

A comprehensive analysis of forum interactions through NLP techniques

AutoInsight: What Car is Right for Me? Help Me Choose!
Navigating Brand Dynamics in Digital Conversations

Contributors

Aasna Shah
Mahrukh Shamas
Meriem Mehri
Kritika

McGill University, Desautels Faculty

Edmunds Forum

[Forum URL](#)

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Task A: Identify top 10 brands by frequency. From the posts, calculate lift ratios for associations between the brands. You will have to write a script to do this task. Show the brands on a multi-dimensional scaling (MDS) map.

We've methodically harnessed text analytics techniques to glean actionable insights from *Edmunds* forum discussions on car models and brands. (*Refer to Tasks A & B.ipynb file*)

First, the analysis begins with the collection and preparation of data from forums, focusing on mentions of car models and brands.

- The data undergoes preprocessing, including tokenization and normalization by lemmatization, to facilitate accurate text analysis. These steps break down the text into manageable pieces (tokens) and standardize it, which is essential for analyzing large text datasets.

Central to the task is the frequency analysis of brand mentions, revealing the most discussed brands in online conversations.

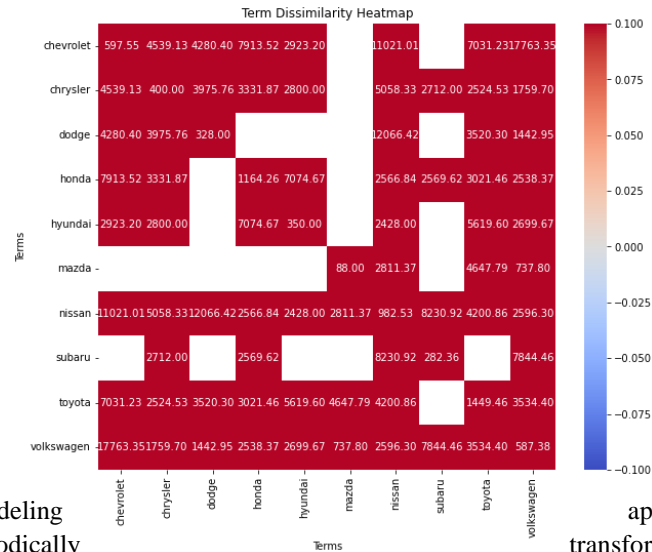
- Counting brand mentions provides a quantitative measure of brand popularity or visibility in customer forums.
- We also incorporated a crucial step of converting model mentions to their respective brands, ensuring that the frequency analysis reflects true brand popularity. The model-to-brand step ensures that the frequency count reflects the brand accurately, as consumers often mention models instead of brands.

Subsequently, the top 10 brands are identified based on mention frequency.

Brand	Frequency
Toyota	2007
Honda	1516
Nissan	1214
Volkswagen	1157
Chevrolet	1044
Hyundai	700
Chrysler	400
Subaru	339
Dodge	328
Mazda	88

- Understanding the most mentioned brands and their relationships with each other provides valuable insights into market positioning and consumer perception, aiding strategic decision-making in marketing and brand management.

Additionally, we included the calculation of lift ratios and the construction of an MDS map, providing visual and statistical insights into how these brands are perceived in relation to each other, providing a more nuanced understanding of the competitive landscape in the automotive sector.

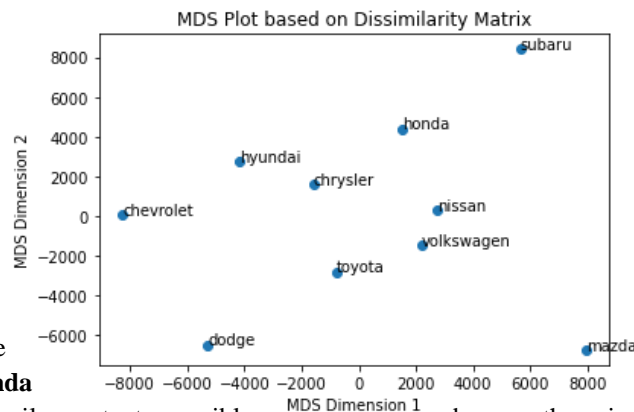


Each step of our modeling previous one, methodically approach builds upon the transforming raw forum data into actionable business insights & to spotlight the top ten brands that dominate the online discourse.

