ASSIGNMENT -3 (Customer Analytics)
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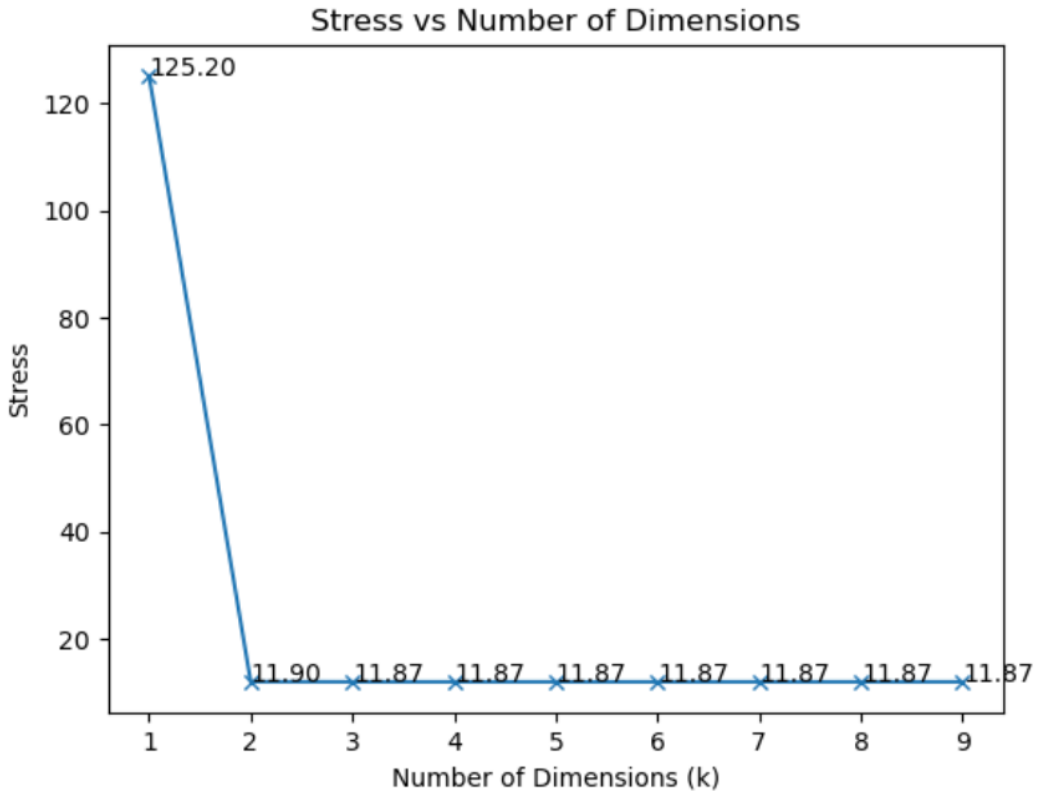
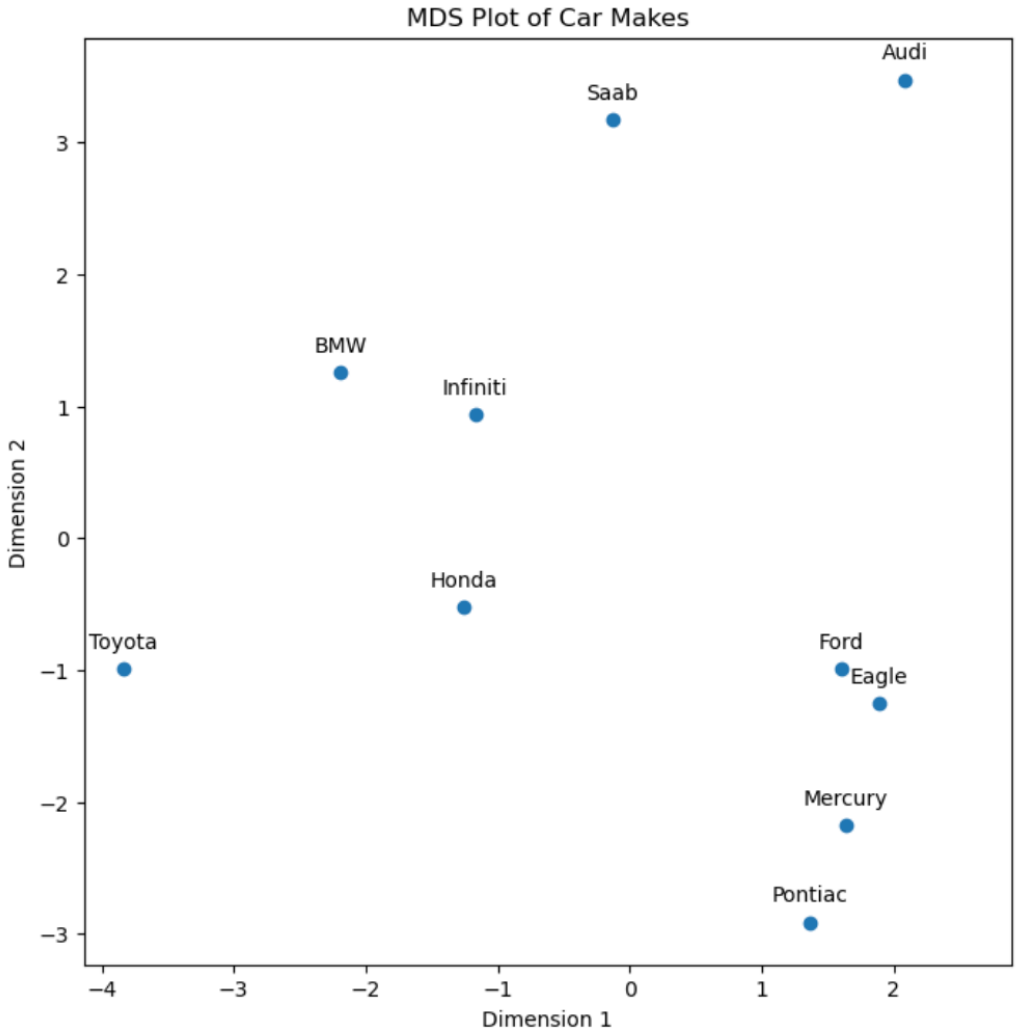
Part A:



