Fall Detection Model

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Overview

01 Business Challenge

02 Data Understanding

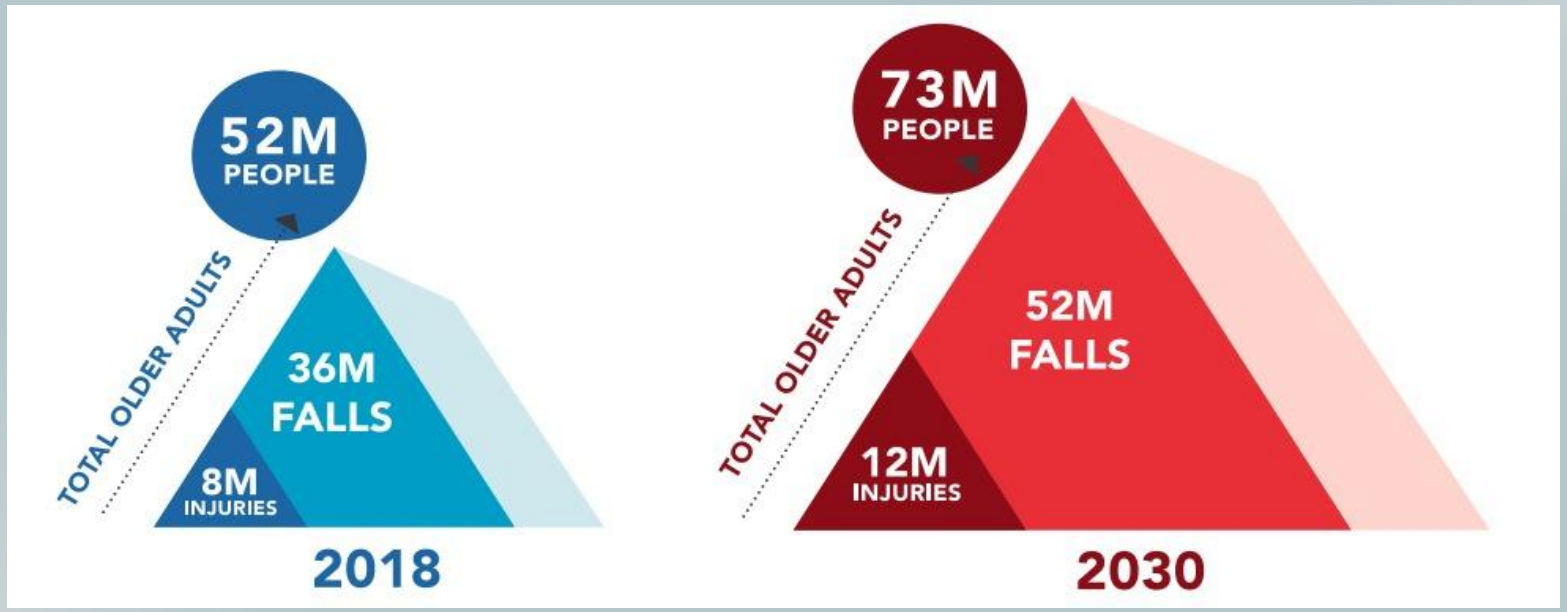
03 Methods & Modeling

04 Conclusion

01

Business Challenge

Current & Future Trends

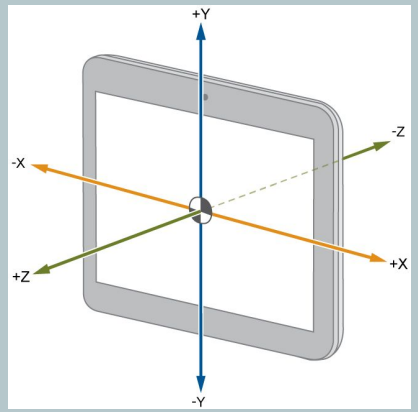


from the CDC

02

Data

- ARCO Research
- 17 subjects
- 45 total tasks (ADLs, Falls)