Task B: What insights can you offer brand managers from your analysis in Task A? Choose two brands that you can offer the most interesting/useful insights for.

In interpreting the results for Task B, the analysis of brand associations through lift ratios and the MDS map reveals crucial insights about how consumers perceive different car brands in relation to each other.

The MDS map (*Refer to Appendix 1*) based on the dissimilarity matrix derived from lift ratios provides a visual representation of the brand associations within the forum discussions. The proximity of brands on the map indicates a stronger association as perceived by consumers. For example, brands clustered together may be viewed as similar in terms of consumer expectations, car features, or market segments. Conversely, brands that are further apart on the map are perceived as less related or offering distinct value propositions to consumers.



In our context, the closeness of certain brands like **Nissan** and **Honda** might suggest that consumers discuss these brands in similar contexts, possibly because they view them as direct competitors or as offering similar features. On the other hand, brands like **Subaru** and **Chevrolet**, appearing further apart from others, might indicate a unique position in the market or less frequent association with the central cluster of brands.

This kind of insight is valuable for brand managers in understanding competitive positioning and could inform targeted marketing strategies and product development initiatives to capitalize on brand strengths or to address areas where consumer perception could be improved.

The insights drawn from our brand association analysis can significantly influence marketing & product-related business strategies. As a matter of fact, brands associated with luxury or reliability can utilize these perceptions in their marketing strategies to reinforce their image. Shifting consumer perceptions, as observed over time, are instrumental for product development to ensure alignment with evolving market needs & preferences.

- For example, the proximity of Nissan and Honda on the map could suggest a shared consumer base, which might encourage collaborative ventures or competitive differentiation.
- Alternatively, the distinct positioning of Subaru and Chevrolet may be leveraged in unique branding campaigns to emphasize their unique selling propositions.

These spatial relationships guide brand managers in tailoring their strategies to either align with consumer expectations or distinctively set themselves apart in the marketplace. Such data-driven insights are crucial for informed decision-making in brand positioning, marketing campaigns, and product innovation tailored to the consumer perceptions and market dynamics within the automotive industry.

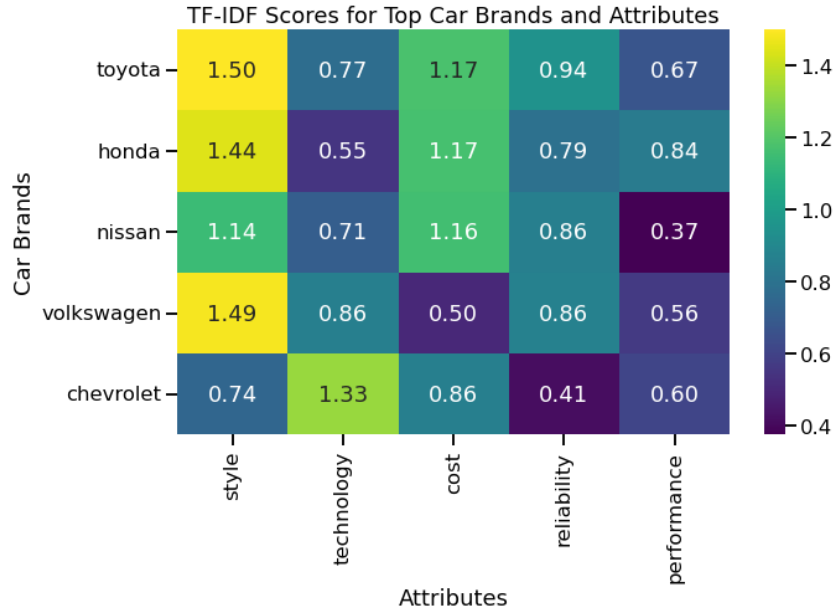
Task C: What are the 5 most frequently mentioned attributes of cars in the discussions? Note that the same attribute may be described by different words – e.g., pick-up and acceleration may both refer to a more general attribute, “performance”. You must make suitable replacements. Now pick the 5 most frequently mentioned brands. Which attributes are most strongly associated with which of these 5 brands?

