



Big Data in Action: Practical Applications in the Banking and Sports Sectors.

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Worldwide, people are generating more data than ever. The collection and analysis of big data has become big business, with the full spectrum of industries looking to leverage this powerful resource. Big data analytics has fast become a competitive advantage for companies large and small to outrun their competition.

The practical applications of big data analytics offer immense value to organisations operating in the banking and sports sectors.



Introduction: What is Big Data Analytics?

Big data analytics involves the examination and evaluation of significant sets of data to reveal behavioural patterns, correlations, and other key insights. (6) Utilising advanced modelling, the intelligent evaluation process becomes quick and more efficient than traditional means of analysis.

The primary goal of big data analytics is to inform and improve decision making. Imagine that a carpenter needs a plank of wood measuring 25 cm to complete a project they are working on. Without measuring the wood, the cut plank might end up 20 cm long – maybe 30cm, maybe even 40cm. When they attempt to fit it in place, it doesn't work. Their guess was not accurate enough.

Now imagine the carpenter used a ruler to measure the wood before cutting. The plank is now exactly 25 cm long, all thanks to data. In essence, they used data to inform their decision-making, and the end product was far, far more successful.

The same logic can be applied to big data – though big data collection, analysis, and implementation are a little more complex. Still, organisations can use an analytics strategy to make better decisions that help them achieve their mission.

The Evolution of Big Data

Big data is nothing new. Businesses have long understood the value of basic data analytics – think numbers input manually into a spreadsheet and then examined by an expert to reveal trends.

Big data has evolved exponentially in speed, scale, intelligence, and efficiency since then. Even going back a couple of years, organisations would use data analytics that evaluated current behaviours to inform future decisions. Today, businesses have the capability to examine data in real-time and use even more sophisticated insights to make decisions in the present moment.

In short, big data analytics has evolved into a tool companies can use to stay agile, adapt to changing circumstances and consumer expectations, deliver more personalised experiences, and make more accurate predictions.

The Importance of Big Data Analytics

Big data reveals insights and opportunities, enabling businesses to capitalise on trends, reshape their offerings to better meet the needs of modern-day customers, and troubleshoot under-performance.

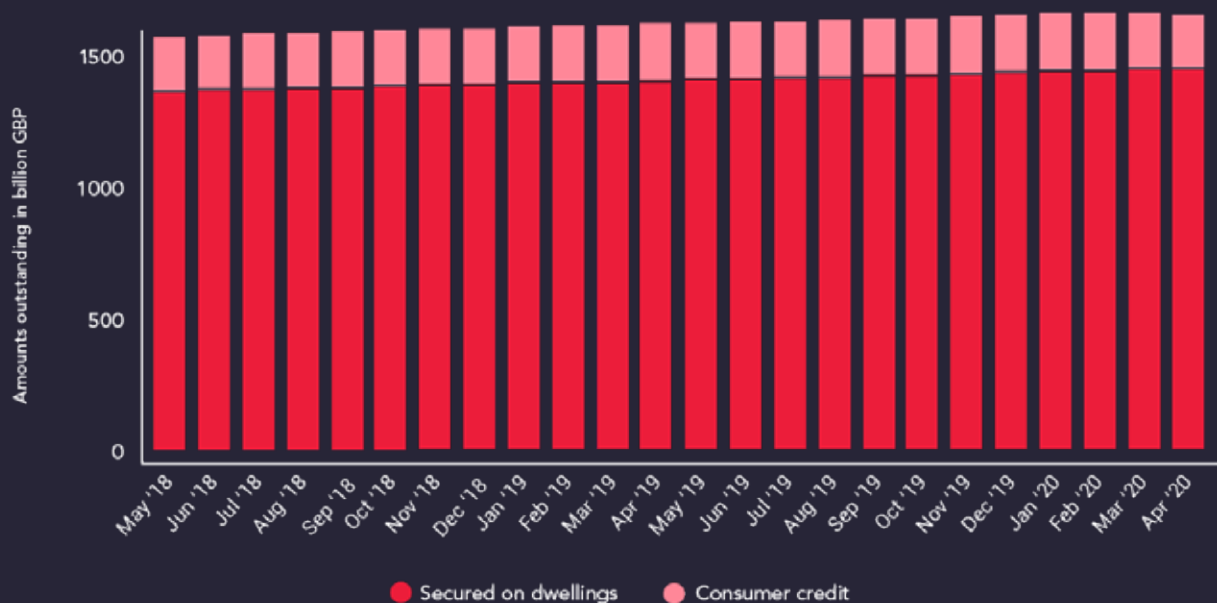
The importance of big data analytics can be summarised in three points:

