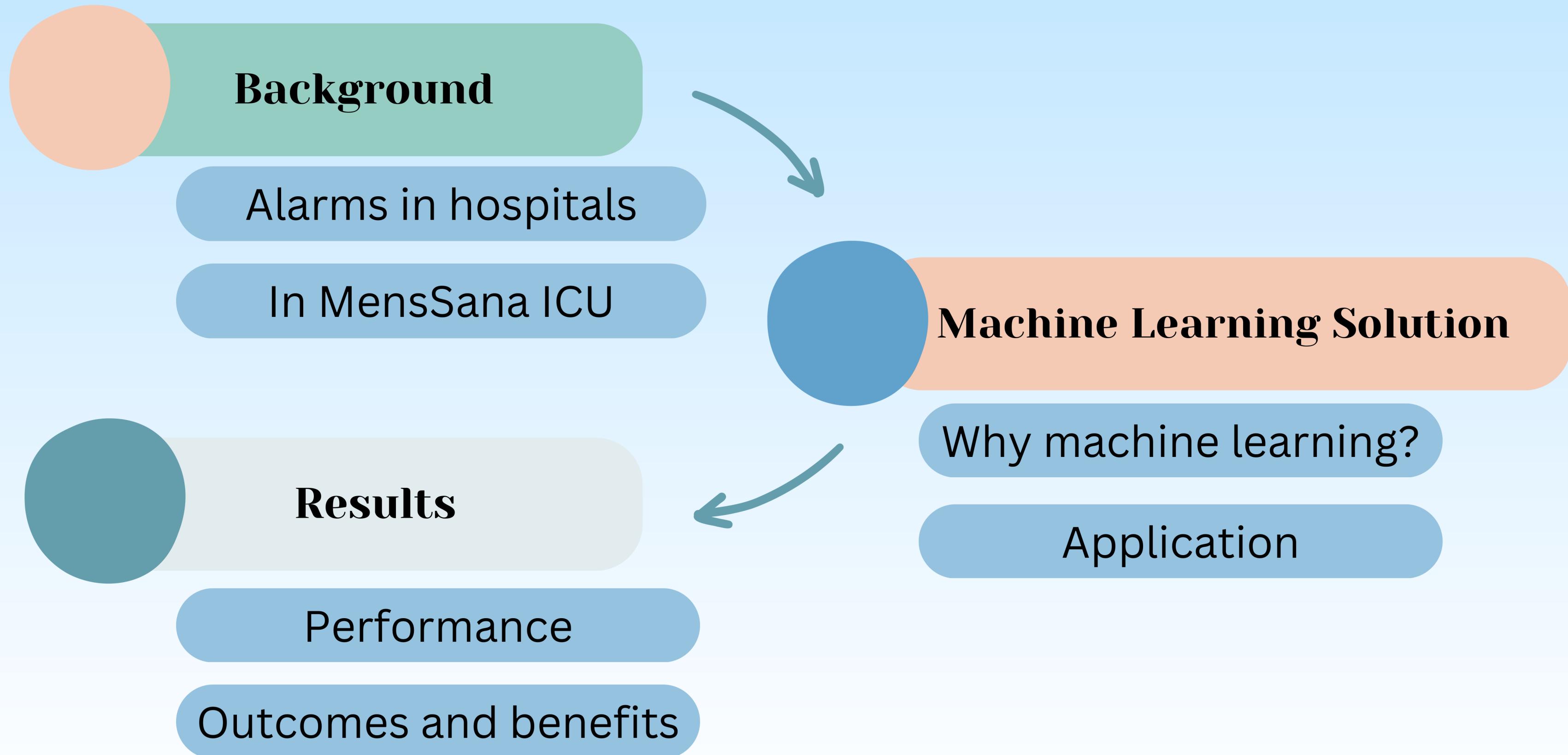


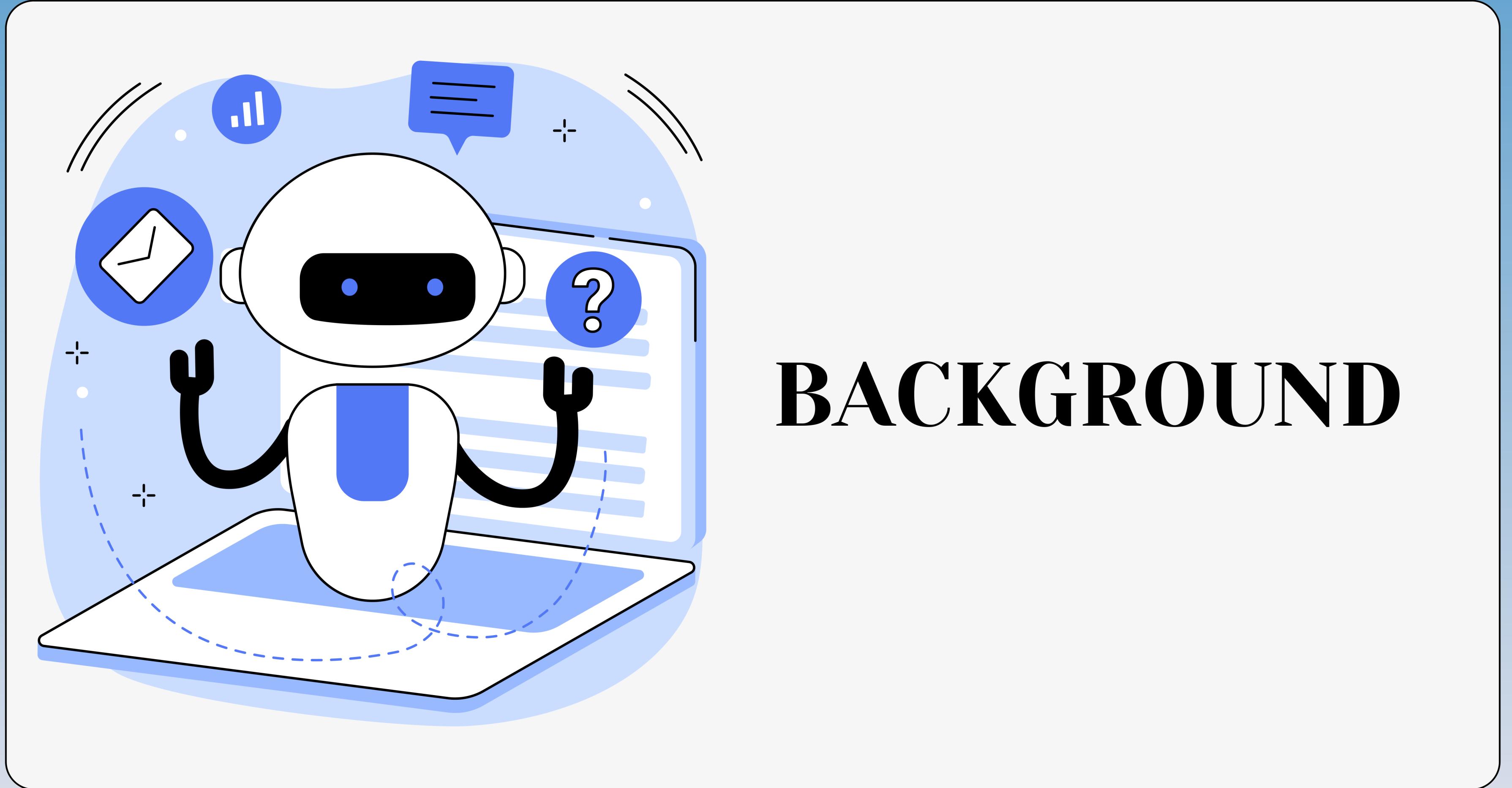
MensSana

Machine Learning in ICU

Duygu Nur Arabaci

Overview





BACKGROUND

Alarms in Hospitals

Background



- 150-400 alarms per patient daily
- 85%-95% false positives

- Clinician desensitization
- Reduced trust in alarm systems
- Missing real alarms



- Reducing patient satisfaction
- Losing money from reimbursements
- Direct cause of deaths

