**Main Page Section 1 Assignment 3**

Understanding the role of AI in A & R/Sports analytics

**Objectives**

* Understand what sports analytics are, and what kinds of things are analyzed.
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* Understand why data is important to analytics and the kind of decisions are made with the data by sports teams and music companies
* Understand what sports analysts and A & R Agents do, and what hard and soft skills are required in these jobs.

**Main Learning Goal**

What are Sports and Music A & R Analytics?

**Focus Question**

How is AI and Data used for decision making in Sports Analytics and the Music Industry.

**Elicit**

Is it fair to use data to determine how much someone is willing to pay for a sports or concert ticket?

Watch this video on the $1000 dollar concert ticket

[Ticketmaster's Dynamic Pricing (youtube.com)](https://www.youtube.com/watch?v=mly_b1uoMoM)

Or this video on Sports pricing by the Buffalo Bills  
  
<https://www.buffalobills.com/video/watch-dynamic-and-variable-ticket-pricing-19304037>

Talk with each other and determine the answer to the following questions

1. What is Dynamic Ticket Pricing?

2. What data or parameters go into figuring out the cost of a ticket?

3. How much of the cost of the tickets for music concerts goes back to Ticketmaster? Is that fair to the artist?

**Develop**

The information below is a summary of a [blog post](https://www.datacamp.com/blog/sports-analytics-how-different-sports-use-data-analysis) on Data Camp by Kurtis Pykes.

**What is Sports Analytics?**

Sports analytics is the study of athletic performance and marketing optimization for the success of a sports organization or the player.

There are two main components in sports analytics:

* **On-field data analytics**. This area involves tracking key on-field data metrics that could be used to improve in-game strategies, training plans, player recovery from injuries, and in-game usage.  These analytics can also be used to develop nutrition plans, that could improve athletes' performance levels. It seeks to answer questions relating to on-field performance, such as “which soccer player has scored the  most goals in Europe?” or “which player has run the fastest over 20 meters?”
* **Off-field data analytics**. Here, the focus is on the business side of sports. It involves monitoring important off-field data metrics such as ticket sales, merchandise sales, fan engagement, player social media engagement..... This type of data analytics seeks to assist decision-makers in sporting teams make better decisions directed toward increased growth and profitability of the team. Players can also track their own social media presence to build their brand and NIL earning potential.

There is not a team, player or sports organization that does not use sports analytics. Before the advent of AI and Machine Learning, teams hired mathematicians, physicists and engineers to do the analytics for them using data bases, spreadsheets and computer programming. Now with AI, the machine and dashboard operators can go in and ask the AI any question and it can answer it using the team's database.

**Why is Data Analytics in Sports Useful?**

The global sports market grew from $354.96 billion in 2021 to $496.52 billion in 2022, according to  research, making it one of the biggest markets in the world. As spending in the global sports market increases, sporting teams are much more committed to investing in sports data analytics for a competitive edge, hence the projection of the sports analytics market reaching upwards of $4.5 billion by 2025.

Some key benefits of data analytics in sports include:

**Informed decision-making**

Sports data analytics can be a useful tool for making important strategic decisions. For example, when Thomas Tuchel, former Chelsea Football Club manager, was asked why he brought on goalkeeper Kepa Arrizabalaga late into extra time, he responded, “So we had some statistics, we were well prepared, that Kepa is the best in percentage in saving penalties.” He added, “There is proof that Kepa is better at this discipline.” Chelsea went on to win the penalty shootout, with Kepa saving two penalties in the process.

Although it may have played out differently in the scenario above, decisions backed by data on and off the field typically lead to more powerful and accurate decision-making.

Another example of this is in the NBA. Several teams, such as the Philadelphia 76ers, are leveraging intricate data analysis techniques, such as data visualization and hypothesis testing, to analyze NBA games to influence the coaching strategy.

This type of analysis has had a profound effect on Basketball. More of the action is taking place at the three-throw line since teams have realized taking more three-point shots is worth the tradeoffs (teams may miss more shots, but when it goes in, they earn more points).

