

Task - 4

Data Science lifecycle applied to smart traffic management

1) Problem definition

- * Traffic congestion causes fuel waste, and increased pollution.

- * The goal is to develop an AI-powered traffic management system that optimises traffic flow and reduce congestion.

2) Data collection:

Sources: GPS sensors, traffic cameras, IoT-enabled signals, weather reports, and historical traffic data.

Types of Data: Real-time vehicle count, road occupancy, speed patterns etc.

3) Data cleaning & Preprocessing

- * Handling missing values

- * Removing duplicates and outliers

4) Exploratory Data Analysis

- * Identifying peak congestion hours using statistical analysis.

- * Visualizing traffic patterns through heatmaps and graphs.

5) Model building & Training.

machine learning algorithms:

- * Time-series forecasting models to predict traffic flow.

- * Computer Vision (CNNs): for analyzing traffic camera footage.

- * Reinforcement learning for adaptive traffic signal control.

6) Model Evaluation & Optimization

Performance metrics: Accuracy, mean absolute error, F1 score for detection

7) Deployment & monitoring.

- * Deploying the model on cloud-based platforms for real-time predictions.

- * Integrating with city traffic management systems for automated signal control.