The plot illustrates the stress values for different numbers of dimensions (k). It's evident that there's a sharp decline in stress from k = 1 to k = 2, with stress dropping significantly. This sharp decline indicates a substantial improvement in model fit by increasing the number of dimensions from 1 to 2. However, beyond k = 2, the curve flattens out. This suggests that adding more dimensions beyond k = 2 doesn't significantly enhance the model's ability to represent the data.

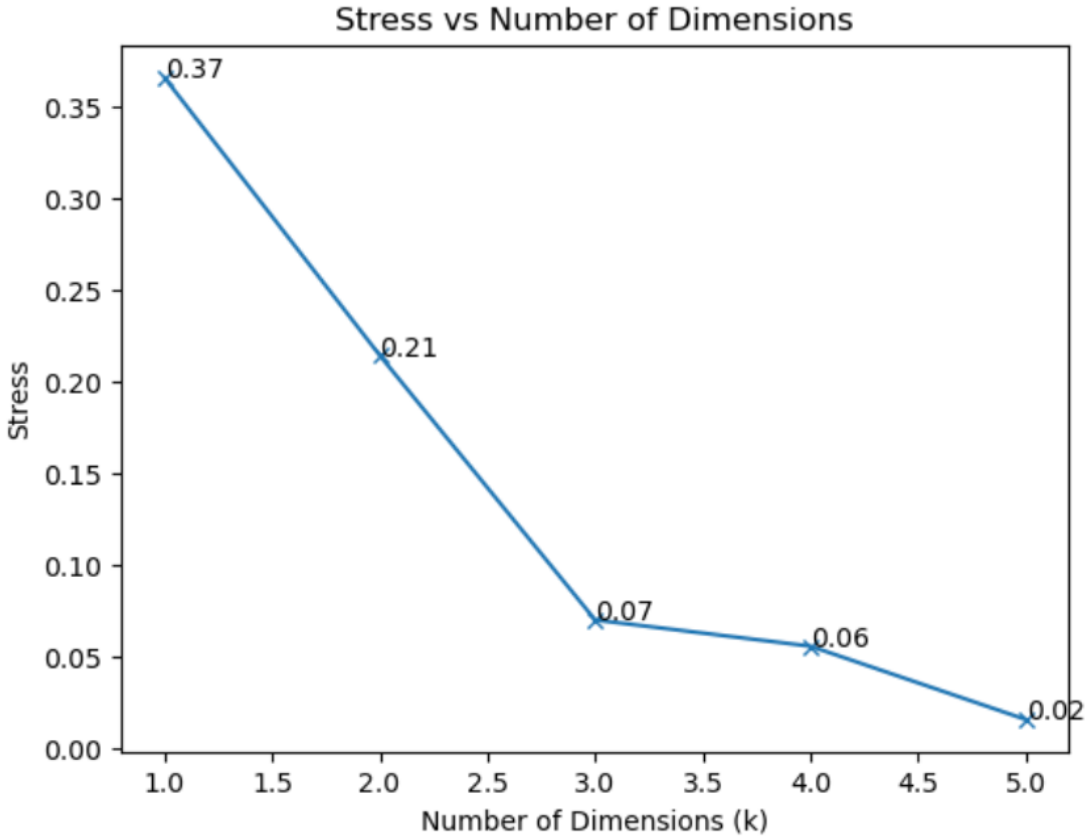
Conclusion: the choice of k = 2 seems justified, as it provides a substantial improvement in model fit while keeping complexity low, which is advantageous for both interpretation and computational efficiency.



Rotation : 330 clockwise such that audi is at the top
the x axis : Build Quality
