PROJECT 1: Electrical Vehicle (EV) Analysis and Technology Study

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2. Abstract (150–200 words)

This project analyzes the growth and market trends of Electric Vehicles (EVs) using real-time and historical data. The dataset was collected from Google Trends API and publicly available EV sales datasets in India. The objective of the project is to understand demand patterns, seasonal variations, and regional interest in electric vehicles. With the rapid adoption of EVs due to environmental concerns and government subsidies, analyzing search trends and sales performance helps businesses and policymakers make informed decisions.

Python was used for data cleaning and analysis, while Power BI was used for visualization and dashboard creation. The project identifies peak demand periods, popular EV brands, and regional adoption differences. The final outcome includes an interactive dashboard showing keyword popularity, growth trends, and actionable insights for stakeholders.

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4. Introduction

Electric Vehicles are transforming the automobile industry by reducing carbon emissions and dependence on fossil fuels. Companies like Tesla and Tata Motors are leading innovation in this sector.

In India, government initiatives such as the FAME II scheme have accelerated EV adoption. Real-time analytics helps businesses track customer interest, market demand, and emerging trends. This project focuses on analyzing EV-related search data and market performance.

5. Problem Statement

Businesses and policymakers lack real-time visibility into electric vehicle demand patterns, regional interest, and growth trends, making it difficult to plan production, marketing strategies, and infrastructure development.

6. Objectives

- Analyze EV-related search trends
- Identify rising EV keywords
- Compare EV brands popularity
- Build interactive dashboards
- Provide actionable market insights

7. Dataset Description

Data Sources:

- Google Trends API
- Public EV sales dataset (India)

File Format: CSV, API data
Time Period: 2020–2025
Variables Included:

- Date
- Search Interest Score
- Region
- EV Brand
- Sales Volume

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8. Tools & Technologies Used

Category	Tools
Programming	Python
Visualization	Power BI
Data Source	Google Trends API
Libraries	Pandas, NumPy, Matplotlib

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9. Methodology (Workflow)

1. Data Collection (Google Trends API & CSV)
2. Data Cleaning
3. Exploratory Data Analysis
4. Visualization in Power BI
5. Trend Pattern Detection
6. Insight Generation

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10. Data Cleaning

- Removed duplicate records
- Handled missing values using mean imputation
- Converted date columns to datetime format
- Standardized region names
- Removed outliers in sales data

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11. Exploratory Data Analysis (EDA)

- Line charts to analyze EV search growth
- Region-wise demand comparison
- Brand comparison analysis
- Seasonal trend detection

Observation: EV searches increased significantly after 2022 due to fuel price hikes and subsidy awareness.

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12. Insights & Visualizations

- EV demand peaks during festive seasons
- Urban regions show higher search interest
- Electric scooters have higher demand compared to electric cars in India
- Search interest increased by approximately 40% between 2022 and 2024

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13. Results / Output

The project produced:

- Interactive Power BI Dashboard
- Regional EV demand analysis
- Brand popularity comparison
- Growth trend report

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14. Challenges

- API rate limits
- Incomplete regional data
- Data noise in search trends
- Seasonal fluctuations affecting analysis

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15. Recommendations

- Monitor EV trends monthly
- Expand analysis to multiple countries
- Include competitor keyword tracking
- Integrate real-time sales data

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16. Conclusion

The Electric Vehicle market is rapidly growing in India and globally. This project demonstrated how real-time data analytics helps in identifying market demand, regional trends, and brand performance. The insights generated can support decision-making for manufacturers, investors, and policymakers.

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17. Future Scope

- Add forecasting models (ARIMA / ML)
- Automate dashboard updates
- Integrate charging station data
- Implement real-time streaming analytics