The goal was to analyze consumer conversations about automobiles to identify key attributes that feature prominently in these discussions. The process builds upon previous tasks executed earlier. A bag-of-words model was generated using a CountVectorizer, distilling the text into its most substantive n-grams while filtering out common stopwords.

The subsequent step involved the manual categorization of attribute related words from the top 200 words by frequency. Here, nuanced human judgment played a critical role in consolidating synonymous terms into broad, meaningful attribute categories. Such a consolidation was essential to accurately reflect the varied ways consumers might describe similar car features, such as "look" and "build," both of which fall under the general attribute of "style." With the terms categorized, frequency analysis spotlighted the top attributes resonating across consumer dialogues.

Attribute	Frequency
Style	2719
Technology	1880
Cost	1657
Reliability	1532
Performance	1370

To delve deeper into the data, we conducted a TF-IDF analysis for each of the top five brands; Toyota, Honda, Nissan, Volkswagen, and Chevrolet. By constructing a brand-specific corpus and computing the TF-IDF scores for words linked to the top attributes, we could gauge the relative importance of each attribute within the brand-specific discussions. TF-IDF scores were aggregated by attribute for the top brands to quantify attribute salience. A heatmap visualized these associations, revealing consumer perceptual strengths of each brand.



The following section delves into the rich insights gleaned from this visualization, providing a clear and compelling narrative of consumer sentiments that have the potential to reshape brand strategies and marketing directions in the automotive industry.

- Toyota has the strongest affinity with 'performance' as indicated by the lowest dissimilarity score of 0.671744. This suggests consumers widely perceive Toyota vehicles as delivering exceptional performance stemming from precision engineering and sophisticated design optimization.
- Honda exhibits a robust association with 'technology' reflected in its dissimilarity score of 0.549598. This indicates consumers regard Honda as a pioneer in bringing high-tech innovations into mainstream automobiles, thanks to its track record of world-first technologies.
- Nissan shows a marked linkage with 'performance' based on its score of 0.374689. This implies consumers view Nissan as a producer of athletic, exciting vehicles with strong acceleration, nimble handling, and dynamic styling cues.
- Volkswagen aligns closely with 'cost' as evidenced by its score of 0.501051. This signals that consumers broadly perceive Volkswagen as an affordable, value-focused brand dedicated to providing quality vehicles at competitive price points.
- Chevrolet displays the strongest connection to 'reliability' with a score of 0.412882. This suggests durability and unfailing dependability are attributes that critically define the Chevrolet brand in the minds of most consumers.

Task D: What advice will you give to a (i) product manager, and (ii) marketing/advertising manager of these brands based on your analysis in Task C?

Drawing upon the insightful revelations from the TF-IDF analysis regarding the brand-attribute associations, we can offer strategic recommendations tailored for product managers and marketing/advertising managers of the automotive brands. These suggestions are meticulously crafted to align with the specific strengths and consumer perceptions uncovered in our analysis, providing a roadmap for enhanced product development and more resonant marketing strategies in the dynamic landscape of the automotive industry.

Product Manager:

- Toyota should invest in continuous enhancements to engine performance, fuel efficiency, transmission responsiveness, chassis dynamics, and overall driving enjoyment. This will further cement Toyota's strength in the performance dimension based on consumer perceptions. Product managers should analyze performance benchmark data and trends to guide development.
- Honda should focus on integrating the most advanced driver-assistance technologies, information/entertainment features, connected services, intuitive interface designs, and over-the-air update capabilities. Allocating sufficient R&D budgets to incubate and commercialize emerging technologies will be key to maintaining Honda's reputation for innovation.
- Nissan product strategy should revolve around developing powertrains that deliver rapid acceleration, sporty handling through suspension and steering upgrades, braking improvements, and aggressive exterior designs. Resources should be devoted to engineering elements that heighten driving excitement.
- Volkswagen should conduct cost-optimization studies to identify opportunities in platform sharing, supply chain efficiencies, simplifying options/trims, and assembly streamlining. The goal should be providing high quality cars with essential features at competitive price points to align with Volkswagen's value positioning.
- Chevrolet must implement comprehensive quality control frameworks across its supply chain while utilizing feedback data to continuously improve manufacturing and address key failure points. Maximizing durability should be a guiding principle during design processes and in material/component selection.