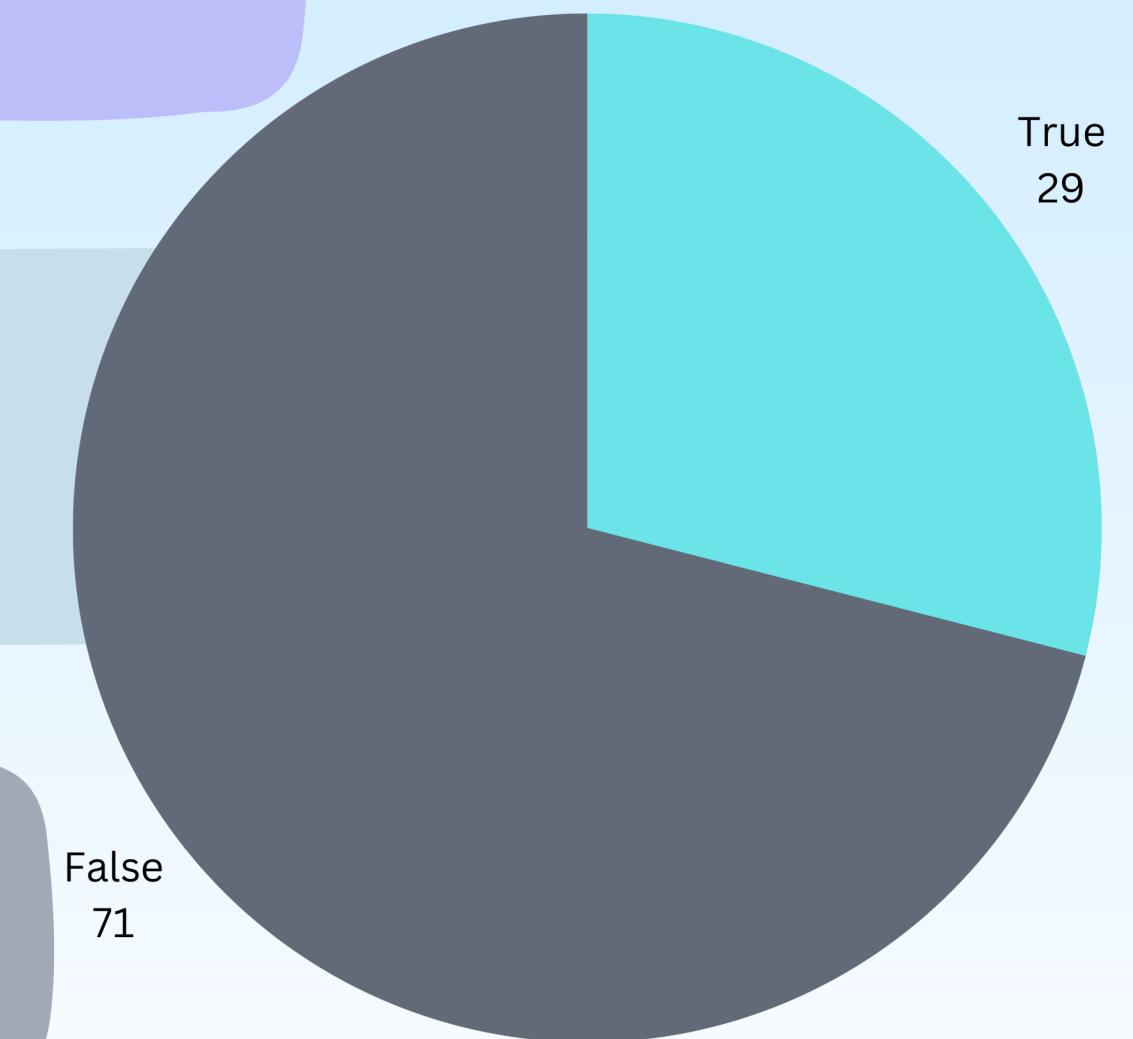


In MensSana ICU

Background



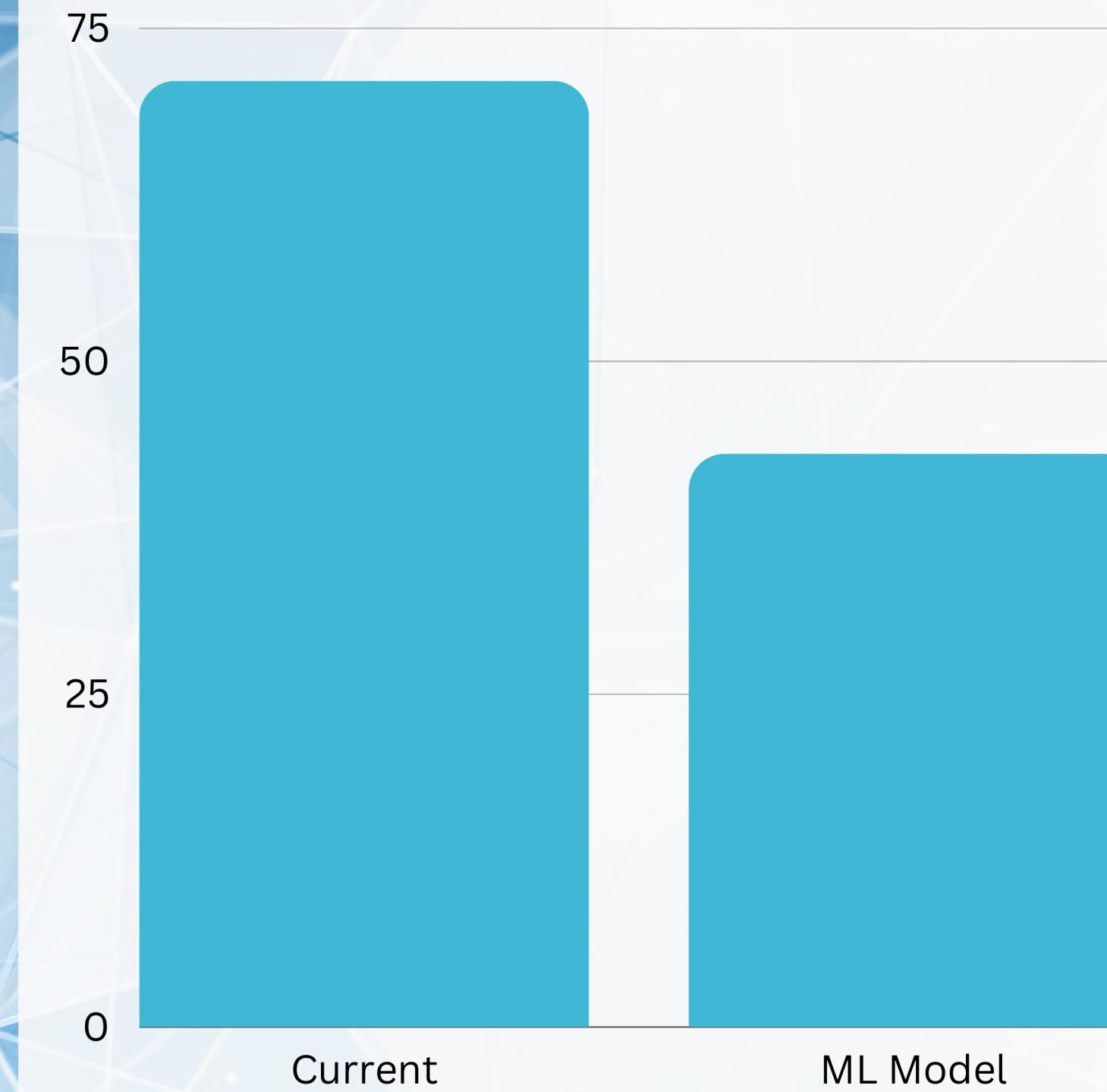
- More than 1 alarm per minute
- 71% False Alarms
- 42 hours/day dealing with false alarms





MACHINE LEARNING SOLUTION

ML Solution



- Reduced false alarms by 40%
- Saving 15 hours of clinician time per day

Why Machine Learning?

Machine Learning

- Hidden patterns
- Considers vitals in context
- Learns and updates dynamically
- High prediction accuracy



Classical Approach

- Only a threshold
- Ignores connected vitals
- Requires manual tuning
- Prone to false alarms





Data

- ~4,000 joint measurements of basic vital signs

Algorithm

- Artificial neural network
- Multi layer perceptron classifier

RESULTS



Results

Performance

Accuracy

The algorithm was able to accurately identify true and false alarms 80-90% while increasing true positive rate.

Recall

The machine learning algorithm increased true alarm recognition.