**Increased revenue**

One area where sports teams are using data analytics to increase revenue is ticket sales. Ticket prices at most games vary depending on the currently popularity of the team or a player or on the popularity of the opposing team, in addition to where the seat is located. With data analysis, sporting organizations can get greater insight what people are willing to pay for a seat at a particular game, which enables them to determine the best value price for customers and the organization.

For example, Houston Astros used data analytics to run “what-if” scenarios to understand single-game ticket buyers with the hopes of converting them into season ticket holders while retaining the current season ticket holders.

**The Development of the Sports Analytics Industry**

Sports and data analytics have been tied closely together for a long time. Baseball was one of the early adopters of sports analytics, with Earnshaw Cook publishing Percentage Baseball in 1964. However, several statisticians would likely credit the popularization of sports analytics to Billy Beane, Oaklands Athletics' general manager from 1997 to 2016. This is what the movie Moneyball was based on.

Up until 2002, coaches and athletes in baseball tended to turn a blind eye to deeper data analytics in favor of instinctive gut feeling, a player’s aesthetics, or shallow statistics like batting average. Billy Beane, who had a small budget for the team, noticed that getting runners on base was vital for scoring more runs. Beane focused his strategy on acquiring overlooked starting pitchers – usually for a fraction of the price of a big-name pitcher –  that have a high on-base percentage with the idea that teams with higher on-base percentages were more likely to score runs.

**How Different Sports Use Analytics**

Although the fundamental purpose of sports data analytics is universal – to gain a competitive advantage through statistics and data analysis – different sports deploy varying methods to collect and analyze data efficiently for their sport.

**Soccer**

Sports data analytics forms an integral aspect of off-field decision-making in soccer. Soccer clubs worldwide have invested heavily in data science and related technology to help boost players' on-field performance and improve off-field decision-making. This involves tracking and monitoring data such as players' in-game positioning, fatigue during training, distance covered, and other data that may provide greater insight into players' conditioning.

Other statistics may be collected to investigate an individual player's performance, such as successful dribbles, passes, and interceptions. Analysis of this data provides coaches and players with greater insight into the strengths and weaknesses of their game, which is useful for their development. You can read more about [how data science is changing soccer](https://www.datacamp.com/blog/how-data-science-is-changing-soccer) in a separate article.

**Baseball**

As one of the first sports to embrace sports analytics, Baseball has been setting the benchmark for several years.

Some of the data tracked to aid the MLB team's decision-making are:

* **The batting average**: A statistic calculated by dividing the number of hits by the number of at-bats for that player. This stat reveals a player's tendencies and which pitch tends to strike them out. The purpose is to aid players in identifying what type of pitch is their weakness – it is also the most commonly discussed stat in baseball.
* **On-base percentage**: This is one of the most important offensive stats; It illustrates how often a batter can avoid being put out at the plate and is defined as the percentage of times a player reaches base on a hit, walk, or being hit by a pitch.
* **Slugging average**: The slugging average measures a player's batting power. It measures the number of bases a player earns on hits. The higher the slugging average, the more likely the player is to hit for extra bases.

You can apply your knowledge of Baseball, Python, and data visualization with Matplotlib and Seaborn in this example [New Era of Data Analysis in Baseball](https://www.datacamp.com/projects/250) project in Data Camp.

**Basketball**

Daryl Morey was one of the first NBA general managers to implement advanced statistical metrics as a key part of player evaluation. Now, most NBA has sports data analysts as staff on their teams. Their role is to support coaches and players with data to aid them in maximizing on-field performance and identifying undervalued players.

At the most elite level of basketball, teams use data-tracking cameras at all angles of the basketball arena to track every movement made by each player on the court. This data is then synced with the players' statistics to provide a full breakdown of players' performance.

**What Do Sports Analysts Do?**

A sports analyst will likely watch their designated sporting event, prepare commentary, and deliver that commentary on air or in print. Thus, they must have exceptionally strong analytical and communication skills as it accounts for a large proportion of their day-to-day responsibilities. In addition, sports analysts have a deep knowledge of their chosen sport, which includes a good idea of the historical context and key statistics that define the competition.