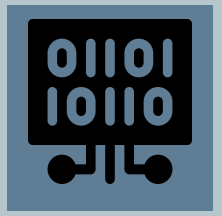
03

Methods and Modeling

Methods

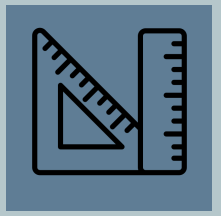
Dataset Selection

- Raw vs. Aggregated
- Separate test dataset



Binary Classification

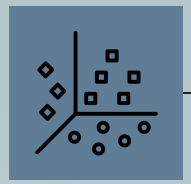
- Target: “Fall”



Metric Selection

- Accuracy, Recall, etc.
- Prediction Time

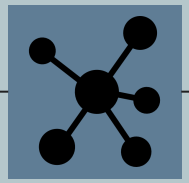
Model Selection



PCA / KMeans

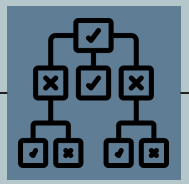
Baseline

Logistic Regression



kNN

- With GridSearch



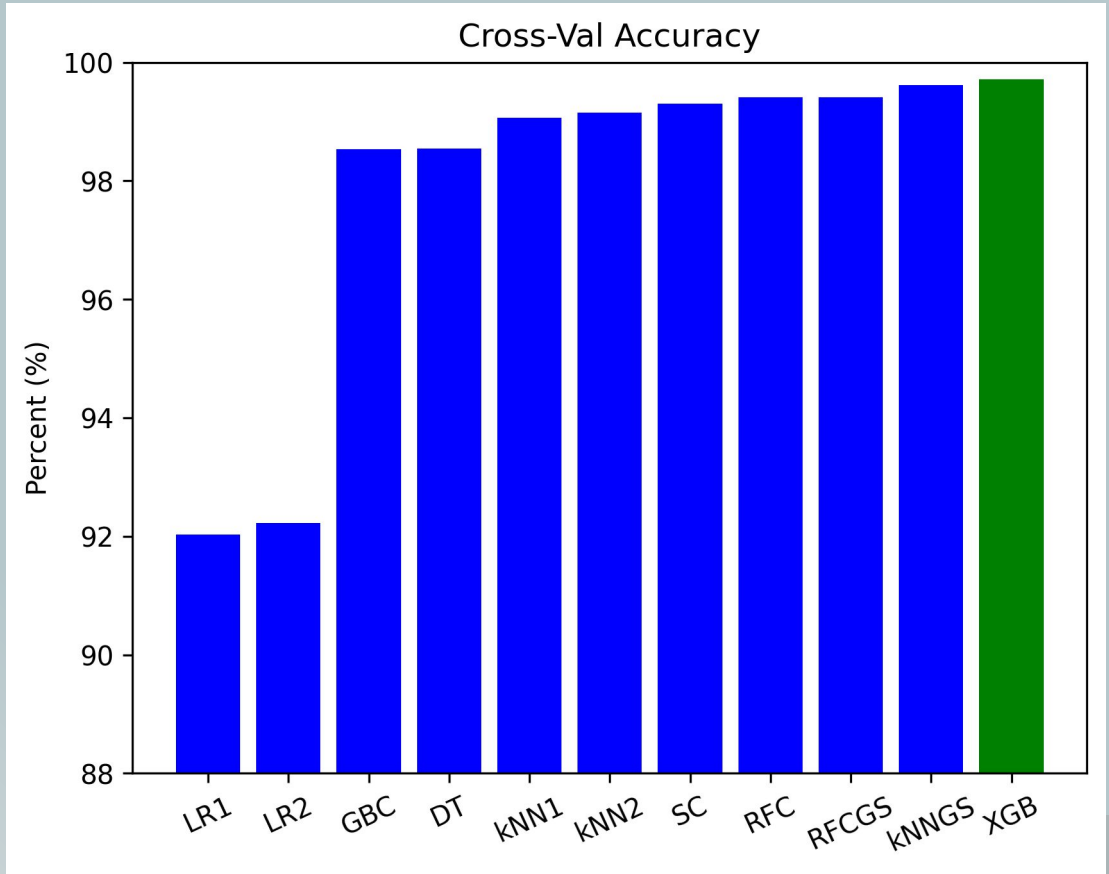
Tree - based

- RFC with GridSearch

Ensemble Methods

- Stacking Classifier
- Gradient Boosting
- XG Boost

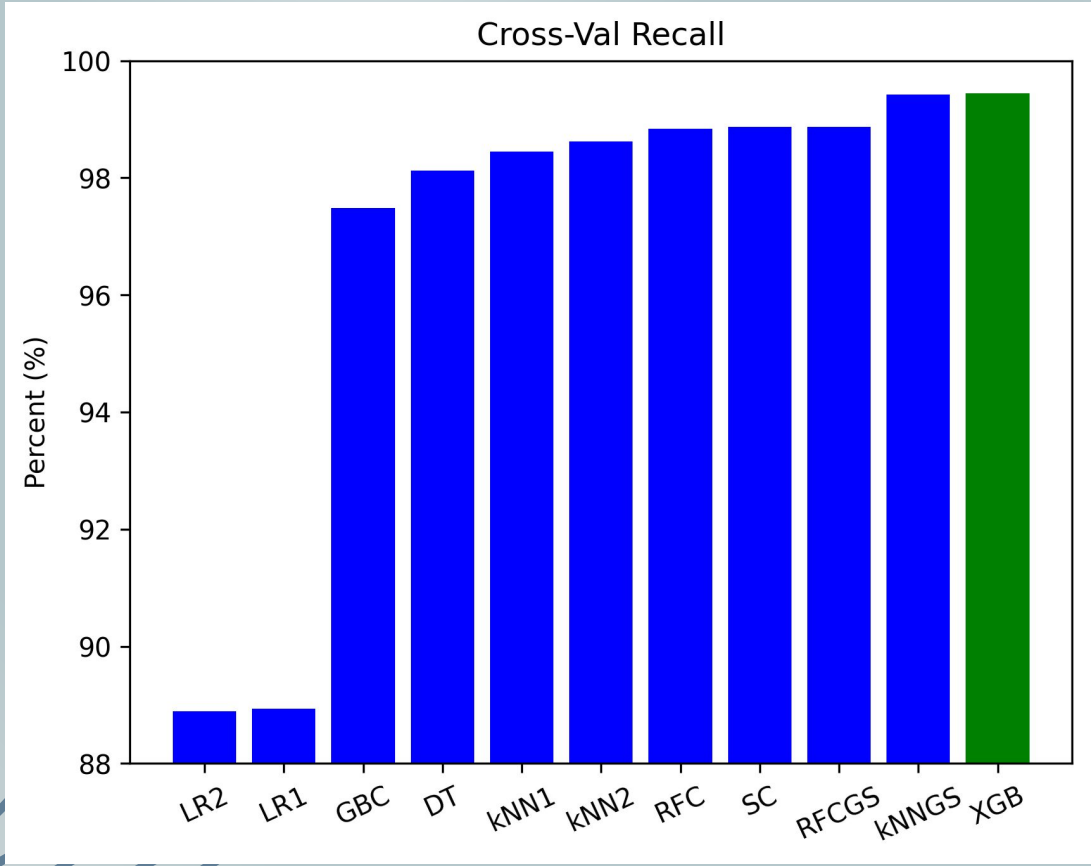