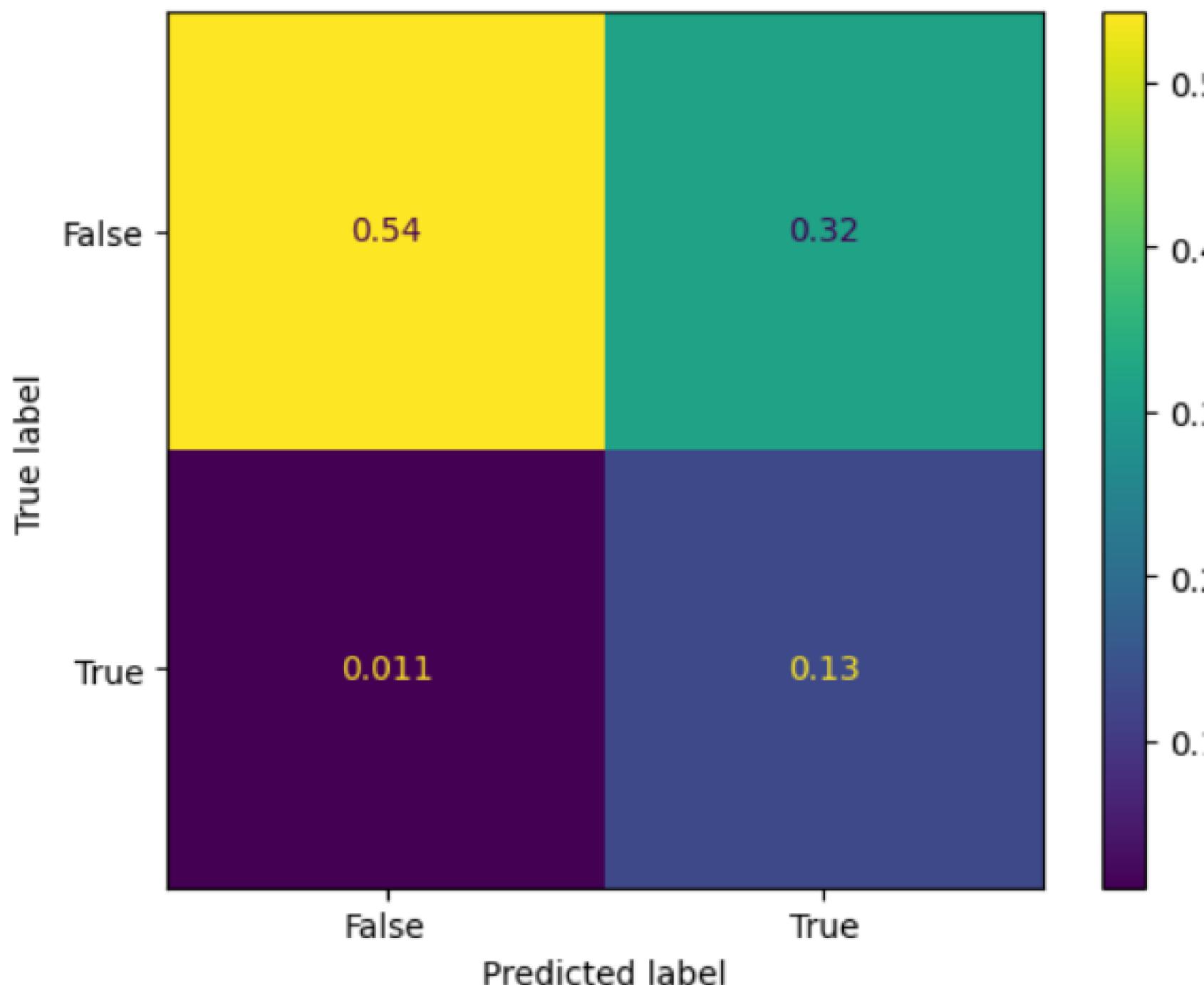
Potential

The algorithm can be further tuned for better results, and this can be accomplished in real time.