**How to Become a Sports Analyst**

As the growth of the sports industry continues, a natural by-product is a wealth of job opportunities. Individuals with a knack for data analytics and a compelling interest in sports can merge their talent with their hobbies to build a fulfilling career as a sports analyst.

Becoming a sports analyst typically comprises three key components: getting educated, developing skills, and gaining experience. If you’re wondering how to get into sports analytics, these steps can help you.

**Getting educated**

The majority of sports analysts start as regular sports fans. However, upon deciding your goal is to become a sports analyst, you must absorb as much information about sports as possible. Sports analysts are often expected to be a kind of walking sports encyclopedia.

Additionally, statistics knowledge is essential. Statistics is the preferred language in sports analytics. It generally helps to pay close attention to current game outcomes, such as player statistics, win-loss records, and other available statistical information, to enhance your statistical vocabulary while learning what metrics are important for sports performance.

In the long run, education in these two areas will aid you in creating authoritative assessments and predictions based on statistical models.

Many sports analysts will take some form of sports data science degree, whether focused mainly on the sports side or the data science side. Of course, other types of education can help, whether in sports, statistics, data science, or related fields.

**Developing skills**

Many soft and hard skills are required to become a sports analyst:

**Soft skills**

Becoming educated in statistics and a chosen sport is only one part of the process. The other part is to leverage the knowledge of statistics and combine it with the contextual information from your chosen sport to generate insights. Having a good relationship with stakeholders certainly goes a long way, as sports analysts are expected to understand the needs of stakeholders (i.e., coaches, directors, etc.) and deliver accurate insights in a timely fashion.

How insights are delivered is also important. Stakeholders are likely less technical than the sports analyst, meaning insights must be reported in an understandable and useful format to simplify stakeholders' planning and decision-making process.

**Hard skills**

Anyone who works with data must be data literate and conscious.  A key element of a data professional's work is ensuring data is accurate and reliable, which requires good knowledge of how the data is collected, stored, and retrieved. This also includes ensuring data is clean: it is often estimated that 80% of a data scientist's time is dedicated to data cleaning.

You can put your data cleaning skills to the test in this [importing and cleaning data](https://www.datacamp.com/projects/758) project, which focuses on soccer attendance data during the 2019 FIFA Women's World Cup. This is another project in Data Camp in Python.

Beyond the ability to read, write, communicate, and reason with data, sports analysts must also be equipped with significant technical knowledge of various analytics tools and programming languages. These sports analytics tools include:

* [Excel spreadsheets](https://www.datacamp.com/courses/data-analysis-in-excel?hl=GB)
* [SQL](https://www.datacamp.com/courses/introduction-to-sql)
* [R](https://www.datacamp.com/courses/free-introduction-to-r) or [Python](https://www.datacamp.com/learn/python)
* [Tableau](https://www.datacamp.com/courses/introduction-to-tableau?hl=GB)
* [Matlab](https://www.mathworks.com/products/matlab-online.html)

**Gaining experience**

Experience is often a deciding factor for several hiring managers. Beginner practitioners often lament the difficulty of breaking into technical fields since hiring managers typically prefer candidates with experience – the saying goes, “but how can I get experience if you only hire people with experience.” This belief system is based on the idea that a job is the only way to gain experience.

Any task that demonstrates professional experience in data analysis is enough to strengthen the resume of a sports analyst candidate. Some example tasks include contributing to open-source, working on projects, freelancing, and internships. Making a portfolio of your projects or having a github site is a good way to share your work with others.

**Music A & R Analytics**

Based on a posting at <https://switchboard-software.com/post/five-ways-automated-data-analytics-keeps-beat-going/>

Before big data, social media and streaming services, people who worked for music companies worked at night, going to multiple clubs and dance halls each night to find new emerging talent. Going to record stores during the day to find new indie releases that were popular.

With AI, the music industry has changed dramatically,  with  new data sources and algorithms streaming services have made illegal downloads, and unauthorized use of songs much more difficult. Social Media and data mining have allowed for a  closer relationship can form between super fans, Artists and music labels. Music providers can now unlock valuable insights into their audience’s listening habits, and make adjustments to their business model and social presence based on this data.

