



Is Data Science Going to Replace Sports Coaches and Doctors?

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Why should you read this?

Traditionally medical care was primarily available to patients with acute conditions. However with the advent of modern medicine and easy availability of healthier diet and lifestyle choices, more people are choosing a healthier life. This means our society of the future needs to increase sports coaches and doctors who instead of treating sick people, will be consultants advising us on how to achieve an ever more healthier lifestyle. This also translates to the fact that instead of a small fraction asking for high levels of critical care, society is moving to a state where wellness care should be provided to all to achieve healthier lives.

This blog talks about how data science can help the sports coaches and doctors of the future to achieve this goal. So if you are suffering from some form of a chronic condition or you are a professional athlete (or anywhere in between), the next four short paragraphs will help you understand the future of sports and healthcare.

What is Data Science?

The term is often interchangeably used with buzzwords like 'Big-data' and 'Artificial Intelligence' in social media to refer to business analytics, or as a sexed-up term for statistics. In actual practice it is an umbrella term often used to describe the interdisciplinary field where statistical methods are used to extract and then present knowledge or insights from data sets. A typical data scientist often has a broad skill set of writing computer code, handling digital databases, statistics, and some working understanding of the overall area in which the data product is operating in.

In the field of sports and medicine, data science allows coaches and doctors to statistically compare the performance of an individual athlete, or the health of an individual patient with the general population with similar conditions. This in turn can be enormously insightful in gauging how well an athlete or the patient performing and therefore fine-tune their training or medication.

How have doctors and coaches dealt with data?

Coaches and doctors tackle two subsequent sets of tasks (from a data science point of view). First, they collate the available historical data of the athlete or the patient to determine their present fitness or health condition. Subsequently, they prescribe a routine or medication based on how a typical patient in that condition has historically been handled.

Historically, the first task involved maintaining paper based fitness charts and histories or doctors' prescriptions. Nowadays, technical gyms allow their subscribers to record workout durations and map how the same affects the user's vitals like heart rate, etc. With the advent of electronic health record, where patient data is stored in a secure remote server (colloquially, the cloud), doctors can update and view patient

data across clinics. However most electronic health records are accessible to certified physicians only at a relatively local scale i.e. either a state or a country.

The second part involves making judgements based on experience or relevant sports or clinical investigations. The coach can look into the athlete's workout data every few days or weeks, and tweak the routine appropriately based on his prior experience. The doctors often refer to a medical journal or refer to case studies to determine the appropriate course of action. Of course, this is built upon the top of years of experience gathered both during training at medical school and while actually practicing medicine.

What are some of the cutting edge solutions available now?

The first step of the challenge i.e. storing medical or health data online, is widely available in EU and USA, and several developing countries are quickly catching up.

The second step, automation, where the devices are themselves smart enough to give personalised feedback in real time to achieve the desired outcome (for both fitness and medical goals) is the current challenge. To achieve this the device needs to be wearable i.e. the person should have the both the sensor and the computational module on his body. The device should also come up with a haptic i.e. vibration, voice or a visual method of communicating the instructions to the athlete or the patient in a reasonably intuitive manner.

Since sports tech is less regulated than medical devices, most of the cutting edge technology is currently available only to athletes. Companies like Athos, Myontec, Hexoskin and Clothing+ are leading the trend by selling smart apparel that have built in ECG sensors and well as motion trackers. These could eventually be used as a platform for building a personalised feedback mechanism. Even activity trackers like Fitbit and Jawbone are focussing beyond building just step counters to more holistic solutions for health and wellness. They are among the first companies to build a Device + App paradigm that will help people to lead a healthier lifestyle based on real time tracking of health data.



How we hope QuasaR™ will lead this revolution?

Our product QuasaR™ is a wearable personal fitness trainer that fits inside sports apparel. QuasaR™ helps users build cardiac and respiratory endurance and reduce obesity and stress by suggesting the optimal running intensity and duration, based on the user's personal fitness goals. QuasaR™ measures the user's heart rate, respiratory rate, blood oxygen saturation, and heart rate variability with medical grade accuracy and combines this data with information about the user's speed to report fitness predictors such as $\dot{V}O_2\max$, heart rate-running speed index, etc. These predictors are then used to recommend personalised coaching routines designed by fitness coaches towards achieving endurance goals.

For example, QuasaR™ can help athletes build cardiac endurance by first tracking how their heart rate increases with the running speed during warm-up sessions. Then during the actual training QuasaR™ uses haptic feedback to keep the user running at the lowest speed where they achieve their highest heart rate. Therefore the athlete can build their cardiac endurance without risking the chance of over exhaustion.

For the next few years, we will focus on building a large set of running and cycling regimens with QuasaR™, beyond just endurance building exercise. This includes programmes to take the athlete from couch to 5K in a month, or even an optimal way to run the Dublin Marathon.

However, we hope that some day this will be the stepping-stone for building a medical grade version of QuasaR™, which will perform similar recovery routines for patients suffering from cardiac and respiratory illnesses.

Is Data Science Going to Replace Sports Coaches and Doctors?

Well, we believe that the answer is no. Activity trackers like Fitbit or Jawbone or fitness trackers like QuasaR™, Hexoskin and Athos will come up with diverse routines for giving real time feedback. However these devices will rely on the experience of professional coaches and doctors to build the new training regimens. As a result an individual may be actually be following these regimens more often at a low cost, while overall interaction with their coach/doctor get significantly lowered. The coach/doctor can monitor their performance remotely and prescribe solutions that directly revise the regimen. So, in effect, the coaches and doctors of the future that are armed with data science will be the architects of wellness, rather than bricklayers tackling the challenge one brick at a time.