IEEE 31st International Conference on Data Engineering*, Seoul, 2015, pp. 1280-1291.

[3] Wall Street Journal (http://blogs.wsj.com/cio/2014/07/10/germanys-12th-man-at-the-world-cup big-data)

[4] The SAP HANA Database – An Architecture Overview, 2015 (http://sites.computer.org/debull/A12mar/hana.pdf)

[5] MIT Technology Review, 2016 (https://www.technologyreview.com/s/600957/big-data-analysis is changing-the-nature-of-sports-science/)

[6] BIG DATA Made Simple, 2016 (http://bigdata-madesimple.com/big-data-an-ultimate-weapon-in the-field-of-sports/)

[7] Kenya Tech News, 2014 (http://www.kachwanya.com/2014/06/12/german-football-association sap-turn-big-data-smart-decisions-player-performance/)

[8] Smart Data Collective, 2016 (http://www.smartdatacollective.com/bernardmarr/200446/big-data and-analytics-sports-game-changer)

[9] Information Week, 2013 (http://www.informationweek.com/software/information management/nba-launches-sap-hana-powered-basketball-statistics-site/d/d-id/1108684)

[10] Tech target, 2016 (http://searchbusinessanalytics.techtarget.com/essentialguide/Guide-to-big data-analytics-tools-trends-and-best-practices)