- 1.** Big data analytics cuts costs. Organisations can minimise the risk in the decision-making process, ultimately increasing the likelihood of a successful venture. What's more, in a technical sense, big data can help companies reduce downtime, speed up customer service, and achieve cost-savings.
- 2.** Big data analytics inform better decisions. Today's analytics tools allow companies to uncover insights in real-time to inform their decision-making process.
- 3.** Big data analytics shapes better services. Data analytics gives organisations an unprecedented look into the customer's wants, needs, and pain points. Behaviour patterns can be viewed on significantly larger scales, enabling engineers, designers, and other key stakeholders to create better services and products.

As such, data has become a hot commodity. According to Gartner, by 2022, 35 per cent of large organisations will be sellers or buyers of data, up 10 per cent from 2020. (5)

Big Data Analytics in the Banking

Lending impacts just about every area of the economy, with UK residents owing billions of pounds. The graph below details funds outstanding from lending to individuals between May 2018 and April 2020. (2)



Any technology that promises to streamline processes, minimise risk, and ultimately enable financial institutions to make more from their loanees is sure to capture widespread interest.

Both boutique and big-name banks are turning to big data analytics in the hopes of protecting their assets and innovating their products to attract customers in an increasingly competitive marketplace.

The banking sector – and lending in particular – is ideally positioned to take advantage of big data. In essence, lending is a straightforward data problem centred around risk.

On the one hand, the potential value of a loan is dependent on the creditworthiness of the loanee. Creditworthiness is determined by analysing historical data to identify habits and determine the likelihood of a loanee defaulting on their loan. The more data a lender has, the more accurately it can evaluate creditworthiness.

But that isn't all. The potential value of a loan is also connected to the loanee's assets, such as their car, home, or business. It's also tied to predicted inflation levels and forecasted economic growth – two further subsets of data.

Aggregating and evaluating these various data types is no easy feat, but it's a problem that big data analytics solves. The rewards are game-changing:

- > **Gaining a more accurate understanding of a customer's creditworthiness can protect banks against high-risk loanees and help them secure more, higher-quality customers.**
- > **Automated processes, AI, and big data can carry some of the administrative burdens, minimising costs and maximising the return on loans.**
- > **Greater insight into customer wants, needs, and expectations can enable banks to be more agile in their product and marketing design, giving them a greater competitive advantage.**
- > **Real-time data and analysis can improve a bank's security efforts, protecting customer information and assets.**

Here's a closer look at the practical applications of big data in the banking

Big Data and Measuring Creditworthiness

A bank's ability to accurately predict a loanee's likelihood of defaulting on their loan is critical to its success. However, this can be a challenging task, even when the data is complete and perfect, which it rarely is.

Creditworthiness is impacted by both positive and negative factors. (4)

Positive factors:

Ensuring credit balances stay low
Having a lengthy history of perfect, on-time credit repayments
Settling outstanding debts

Negative factors:

Making late payments or missing payments completely
Opening several new lines of credit within a short timeframe
Filing for bankruptcy

Having financial associations with others that have a poor credit history, such as a joint mortgage

The factors above are just the tip of the iceberg, with lenders increasingly looking to non-traditional data points to gain a clearer picture of an individual's or organisation's financial profile. This is particularly important for loanees that do not have a typical credit history – or that don't have a credit history at all.

So, where does big data analytics come in?

Big data analytics can help institutions in the banking sector more effectively measure dissimilar, fractured data drawn from a whole variety of disparate sources to determine creditworthiness. The result is a risk profile or credit score that is more holistic and more accurate.

Big Data and Security in the Banking Sector

As the world becomes increasingly digital, the financial industry is subject to an ever-evolving array of compliance regulations. In the UK, anti-money laundering legislation meets robust global standards set by the intergovernmental Financial Action Task Force (FATF).

