

Fall Detection System

Using Machine Learning Models

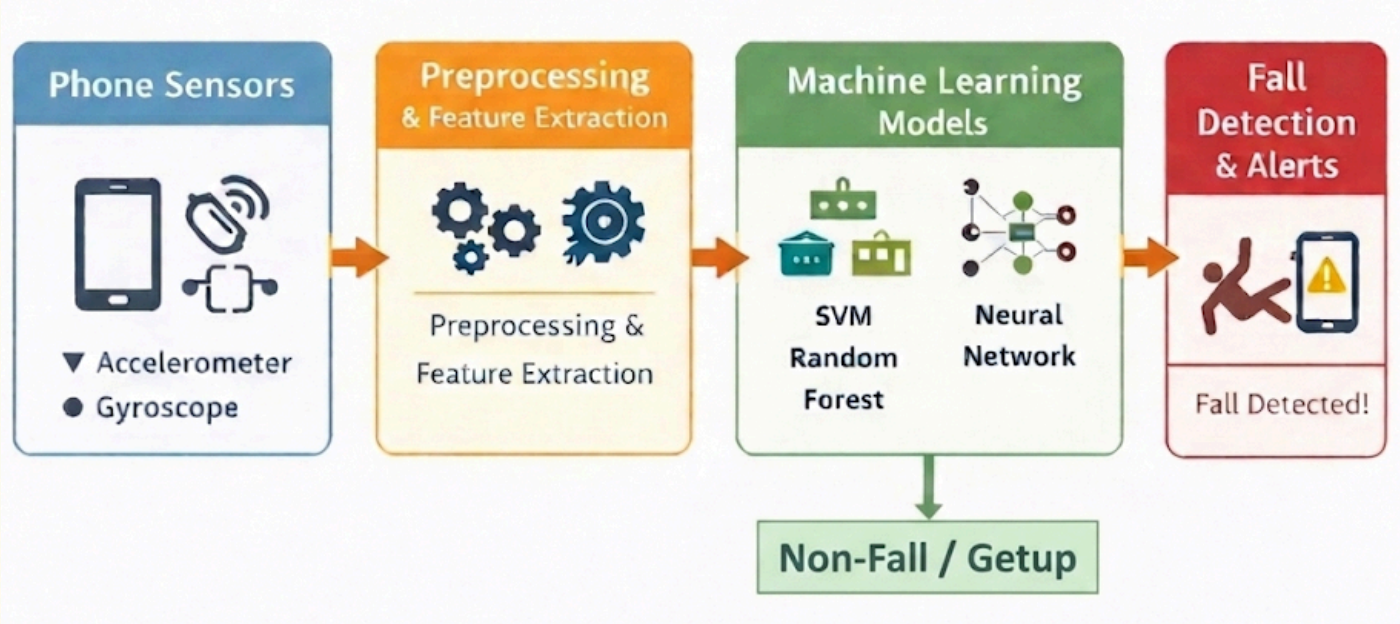
ABDULLAH KHALID | C00317154 | SUPERVISOR: DR CHRISTOPHER STAFF | MABDULLAH.K988@GMAIL.COM

A machine learning based system leveraging accelerometer and gyroscope sensor data to detect falls, minimise false alarms and send real-time alerts for safer independent living.

1. Introduction

- Falls are a major cause of injury and death, especially among older peoples(World Health Organization, 2021).
- immediate detection and response can save lives and reduce medical complications (Wang et al., 2020).
- Wearable devices can be costly and often face maintenance issues (Newaz & Hanada, 2023).
- Smartphones with built in accelerometer and gyroscope provide a practical and accessible solution (Abbate et al., 2012).
- Machine learning can accurately classify fall and non fall activities for real time monitoring(Harari et al., 2021).

3. Project



5. Key Strengths

- Speed - real time 3 second window.
- Lightweight computational load.
- High accuracy in classification.
- Ideal for fall detection notification.

