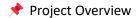
Dynamic Pricing for Urban Parking – Capstone Project



This capstone project presents a smart pricing simulation model for urban parking lots. It dynamically adjusts parking prices in real time or batch mode based on several influencing factors. Built using Python, it demonstrates demand-driven pricing algorithms integrated with real-time data processing tools.

6 Objective

To simulate and implement a demand-based pricing strategy for parking spaces by accounting for:

- Parking occupancy
- Queue length
- Traffic conditions
- Special day status
- Type of vehicle (Cycle, Bike, Car, or Truck)

The model ensures that parking prices adapt intelligently to dynamic environmental and usage variables, helping optimize space utilization in urban areas.

- Technologies Used
- Pathway For real-time and static data stream processing
- Pandas For data manipulation
- Bokeh For data visualization and trend analysis
- Google Colab As the development and execution environment
- Project Files

| File Name | Description |

Dynamic_Pricing_Final.ipynb | Main notebook with complete logic, implementation, and outputs |

| dataset.csv | Input dataset containing raw parking data (no headers) |

| final_output.csv | Output file with computed parking prices after processing |

| README.md | Documentation of the project workflow and key components |

Core Logic

The pricing is determined by a weighted demand formula implemented in the pricing_logic() function:

Demand = $1.5 \times (occupancy / capacity)$

- + 0.5 × queue length
- traffic weight
- + 2.0 × special day
- + vehicle weight
- Vehicle Weights: Truck > Car > Bike > Cycle
- Traffic Weights: Low < Average < High
- Base Price: ₹10
- Final Price Range: Smoothly adjusted between ₹5 and ₹20, based on normalized demand
- Data Flow Architecture

dataset.csv

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Pathway ingestion (has_header=False, mode="static")

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pricing_logic() calculation

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Result table creation

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Write to CSV \rightarrow final_output.csv

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File download via files.download("final_output.csv")

- Pricing Models
- Model 1: Linear Pricing Basic static pricing logic (baseline)

- Model 2: Demand-Based Pricing Active model used in simulation
- Model 3: Competitive Pricing (Optional & not implemented) Pricing based on GPS data from nearby parking lots



- Open Google Colab and load Dynamic_Pricing_Final.ipynb
- When prompted, upload your dataset.csv file (must be headerless)
- Execute all cells in sequence
- The model will generate and download final_output.csv automatically with computed pricing

🖺 Developer Info

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