In recent years, obligations defined by FATF have become more specific and more complex, forcing banks to up their game in the fight against money laundering, fraud, and other integrity risks. In response, banks have made significant investments into big data analytics, AI, and other automation technology in an attempt to improve the effectiveness and efficiency of their compliance tasks.

For example, the analysis of data drawn from multiple sources – both internally and externally – can trigger alerts signifying high-risk clients or transactions. With fewer staff and minimal manual interference, these kinds of automated techniques are a cost-effective way to meet compliance responsibilities.

The Future of Big Data in the Banking Sector

Beyond determining creditworthiness and improving surveillance, the successful application of big data in the banking sector will open new doors and present financial institutions with opportunities to innovate their products and services.

The interpretation of behavioural data will likely become a key differentiator for competing banks, with personalised services like real-time lending becoming a possibility.

Further, the concept of open banking – which has already seen tentative adoption in the UK – will give customers more control over their banking data, such as their transaction histories and account balances. (3) This data can be shared with other organisations, such as competing banks and fintech companies, lowering the barrier to entry for new institutions looking to break through into the banking sector.

The benefits of big data won't come without challenges. Banks and lawmakers must continue to protect personal and sensitive data from threats, with privacy remaining a top priority.

In other words, the power of data should only be used for the good of the customer – to deliver a better product and a smoother experience. With this golden rule front-of-mind, banks can utilise big data analytics while maintaining a high level of integrity.

Big Data Analytics in the Sporting Sector

It's not only the financial industry that has embraced the power of data. The sporting sector has, too, with analytics becoming a crucial element of many teams' success strategies. The presence of big data is particularly evident in the world of football.



Big Data Analytics in the World's Leading Football clubs

Big data is, at its core, a decision-making tool. The goal is to obtain as much information as possible, synthesise that information, and draw conclusions.

In football, this process can be extremely beneficial, giving teams the competitive edge they need to secure both long- and short-term success. Here are some of the ways the world's leading football clubs are using big data analytics to improve their team compositions and playing strategies.

Using Data Analytics to Complement Visualisations

Big data analysis is a science. Football players are not scientists; they are football players. And that's why data scientists are using key insights to complement and inform visualisations, which have become central to the practical application of data analytics in football. The aim is to ensure the insights deduced are clearly understandable by those positioned to benefit in the real world. Otherwise, the exercise is pointless.

Using Data Analytics to Sign New Players

A player's data can be a black-and-white source of information that managers can use to determine whether or not that player is a good fit. It is worth mentioning, however, that while data analysis can be a powerful tool, it's important that other factors are considered, too. Data is used as complementary information, rather than the be-all and end-all of a player's worth.

Using Data Analytics to Shape Better Strategies

Big data helps us understand the past and shape better outcomes in the future. In the context of football, this is extremely valuable.

Historical data sets, like the average area covered per game and passing percentages, can help clubs design more competitive playing strategies that are tailored to their team's current composition and their competitor's playing style.

Again, context is crucial. Raw numbers are not enough to draw valuable conclusions, as analysis will vary depending on a team's or individual's tactics.

Using Data Analytics to Answer Specific Questions

The game of football is full of measurable events – passes, tackles, shots, goals, injuries, the list goes on. These data sets can be used to answer specific questions about a team, player, or competitor.

That being said, data scientists must differentiate valuable statistics from those that are superficially interesting. For example, when analysing a game, one scientist might examine the number of tackles made by a player. The other might place more emphasis on the number of expected goals (xG). Depending

on the team's strategy, either data set can be used to generate conclusions on the overall defensive and offensive performance.

Further to this, some metrics will be more useful than others, depending on the line of investigation. For example, examining the distance covered by each player can help teams prevent injury and reduce the effects of fatigue. But that same data cannot be used, in most cases, to determine the level of success of a particular strategy.

Case Study: FC Barcelona

FC Barcelona is a Spanish professional football club widely considered one of the best in the world. Under Raúl Peláez Blanco, Head of Sports Technology Innovation Analysis, the club has embraced data analytics to its advantage.



For Blanco, context is crucial. “We do not rely on event data in player evaluation,” he said in an interview with Barça Innovation Hub. (7) “We believe we need to understand how players act in different contexts.”