XG Boost Results: Accuracy



XG Boost = **99.71%**

kNN GS = **99.62%**

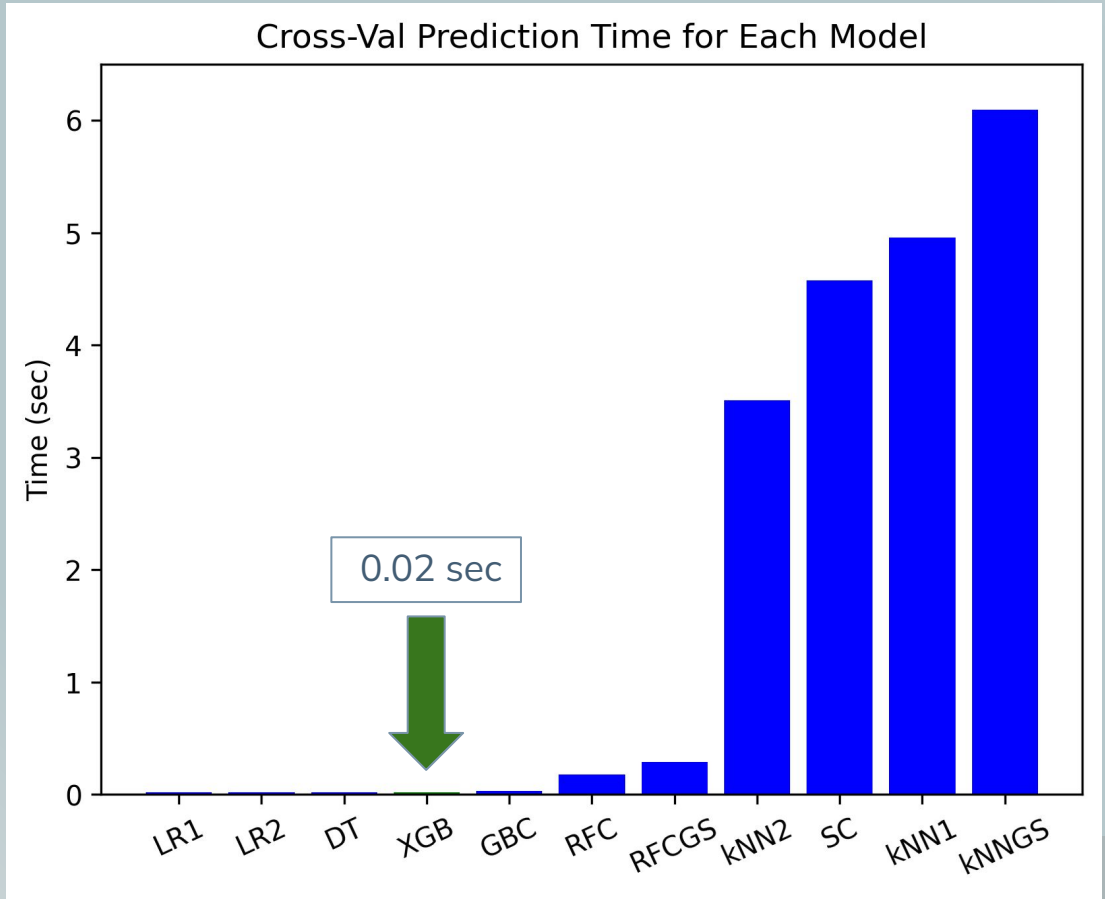
XG Boost Results: Recall



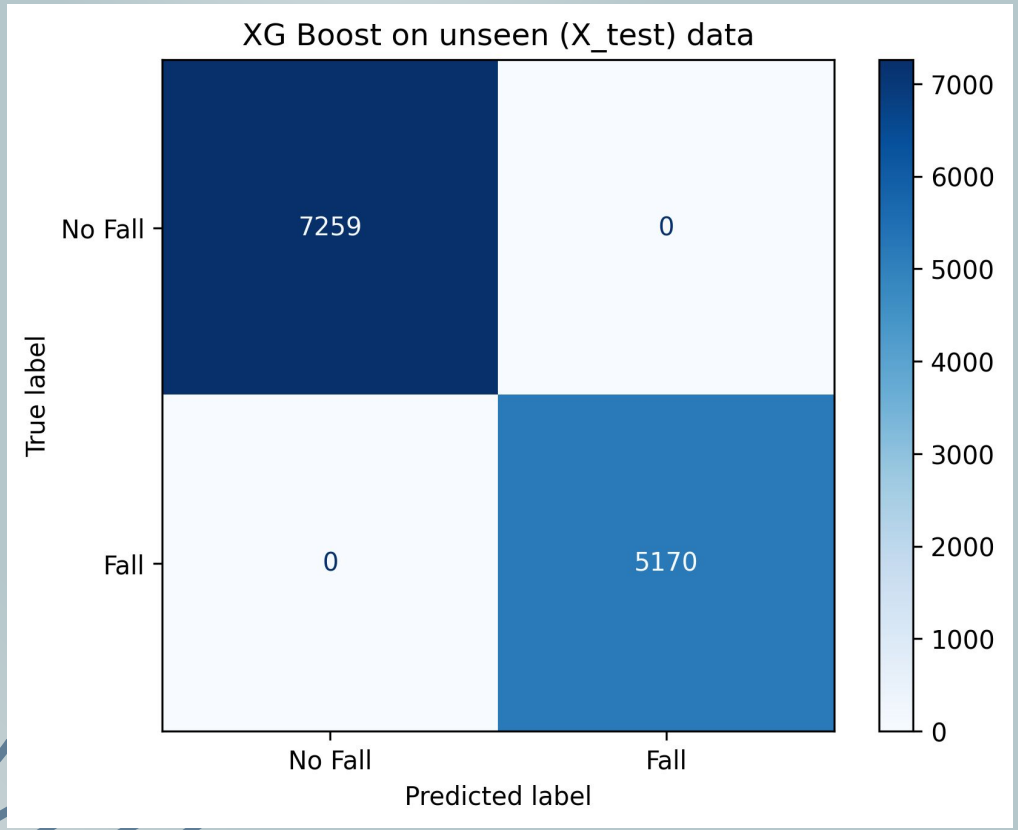
XG Boost = **99.44%**

kNN GS = **99.42%**

