Leveraging Data Science for Hybrid Customer Segmentation

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Significance of the Research

Modern markets, especially dynamic ones like the electric vehicle market, are characterized by complex and unique consumer behavior. Traditional segmentation methods, which rely mainly on socio-demographic or price indicators, are not effective enough. They allow us to answer the question "what" consumers buy, but do not provide an understanding of the deep drivers of their choices - the question "why?".

We propose a hybrid model for consumer segmentation of the Ukrainian electric vehicle market. By analyzing structured and unstructured data using Data Science methods, four behavioral segments were identified, proving the advantage of a comprehensive approach for a deep market understanding.

Aim and tasks

The aim of the work is to develop and test a hybrid consumer segmentation model based on integrated analysis of structured (quantitative) and unstructured (text) data using Data Science tools.

To achieve the goal, the following tasks were performed:

• market trends were analyzed based on structured data on electric vehicle registrations in Ukraine;

• unstructured data (text responses from owners) were collected and processed to identify psychographic and behavioral characteristics of consumers;

• a hybrid model was developed by synthesizing both types of data;

• a cluster analysis algorithm was applied to identify and describe end consumer segments based on the developed hybrid model.

Structured data analysis

Cluster	Type	Color	Range	Segment	Country of Origin	Region
0 (38%)	Wagon, Sedan	White	Large	Standard, Premium	USA, Europe, China	Capital, West, South, East, Central, North
1 (13%)	Hatchback, Wagon	White, Gray	Small	Economy	China, Europe	Capital, West
2 (8%)	Wagon	Gray	Medium	Standard	Korea	Capital
3 (25%)	Wagon	Gray	Small	Standard, Premium	Japan	West, Capital, South, East
4 (15%)	Hatchback, Wagon	Gray	Small, Medium	Standard, Premium, Luxury	Europe	Capital, West, South

Unstructured data analysis

Cluster	Features: Primary	Features: Secondary	Usage
0	Dynamics Design Handling Transmission Quality Brakes	Range Price Soundproofing Visibility Maintenance Interior Trunk	For city For other
1	Handling Maintenance Range Dynamics Quality Interior Transmission Brakes Price Design Trunk	Soundproofing Visibility	For city For other For family For travelling For business
2	Quality Transmission Interior Design Visibility Trunk Maintenance	Range Handling Dynamics Brakes Soundproofing Price	For city For other For family For business

Hybrid segmentation

"**Enthusiasts and individualists**" (33% of the market): The largest segment, for which the priority is emotional criteria - dynamics, handling and design. Rational aspects such as price or practicality are secondary for them.

"**Pragmatic optimizers**" (28%): Consumers focused on a rational ratio of price and functionality. They choose mainly budget cars with a small range to solve everyday tasks.

"**Technological leaders**" (25%): A segment that chooses status, innovation and technological superiority. It is clearly associated with premium American sedans with maximum range.

"**Modern family**" (13%): The smallest, but qualitatively distinguished segment, for which the priority are build quality, comfort and safety, rather than dynamics or economy. This indicates the transformation of the electric car into the main family transport.

Conclusions

The study proves that a hybrid approach that combines "what" (objective market data) and "why" (subjective consumer feedback) allows for a complete and deep understanding of the demand structure.

The most important conclusion is that the largest segment of the Ukrainian electric vehicle market (33%) is driven by emotional factors, rather than purely rational factors.

The prospects for further research are to study the dynamics of the identified segments over time, which will allow tracking changes in consumer priorities and adapting business strategies to new market conditions.

Thank you for your attention!