The X axis seems to reflect the built quality. Brands located on the left side, like Toyota and Honda, are commonly associated with superior built quality, renowned for their reliability and robustness. Conversely, brands situated towards the right, such as Mercury and Eagle which are mid-range lower quality, suggest a perception of comparatively lower built quality

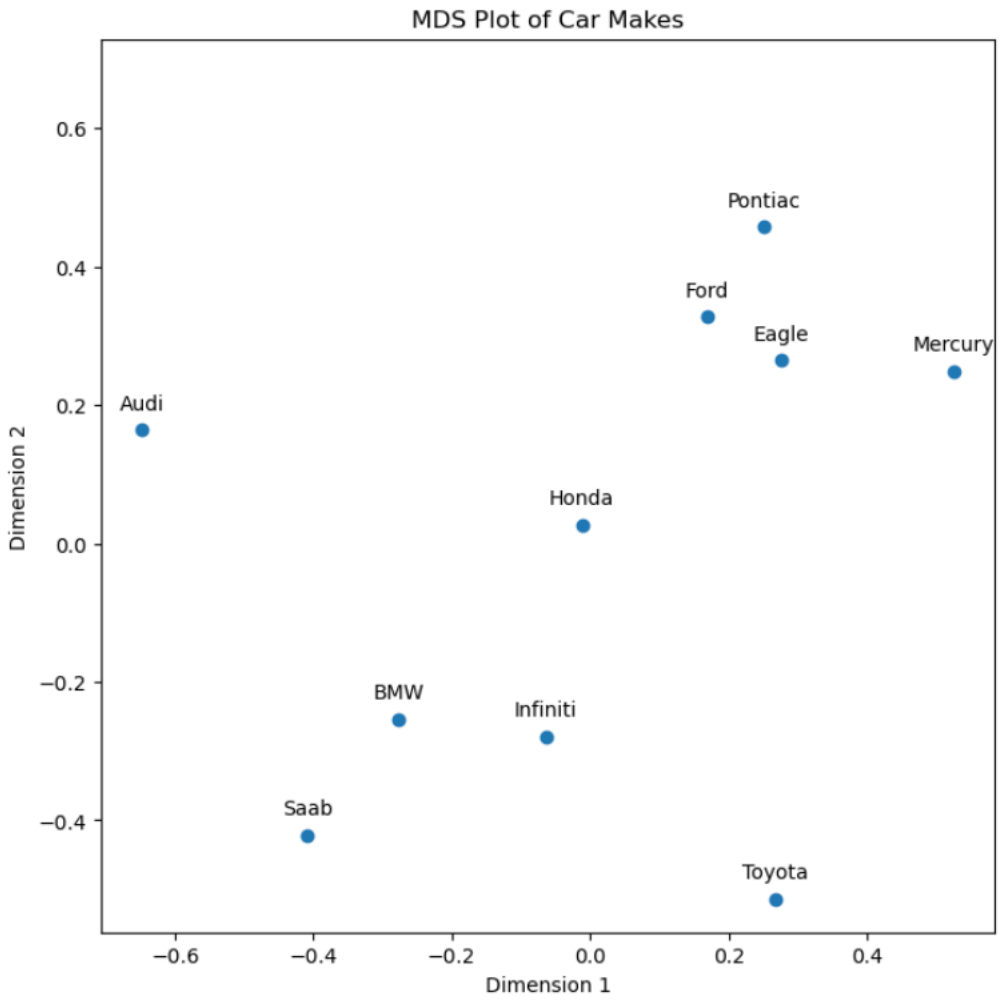
y axis : Comfort
The vertical axis seems to denote comfort. Brands positioned higher up, like Audi and Saab, are typically linked with enhanced comfort and spacious interiors, providing a superior driving experience. On the contrary, brands lower on the axis, such as Toyota and Honda, though known for reliability, are often regarded as offering more pragmatic and budget-friendly vehicles that prioritize practicality over comfort.