XG Boost Results: Time



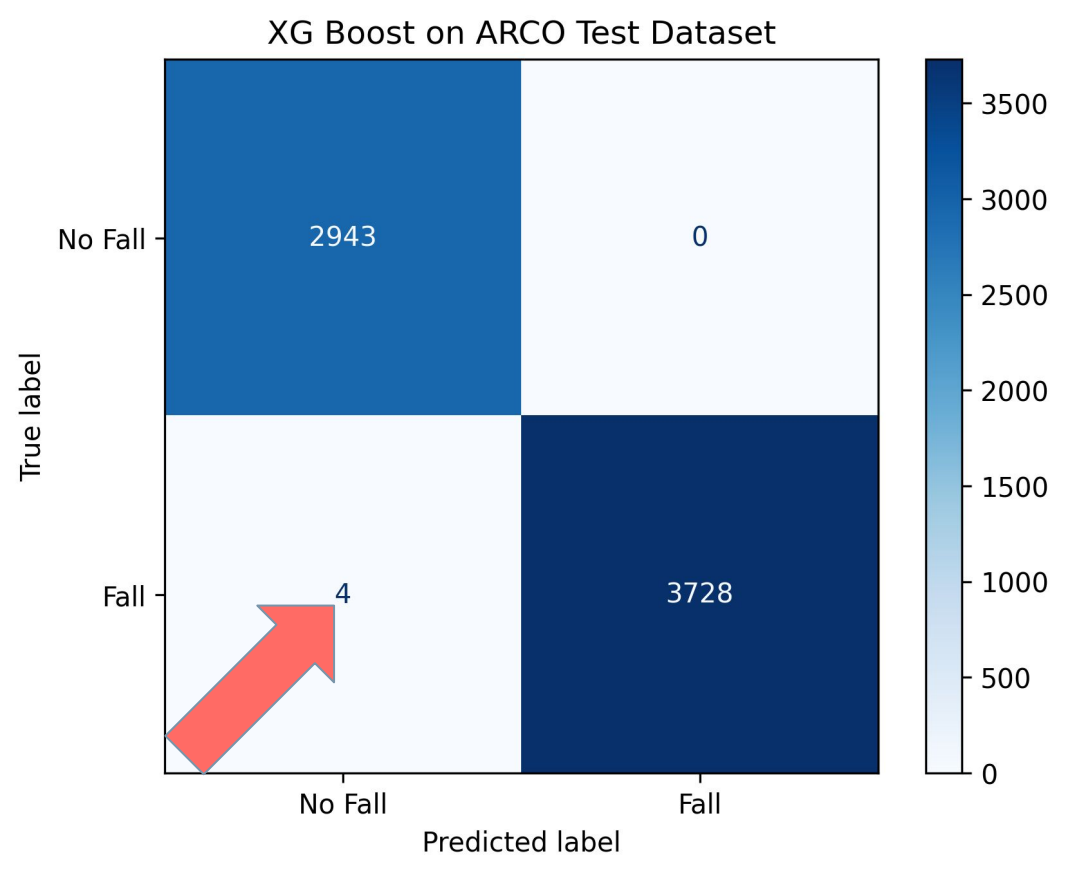
XG Boost on Unseen (X_test) Data



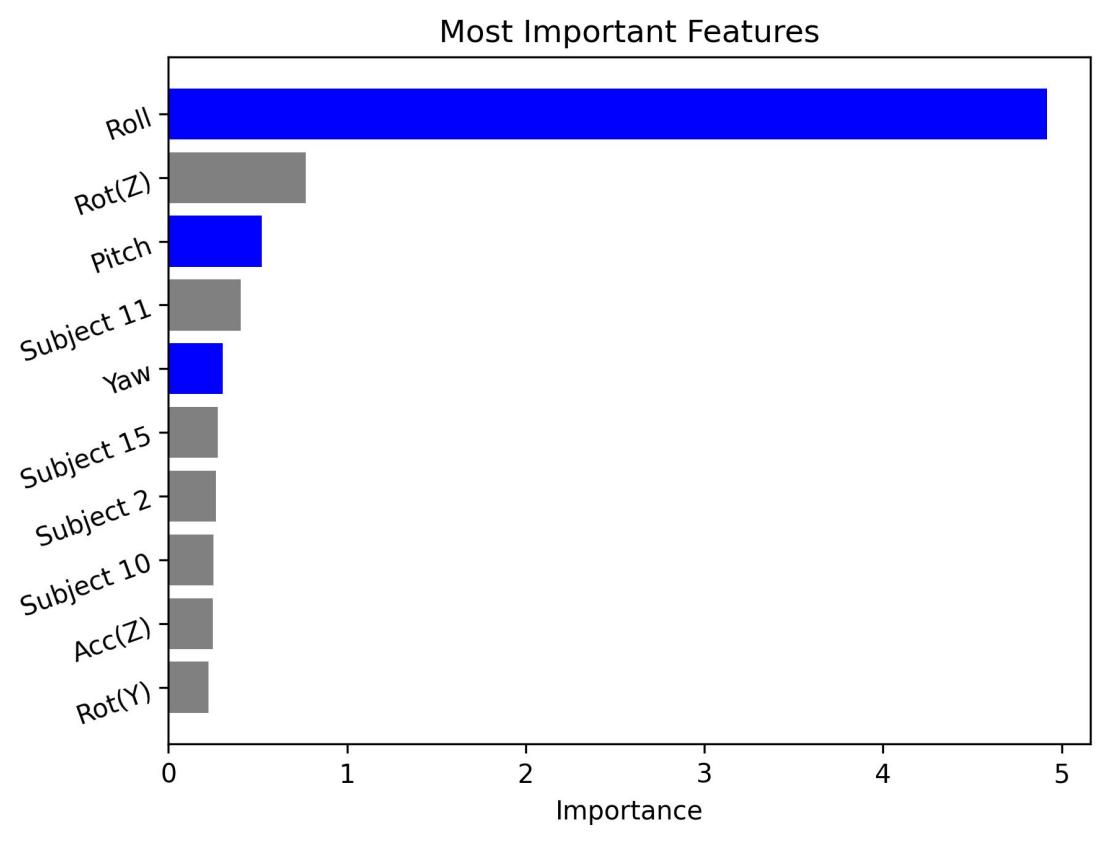
Prediction time: **0.01 sec**
Accuracy score: **1.00**
Recall score: **1.00**

