

# **AI800 – Research Methodology in Computer Science**

## **Combined Report: Literature Review, Problem Statement and Research Objectives**

### **Research Title**

**Big Data Analytics and Machine Learning: Applications, Challenges, and Future Directions**

### **Literature Review**

Recent studies indicate that Big Data Analytics plays a vital role in modern organizations by supporting data-driven decision-making. Machine learning has significantly improved predictive analytics in sectors such as healthcare, finance, manufacturing, and smart cities (Jamarani et al., 2024).

Researchers also emphasize the rapid development of cloud computing and explainable artificial intelligence, which improve transparency and analytical performance (Tosi et al., 2024; Mills et al., 2024).

However, important challenges remain, including scalability, privacy, fairness, and quality assurance, indicating that further research is still required (Badshah et al., 2024; Ogrizovi■ et al., 2024).

### **Problem Statement**

Although Big Data Analytics has become an essential technology, existing analytics systems still experience limitations in scalability, data privacy, explainability, and quality assurance. Current solutions often address these issues separately rather than providing an integrated framework. This limitation reduces user trust and the effectiveness of analytical decision-making (Mills et al., 2024). Therefore, further research is needed to investigate current approaches, identify research gaps, and support the development of more reliable and trustworthy analytics systems (Tosi et al., 2024).

### **Research Aim**

**To investigate current Big Data Analytics approaches and identify opportunities for developing more trustworthy and explainable analytics systems.**

### **Research Objectives**

- To investigate the current applications of Big Data Analytics.
- To identify the major challenges affecting Big Data Analytics systems.
- To evaluate existing machine learning and explainable AI approaches.
- To identify research gaps in the current literature.
- To propose recommendations for improving trustworthy Big Data Analytics systems.

### **References (APA 7th Edition)**

Badshah, A., et al. (2024). Big data applications: Overview, challenges and future. *Artificial Intelligence Review*.

Jamarani, A., et al. (2024). Big data and predictive analytics: A systematic review of applications. *Artificial Intelligence Review*.

Mills, N., et al. (2024). A cloud-based architecture for explainable Big Data analytics using self-structuring artificial intelligence. *Discover Artificial Intelligence*.

Ogrizovi■, M., Draškovi■, D., & Boji■, D. (2024). Quality assurance strategies for machine learning applications in big data analytics. *Journal of Big Data*.

Tosi, D., Kokaj, R., & Rocchetti, M. (2024). 15 years of Big Data: A systematic literature review. *Journal of Big Data*.