

## Chapter 2

# Advanced Analytics and Machine Learning Algorithms for Healthcare Decision Support Systems: A Study

**Ketan Sarvakar**

 <https://orcid.org/0000-0003-4486-0224>

*Ganpat University, India*

**Chandrakantbhai Devabhai Patel**

 <https://orcid.org/0000-0003-2340-4457>

*Ganpat University, India*

**Rahul Yadav**

 <https://orcid.org/0009-0007-4065-0314>

*Ganpat University, India*

**Kaushik Rana**

 <https://orcid.org/0000-0002-6251-343X>

*Vishwakarma Government Engineering College,  
India*

**Akshita Patel**

 <https://orcid.org/0009-0007-7377-2502>

*Ganpat University, India*

**Viral Borisagar**

 <https://orcid.org/0000-0002-4816-7374>

*Gujarat Technological University, India*

### ABSTRACT

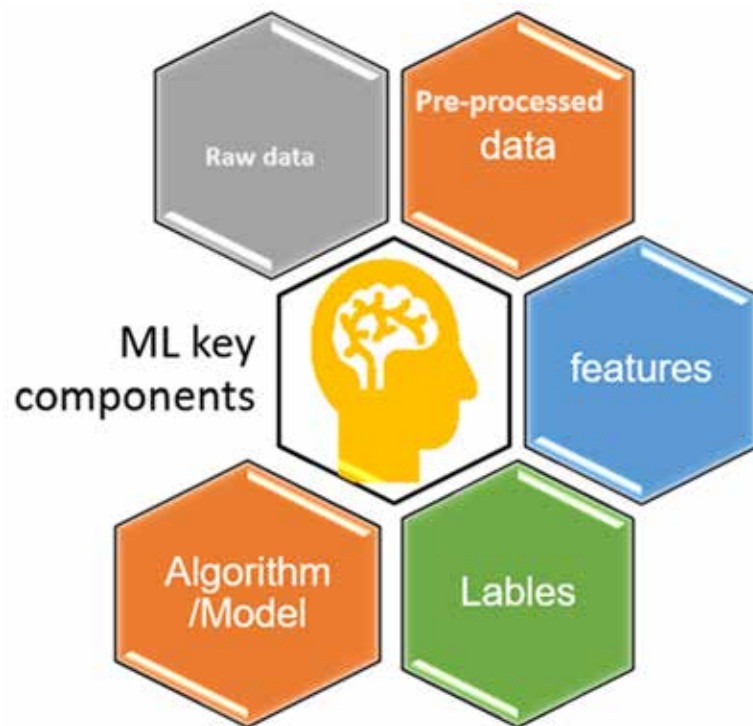
*Healthcare CDSS uses machine learning and analytics for real-time insights, risk projections, and decision support. The chapter covers CDSS development, deployment, and evaluation using machine learning for early illness prediction and personalised care. NLP analyses unstructured medical data to identify risks and schedule staff efficiently. Data scientists detect abnormalities to prevent healthcare fraud. CDSS machine learning speeds drug discovery with diagnoses, treatments, and insights. CDSS machine learning and analytics improve patient care, personalisation, and outcomes.*

## 1. INTRODUCTION

### 1.1 A Brief Overview of Machine Learning and Advanced Analytics

Machine learning is the area of artificial intelligence (AI) that focuses on developing models and algorithms that enable computers to learn and make decisions without the need for explicit programming. It involves applying statistical techniques to make computers perform better over time when they are exposed to additional data as like in Figure 1.

*Figure 1. Machine Learning Key Component.*



Important Elements:

Data: The unprocessed input that is separated into training and testing sets and used by the model to learn.

Features: The attributes or input variables that are employed in the prediction process.

Labels/Targets: In supervised learning, these are the output variables the model is trying to predict.

Algorithm/Model: A mathematical model or collection of guidelines that the machine learning system applies in order to generate forecasts or judgements.

33 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/advanced-analytics-and-machine-learning-algorithms-for-healthcare-decision-support-systems/351586](http://www.igi-global.com/chapter/advanced-analytics-and-machine-learning-algorithms-for-healthcare-decision-support-systems/351586)

## Related Content

---

### Metadata Management and Its Role in Data Governance

Rajesh Vayyala (2025). *Data Governance, DevSecOps, and Advancements in Modern Software* (pp. 47-72).

[www.irma-international.org/chapter/metadata-management-and-its-role-in-data-governance/376993](http://www.irma-international.org/chapter/metadata-management-and-its-role-in-data-governance/376993)

### A Hierarchical Security Model for Multimedia Big Data

Min Chen (2014). *International Journal of Multimedia Data Engineering and Management* (pp. 1-13).

[www.irma-international.org/article/a-hierarchical-security-model-for-multimedia-big-data/109075](http://www.irma-international.org/article/a-hierarchical-security-model-for-multimedia-big-data/109075)

### A Biologically Inspired Saliency Priority Extraction Using Bayesian Framework

Jila Hosseinkhani and Chris Joslin (2019). *International Journal of Multimedia Data Engineering and Management* (pp. 1-20).

[www.irma-international.org/article/a-biologically-inspired-saliency-priority-extraction-using-bayesian-framework/233861](http://www.irma-international.org/article/a-biologically-inspired-saliency-priority-extraction-using-bayesian-framework/233861)

### ISEQL, an Interval-based Surveillance Event Query Language

Sven Helmer and Fabio Persia (2016). *International Journal of Multimedia Data Engineering and Management* (pp. 1-21).

[www.irma-international.org/article/iseql-an-interval-based-surveillance-event-query-language/170569](http://www.irma-international.org/article/iseql-an-interval-based-surveillance-event-query-language/170569)

### AI for Multimedia Healthcare Applications

Tina Babu, Rekha R. Nair and Kishore S. (2025). *AI Techniques for Multimedia Data Processing* (pp. 1-38).

[www.irma-international.org/chapter/ai-for-multimedia-healthcare-applications/382620](http://www.irma-international.org/chapter/ai-for-multimedia-healthcare-applications/382620)