He gives an example. Imagine the club is looking for a winger who excels at dribbling in counterattacks. The club could use historical event data, but that would only tell one side of the story. Event data is decontextualised. The club needs to know how the player dribbles when facing various counterattacks – when the opponents are well organised, when they are disorganised, and so on.

According to Blanco, many clubs are in the habit of assessing and categorising players based solely on their playing data. This can be limiting.

“Before we sign a player, we must examine how he solves problems in the contexts he will face at Barcelona.”

For example, when examining a single pass, it’s not enough to isolate that pass and evaluate that data. Instead, data should reflect how all other players are positioned when the pass is made. This strategy helps Blanco uncover high-impact insights for the coach.

The data analytics strategy preferred by Barcelona is known as 22-player data, and it’s significantly richer than stand-

alone event data. Twenty-two-player data encompasses the position coordinates of all players on the field and the ball, providing a complete picture of the context of a particular event.

A footballer might have the ball for less than a few minutes of a full, 90-plus minute match. But their impact on the game’s outcome is much greater than those few minutes of play. Tactical positioning, for example, is a significant contributor that cannot be accounted for using shot statistics.

To capture this data, FC Barcelona has invested in the automation of video analysis.

“A few years ago, video analysts spent most of their time recording games and labelling matches and workouts,” said Blanco. Today, computer software is sophisticated enough to label events within a recording, giving analysts more resources to dedicate to evaluation and insight.



The advent of video analysis automation has seen a new set of skills become in-demand at the football club: machine learning and computer vision. The algorithms need to be intelligent enough to not only identify where the players are on the field but also their orientation – all in real-time. From there, the software must accurately determine whether a pass is a counterattack or established possession.

Even among the top leagues with several cameras filming every match, tracking and

labelling this data is not always completely accurate. This will likely be an area of growth and innovation within the sporting sector in the next few years.

Despite this, 22-player data is being used at Barcelona and within other football clubs. Physicist William Spearman, who works at Liverpool FC, has created a passing model that includes a distinction between plausible passes and passes that will likely be blocked by the opponent’s defence.

Another model by computational science student Fran Peralta Alguacil demonstrated how “disruptive runs” by Barcelona players gave teammates more space to attack. This particular model was based heavily on physics data, including ball dynamics and player movement.

In the near future, Barcelona is looking to implement code on parallel computers so that insights can be generated in real-time to speed up decision-making during matches. Computer-generated decisions will be used alongside coach directions, rather than replacing them.

Limitations of Big Data Analytics in Football

Big data analytics in football is not without its limitations. Here are some of the most pressing to be aware of:

- > **Mathematical models are always approximate and can never be 100 per cent accurate in real-life contexts – there are simply too many variables at play in the real world. Further to this, football players are human beings with good days and bad days. Even the best players in the world are inconsistent.**
- > **The information needed to make the most accurate predictions using data analytics is difficult to measure. For example, a player’s body orientation will determine whether or not a pass is possible but creating an algorithm that can recognise body positioning is extremely difficult.**
- > **Interpreting and implementing data insights requires skills outside the realm of what is typical of coaches and sports scientists. Getting the most out of data analytics requires an understanding of advanced mathematical models, and how these models support, challenge, and complement coach experience and intuition.**



Conclusion.

There is no denying the practical potential of big data within both the banking and sporting sectors. As new innovations come to the fore and become increasingly accessible, automation, AI, and intelligent analytics will surely become the norm.

In the financial industry, customers will be able to access loans in real-time, as banks draw on non-traditional data to determine their risk level and creditworthiness. In the football world, teams will use advanced models to shape their team and playing strategy and may even implement data-backed insights mid-game. The line will blur between coach and data scientist, and competition could be tougher – and more entertaining – than ever.

With so much potential, organisations are burdened with significant responsibility. Protecting sensitive information must be at the heart of data-based initiatives. In sports, the ownership of data may become a point of contention, as performance insights become more and more integral to a club's success.

About Shout.

Shout are a software consultancy headquartered in the UK, with offices in Newcastle, London and Philadelphia. Led by founder and CEO Gary Boon, author of this paper, Shout design, architect and engineer software solutions for clients across finance, property, sport and leisure sectors, and for UK government.

Digital partners to the UK ICO and Hitachi Capital, Shout provide Cloud Strategy, Application Development, Data Analysis and UX Design Services to a host of public and private sector organisations.



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