

# Enhancing Early Cancer Detection with Machine Learning and Data Analytics

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**Abstract:** *Cancer remains a leading cause of mortality worldwide, emphasizing the need for early and accurate detection. Traditional diagnostic methods often suffer from delays and limitations in precision. This research explores an AI-driven approach to early cancer detection using machine learning and deep learning techniques. By leveraging large-scale datasets from sources like the Genomic Data Commons (GDC) Portal, the study aims to develop predictive models that enhance diagnostic accuracy. The proposed framework focuses on pattern recognition, anomaly detection, and classification algorithms to identify cancerous cells at an early stage. Feature selection techniques and data preprocessing are applied to improve model efficiency. Performance evaluation metrics such as accuracy, sensitivity, and specificity are analyzed for validation. The findings highlight the potential of AI in transforming cancer diagnostics, reducing false positives, and enabling timely medical intervention. This study contributes to the advancement of AI-powered healthcare solutions, paving the way for more accessible and cost-effective cancer screening methods.*

**Keywords:** Early Cancer Detection, Artificial Intelligence, Predictive Analysis, Cancer Diagnosis, Early Detection Cancer.