Exercise 1.1

Case study: Using Machine Learning for Autonomous Ships

The problem definition

The shipping industry faces major challenges in improving safety, reducing human error, and increasing efficiency. Operating large vessels across long distances involves constant decision-making and quick responses to changing conditions. Relying only on human control can lead to accidents, delays, and higher costs. The goal was to find a way to reduce human involvement while making shipping safer and more efficient.

Background

Ships transport over 90% of global trade, but the industry still depends heavily on human crews. Factors like fatigue, weather, and navigation complexity increase the risk of mistakes. To address this, companies started exploring the use of artificial intelligence and machine learning to automate ship navigation and operations. The idea is to develop vessels that can operate with minimal or no human intervention by learning from large amounts of data collected from previous voyages and onboard sensors.

Hypothesis

By using machine learning, autonomous ships can learn to make decisions based on real-time data—like weather, traffic, and obstacles—allowing them to safely navigate without relying on human crews.

Solution

Machine learning models were trained using sensor data, maps, and previous shipping patterns. These models help ships detect and avoid obstacles, calculate optimal routes, and adapt to changing sea conditions. For example, AI systems can analyze radar, camera, and GPS data to avoid collisions or choose better routes to save fuel. This would be too time-consuming or stressful for human crews to handle constantly. By removing human error and enabling continuous decision-making, machine learning is transforming how ships operate.

Autonomous ships powered by machine learning represent a major step toward safer and smarter marine transportation. They can process more data, faster and more accurately than humans, making global shipping more reliable and cost-effective.