

# Chapter 12

## Machine Learning in Management of Rocket Sports

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### **ABSTRACT**

*Today, technology plays a part in almost any aspect of our life. In sport management, whether in the case of competition, training, recovery, or care, high-tech technologies and innovations are beneficial to improve the performances. Nowadays, some scientists dedicate all their research to sport and improving the performance of athletes. In this context, machines, a branch of artificial intelligence, can offer many advantages to the sport management. This chapter analyses the benefits of machine learning in racket sports and gives future direction for practitioners and researchers.*

### **1. INTRODUCTION**

Racket sports combine precision, strategy and power, these sports have undergone real evolution over the years. However, in today's digital age, a new technology has emerged that could propel these sports to new heights: machine learning (Dadsena et al., 2021; El-Nemr et al., 2020). This innovation based on artificial intelligence offers new opportunities to analyse data, predict results or even personalize training strategies. In these chapter, we will explore the role of machine learning in the evolution of racket sports and understand how this technology can help improve player performance. The main objective of this chapter is to present the various uses of machine learning in the field of racket sports, as well as the results obtained thanks to this innovative approach. We will also look at how machine learning can be applied to analyse player performance, predict match outcomes, personalize training and optimize game strategy.

Machine learning has the potential to revolutionize the way racket sports played and perceived. In addition, technological advances such as the use of sensors and connected devices enable real-time data collection (Pant & Taghipour, 2023). This opens up new perspectives for real-time analysis and on-court strategic decision-making. In this context, this report aims to explore the possibilities offered by machine learning in tennis, while highlighting the challenges and ethical challenges associated with this use (Gao et al., 2018; Husna et al., 2021; Le bosse et al., 2017). We will also examine the signifi-

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cant results already obtained from the application of machine learning in rocket sports, as well as future opportunities for stakeholders in these sports.

In conclusion, machine learning represents a major breakthrough in the world of rocket sports, offering promising prospects for performance analysis, result predictions, training personalization and game strategy optimization. This chapter aims to provide an in-depth view of these key aspects and highlight the importance of machine learning in the evolution of rocket sports.

## 2. MACHINE LEARNING

### 2.1 What Is Machine Learning?

#### 2.1.1 Definition and Function of Machine Learning

Machine learning, also called automatic learning, is a branch of artificial intelligence specializing in the development of methods that allow computers to learn from a database (Nadia et al., 2021; Ren et al., 2016).

Machine learning allows machines to discover patterns, generalize from experiences, make decisions or make predictions.

This technology is based on a process composed of several steps:

- **Data collection:** The first step is to collect relevant data related to the problem to be solved. This data can come from various sources such as sensors, databases, social networks, videos, etc (Taghipour, 2009).
- **Data processing:** The raw data collected must be processed for use in the learning process (Taghipour & Frayret, 2010).
- **Choosing and training a model:** A machine learning model is a mathematical or statistical representation that learns from populated data. There are different types of models, such as neural networks, decision trees, etc. The model is trained on the training data, where it adjusts its parameters to minimize the risk of error and maximize performance.
- **Model evaluation:** Once the model is trained, it is evaluated on independent test data to measure its performance. This helps determine whether the model generalizes well and is able to make accurate predictions on new data.
- **Improvement and adjustment:** If the model does not perform as desired, additional adjustments may be necessary. This may involve readjusting parameters, selecting more relevant features, or even exploring different types of models (Taghipour et al., 2023a).

#### 2.1.2 Main Types of Machine Learning

There are different types of machine learning, each with their own characteristics and applications:

- **Supervised learning:** In supervised learning, the model is trained on a set of data, where the inputs are associated with known outputs. The goal is to learn a function that can correctly predict outputs for new inputs. It is therefore commonly used to make predictions (Taghipour et al., 2023b).

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