Applications to the Music Industry

**1. AI-powered A&R discovery**

Music publishing companies and record labels often have their own A&R (Artist & Repertoire) discovery division which is responsible for finding the ‘next big thing’. But scouting for emerging talent manually can be time-consuming, as it involves sifting through hundreds of different artists and music data (social, broadcast, streaming, touring).

By using predictive analytics and AI, A&R teams can accelerate the talent-scouting process, in turn saving on costs and resources. Data-driven scouting tools use machine learning to collect data from a variety of sites such as Spotify, social media, or music-specific blogs. This data can then be used to easily identify new talent, as well as filter out those that aren’t a good match for the label.

**2. Data-driven royalty collection**

In order to allocate royalties to artists, music consumption has to be tracked. With such a large ecosystem at play (music is spread across multiple streaming sites, blogs, and social media), tracking all this metadata can be a challenge. This has directly impacted artist compensation, with hundreds of millions in royalties left unaccounted for.

Advanced data analytics, however, plays a key role in the effectiveness of royalty collection tools today. Verified credit platforms combine data analytics and AI, enabling artists and copyright holders to measure how many consumers listen to or download their music each day, as well as identify missing legacy credits. There are also apps that allow an artist to add tags and unique labels to all their songs so when they search the internet using an API tool, all copies of the song being used show up. This allows artists to find unauthorized use of their songs.

**3. Automated music mastering**

For many years, music mastering (adjusting elements of a stereo mix to optimize playback) has been done manually by sound engineers. Depending on the size of the project, this process can take hours, leading to mounting costs.

This is where automated music mastering  or even AI tools come into play. Since they rely solely on algorithms, machine listening and reference tracks to generate or master music, less manual input is required when it comes to optimizing a track.

**4. Predicting the next craze**

Finding the next big ‘hit’ – especially amongst listeners – has always been an objective for record labels and music publishing companies. What will make people tick? What song will be the most popular? What will drive the most downloads/shares/likes?

In 2015, researchers at the [University of Antwerp](http://www.dorienherremans.com/sites/default/files/wp_hit.pdf) were one of the first to create a tool that predicted possible musical hits, which proved reasonably successful.

**5. Music streaming**

Music streaming providers such as Spotify use automated data analytics and AI to ask questions based on the huge amounts of data they generate.This data can then be used to unlock valuable insights into tracks, artists, and listener sentiment, and this information can be sold back to Music companies or to other companies interested in this data.

**Wrap-up**

Sports analytics involves collecting and analyzing relevant historical statistics that can provide a competitive edge to a team or individual. With more sporting teams pouring investment into data analytics, several sports and statistics enthusiasts are flocking towards a career as a sports analyst.

Music analytics combines a love of music with large data sets from streaming, social media channels and the internet with statistics and business marketing. This is a career for those who love music and math.

**Deploy**

**TO DO:**

1. Watch this video where a music artist shows how to track fan engagement for their music on Spotify. They are using an external Data AI Tool called [MusicStax.](https://musicstax.com/)

[Dominate Spotify With These HIDDEN Metrics 🤫 (youtube.com)](https://www.youtube.com/watch?v=qLSONJE0YMU)

1. What is the popularity score- what specific data makes up the popularity score (1.59 mins in) What are the hidden metrics that goes into a popularity score?  What other metrics (information) does the program provide to the artist?

2. Pick two musical artists in the same genre that you like. Look up their metrics for popularity, energy, danceability, positiveness, speechiness, liveness, instrumentationess.  Compare the two. Who is the most popular and why do you think that is?

3. What kind of data do you think they use for energy, danceability, positiveness, speechiness, liveness, instrumentationess?

**Refine**

In the video above, at about 7:34 minutes in, the artist talks about the Discover Weekly Algorithm and how if you can get this to activate, then you can promote songs more.

4. What do you think an Algorithm is and what does it do here when it is triggered?  What data is it using?