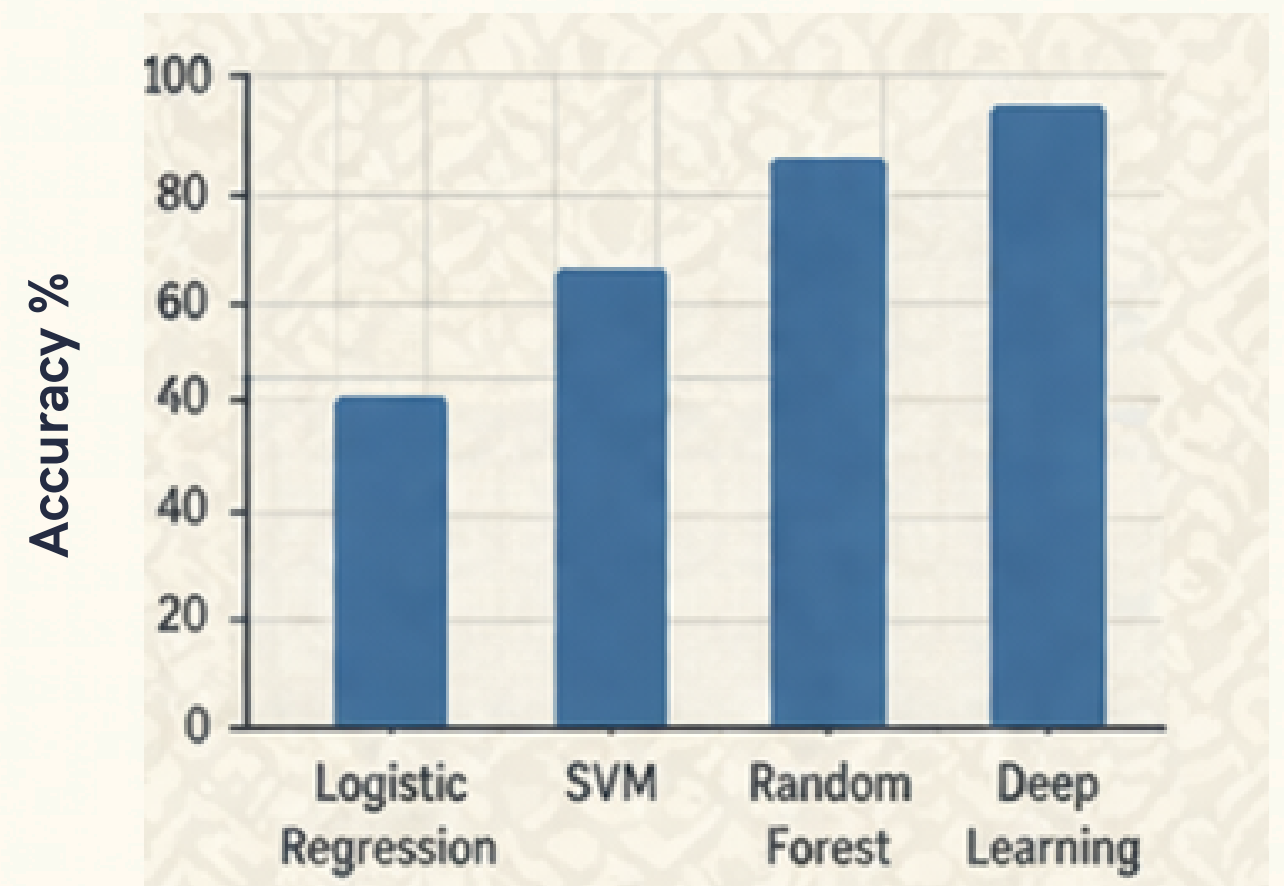
7. Conclusion

A smartphone based fall detection system using machine learning models can provide an accurate, real time and cost effective solution for elderly care and safety monitoring, reducing response time and potentially saving lives.

2. Problem Statement

- High false positive in threshold based system.
- Dependence on dedicated wearable hardware.
- public datasets mostly contain simulated falls by young individuals, limiting real world application.
- Many systems lack real time alert functionality.
- Need a cost effective, accurate and scalable solution using Smartphone.

4. Systems



6. Fall Accuracy

- Real time data collection and decision making.
- Highly trained model are making decisions.
- Different models are trained differently to take decision.
- Low chances of false alarms.

8. References

- World Health Organization (2021). Falls.
- Abbate, et al. (2012). Fall Detection using smartphone.
- Harari, et al. (2021). Real-Time Fall Detection.
- Newaz, S. & Hanada, K.(2023). Fall Detection Methods.
- Wang, et al. (2020). A Review of Fall Detection Techniques.

