

Use Case- Robustness

Destiny Pounds
M.S. Student, Biomedical Data Science
Advised by Vibhuti Gupta, Ph.D.
Assistant Professor, Computer Science and Data Science
School of Applied Computational Sciences
Meharry Medical College

Use Case: Robustness in AI for Patient Monitoring



In a hospital's intensive care unit (ICU), there is a new AI system designed to monitor patient vital signs and alert healthcare providers of any concerning changes in real-time. The AI system uses machine learning algorithms to analyze data from various sensors attached to patients, such as heart rate monitors, blood pressure cuffs, and oxygen saturation sensors. The goal is to improve patient care by detecting early signs of deterioration and enabling quicker interventions.

AI Monitoring System



- The AI system is set up to continuously collect and analyze patient data, including vital signs, lab results, and medical history.
- It is programmed to recognize patterns that indicate potential health risks, such as sepsis, cardiac arrest, or respiratory failure.
- When the AI detects an abnormality, it sends immediate alerts to the healthcare team, providing detailed information about the patient's condition and

Robustness Challenges



- Adverse Events Detection
- Data Interoperability
- Continual Learning
- Cybersecurity

Scenario



- One night, the AI monitoring system detects a sudden increase in a patient's heart rate, along with a drop in oxygen saturation levels. It sends an alert to the nurse on duty, recommending immediate evaluation.
- The nurse rushes to the patient's room and finds the patient experiencing shortness of breath and chest pain. The healthcare team quickly intervenes, providing oxygen therapy and initiating cardiac monitoring.
- Thanks to the early alert from the AI system, the patient's condition stabilizes, and they receive timely treatment to prevent a potential heart attack.

Robustness Evaluation



- The hospital regularly evaluates the AI system's performance by comparing its alerts with actual patient outcomes. This helps identify areas for improvement and ensures the system remains effective and reliable.
- Ongoing training of healthcare staff on how to interpret and respond to AI-generated alerts is also crucial for the system's overall effectiveness.

Scenario Question

Scenario: Robustness Considerations in autonomous vehicles

Question: How can we develop AI systems for autonomous vehicles that are robust enough to handle unpredictable real-world scenarios, such as extreme weather conditions, road construction, or sudden changes in traffic patterns, while ensuring passenger safety and regulatory compliance.