Final Evaluation: ARCO Test Dataset

XG Boost on ARCO Test Dataset



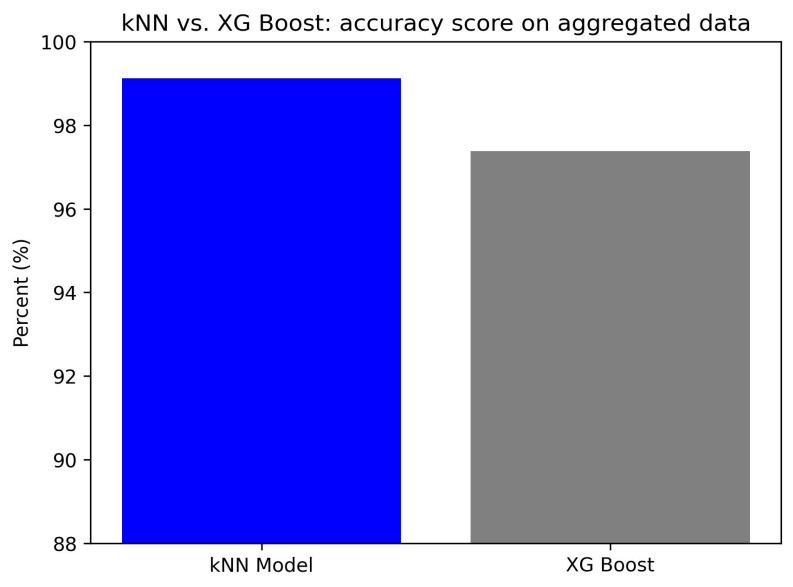
XG Boost: Feature Importance

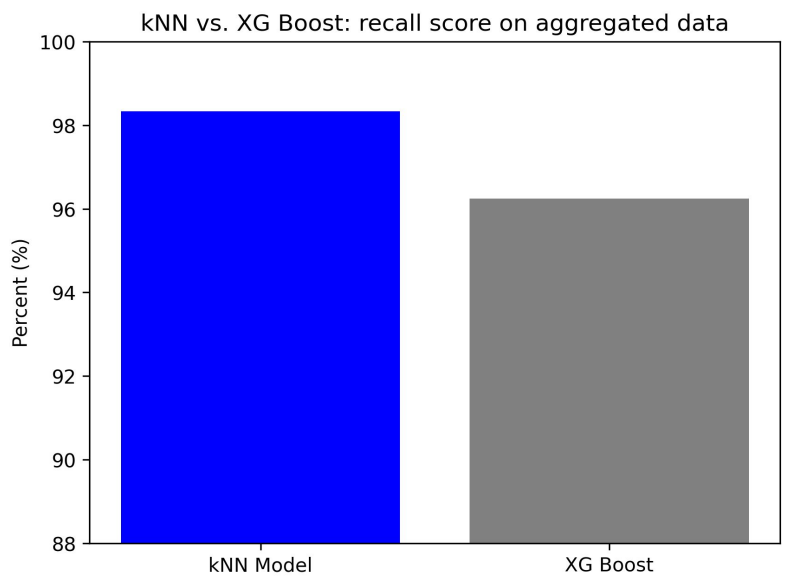


Considering an Alternative...

Alternative Model: Time Lapse

- Aggregated Data
- kNN vs. XG Boost





04 Conclusions

ARCO Research Smart Mirror

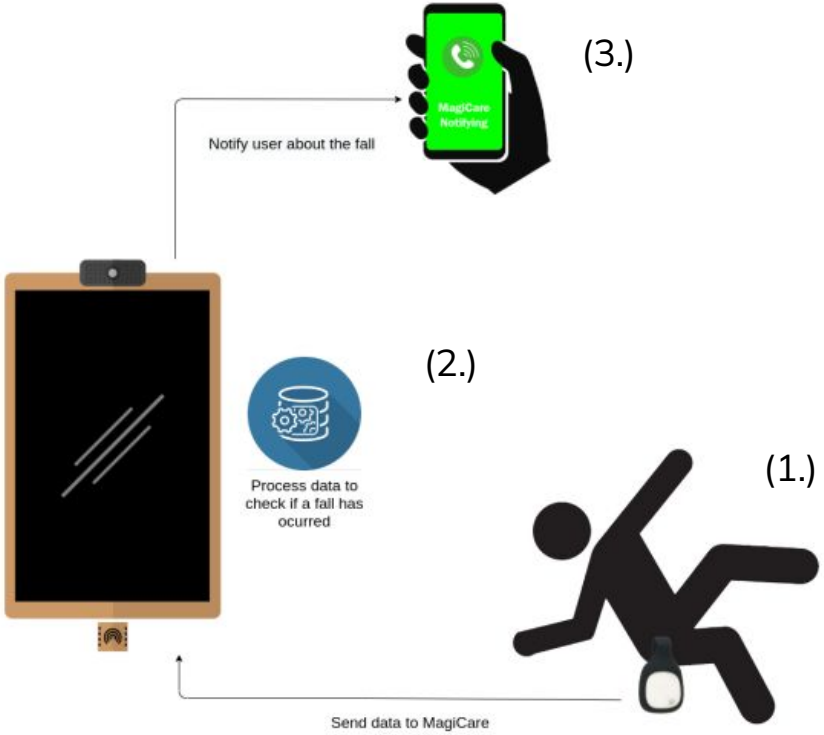


Figure 9. Fall detector.

Thank you!

Any questions?
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