Marketing/Advertising Manager:

- Toyota should highlight its vehicles' track performance, utilize racing partnerships/imagery, and lean into adrenaline-fueled narratives in advertising campaigns centered on performance.
- Honda should craft ads showcasing its innovation history, tech credentials, and futuristic concept vehicles while finding opportunities for consumers to interactively experience new technologies first-hand.
- Nissan can amplify its performance attribute through dynamic media, adrenaline-pumping sports partnerships, celebrity endorsements, and social campaigns that inspire consumers to push performance boundaries.
- Volkswagen's campaigns should compare cost of ownership against competitors and emphasize long-term value, both rationally and emotionally. Targeting young, budget-conscious demographics could further reinforce Volkswagen's value associations.
- Chevrolet should consistently reaffirm its reliability promise through storytelling - real customer testimonials, longevity stats, warranty assurances. Moreover, advertising should spotlight extensive service center presence and expert technical support. should highlight performance credentials and driving experience in marketing campaigns to attract performance-driven consumers.

Task E: Which is the most aspirational brand in your data in terms of people wanting to buy or own? Describe your analysis. What are the business implications for this brand?

Process of Analysis:

In order to determine the most aspirational brands, first a list of bigrams were defined that signify aspirational sentiments, such as 'love to' and 'dream of'. Similar to what was done previously, the text was then preprocessed and tokenized, and bigrams were generated from this preprocessed text. Following this, a function was implemented to identify whether each review contained any of the aspirational bigrams defined previously.

To quantify the association between brands and aspirational sentiments, lift values were calculated for each brand. This lift value compares the frequency of aspirational mentions of a brand to its overall mentions, normalized by the total aspirational mentions in all reviews. Higher lift values indicate a stronger association with aspirational

sentiments. By sorting brands based on their lift values, the top five “aspirational” brands were identified, and Nissan emerged as the top aspirational brand, followed by Honda, Acura, Toyota, and Hyundai.

Brands	Lift Value
Nissan	4.32774
Honda	2.16116
Acura	2.00888
Toyota	1.91259
Hyundai	0.748914

Business Implications:

There are several business implications of Nissan being identified as the top aspirational brand, such as the following:

1. **Marketing and Branding:** Nissan can capitalize on its aspirational status to enhance its branding and marketing strategies. This could involve tailoring advertising campaigns to emphasize the qualities that make it aspirational, which can be identified through further text analysis, thereby attracting customers seeking these attributes.
2. **Pricing Opportunities:** Nissan can leverage this aspirational perception to adopt pricing strategies for certain models. For example, further analysis can be done to understand which models are highly aspirational and if there are certain attributes such as “quality” that are associated with those highly aspirational models. This can then be used to create premium pricing strategies for these models, as consumers often associate aspirational brands with higher quality and are generally willing to pay more for products that resonate with their aspirations. On the flip side, Nissan can also make their vehicles more accessible to aspirational customers, through the introduction of innovative financing options. This could include attractive leasing options, flexible payment plans, or financing options that target younger buyers.
3. **Product Development:** Nissan can understand the attributes that make their brand aspirational to consumers in order to develop products and features that align with consumer aspirations. This might include advanced technologies, sustainable practices, or luxury elements that appeal to the consumers that view their brand as aspirational. They can also curate a lineup of aspirational models, with different price points and styles to appeal to diverse consumer aspirations at varying lifestyles and income levels.
4. **Investment In Cutting-Edge Technology:** In order to maintain its status as an aspirational brand, Nissan can invest in cutting-edge automotive technologies such as autonomous driving, electric vehicles, and connected car features, to ensure that the brand remains at the forefront of innovation. Nissan can also partner with leading tech companies to collaborate on developing new technologies like AI assistants, augmented reality displays, or advanced batteries.
5. **Opportunities for International Expansion:** Building an aspirational brand provides Nissan opportunity for significant global growth. As demand and desirability for the Nissan brand climbs worldwide, the potential to expand internationally increases substantially. Strategically partnering with luxury brands in key markets can provide Nissan with access to valuable dealership networks and joint marketing activities to spread brand exposure. Nissan can also target developing economies as a major growth avenue by tailoring products that appeal specifically to the aspirations of emerging middle classes.