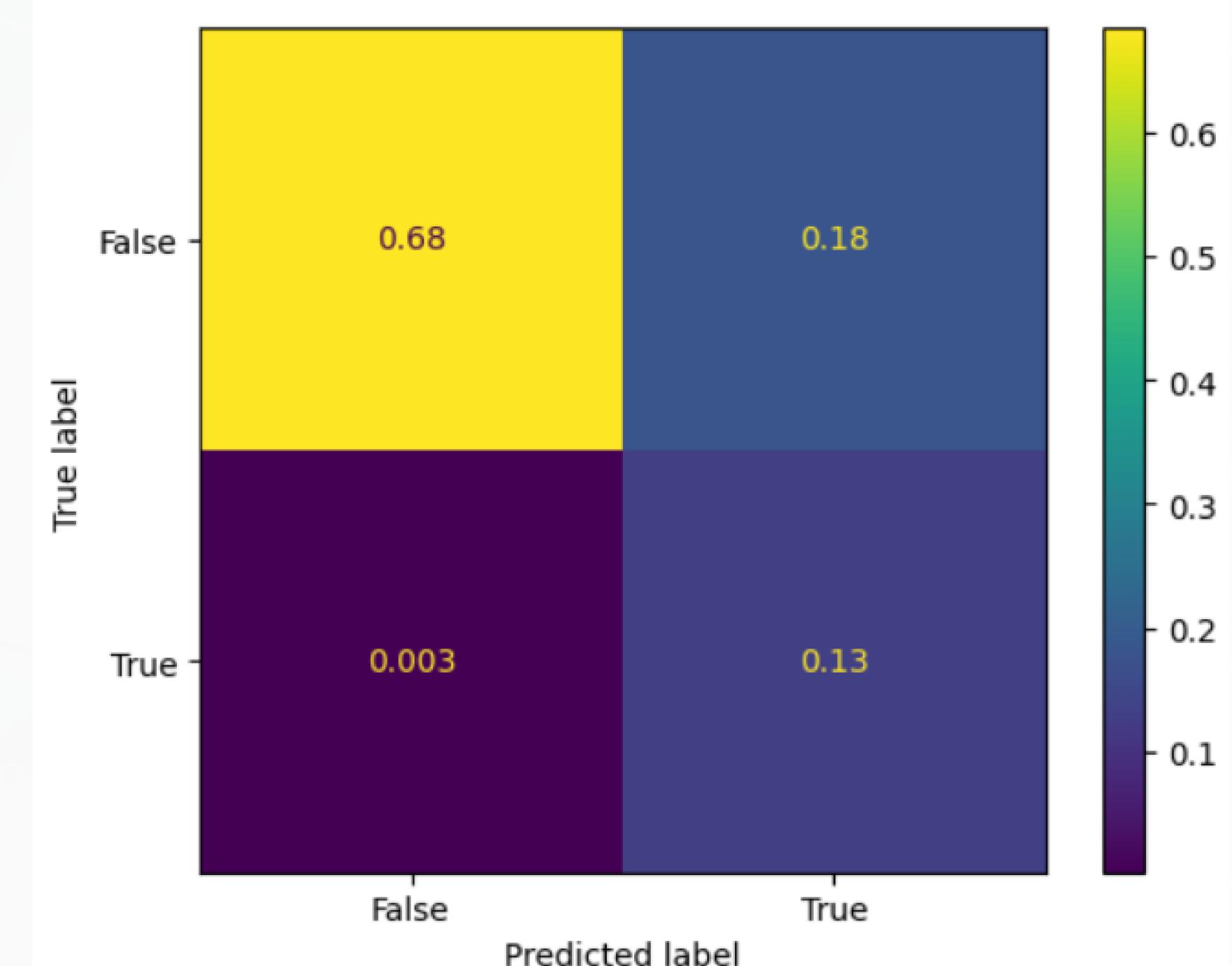


Results

Confusion Matrix for Monitor



Confusion Matrix for MLP predictions



Conclusion

Outcomes and Benefits

Reduced False Alarms

The machine learning algorithm is a promising solution to reduce false alarms in hospitals.

Cost Savings

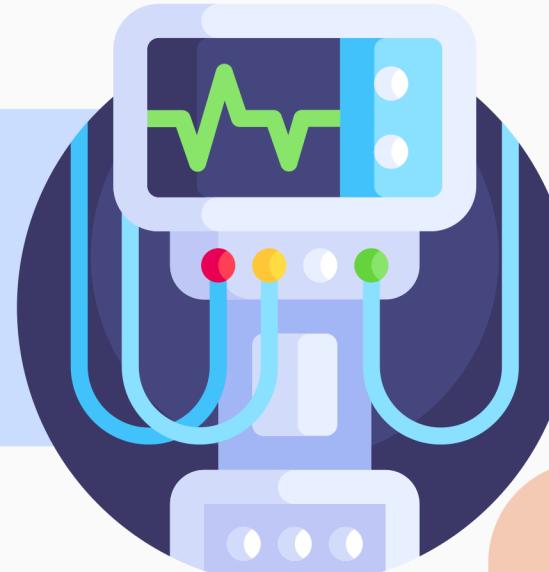
The algorithm can help reduce costs associated with unnecessary staff response to false alarms by 40%.

Improved Patient Outcomes

The algorithm can help reduce hospital noise, resulting in improved patient outcomes and experiences.

In conclusion, machine learning can:

Significantly reduce number of false alarms



Gain clinician time
and prevent burnout

Reduce operational costs



Increase patient
satisfaction



Thank You



Additional information

MLP

Multi Layer Perceptron