Part B:



Sharp Drop from k = 1 to k = 3: Stress significantly decreases, suggesting a major improvement in model fit. Minimal Change Beyond k = 3: From k = 3 to k = 5, the stress values decrease very little.

Conclusion: Choosing k = 3 is effective, as it provides a good balance between model complexity and accuracy, with significant reductions in stress up to this point but minimal benefits from adding more dimensions.



I treated the plot as if it were rotated by **45° clockwise.**

Interpretation of Axes:

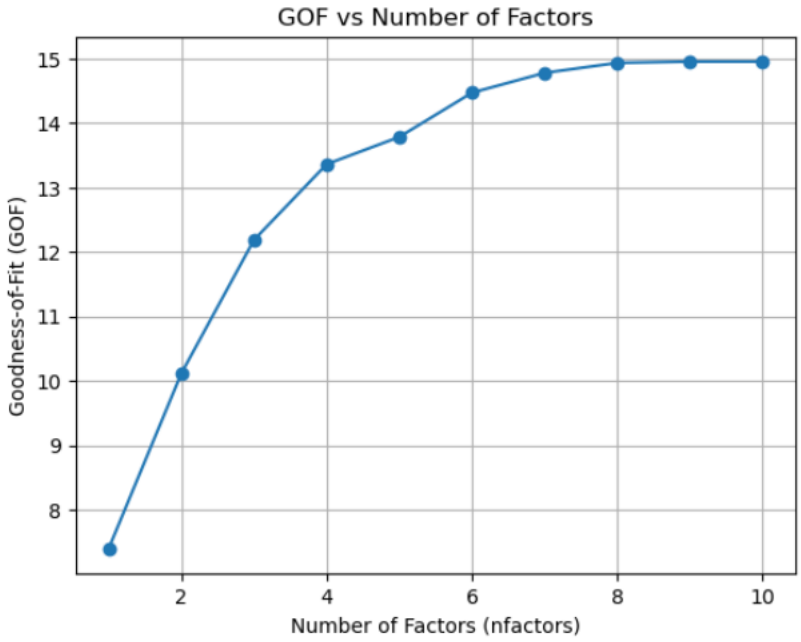
X axis : international versus American

The X-axis now signifies the degree of international versus American branding for the various car manufacturers. Brands positioned towards the left side, such as BMW and Audi, are closely linked with global markets, renowned for their superior performance and dependable engineering. Conversely, brands like Mercury and Pontiac, situated towards the right side of the axis, emphasize their American heritage .

y axis : sporty(performance)

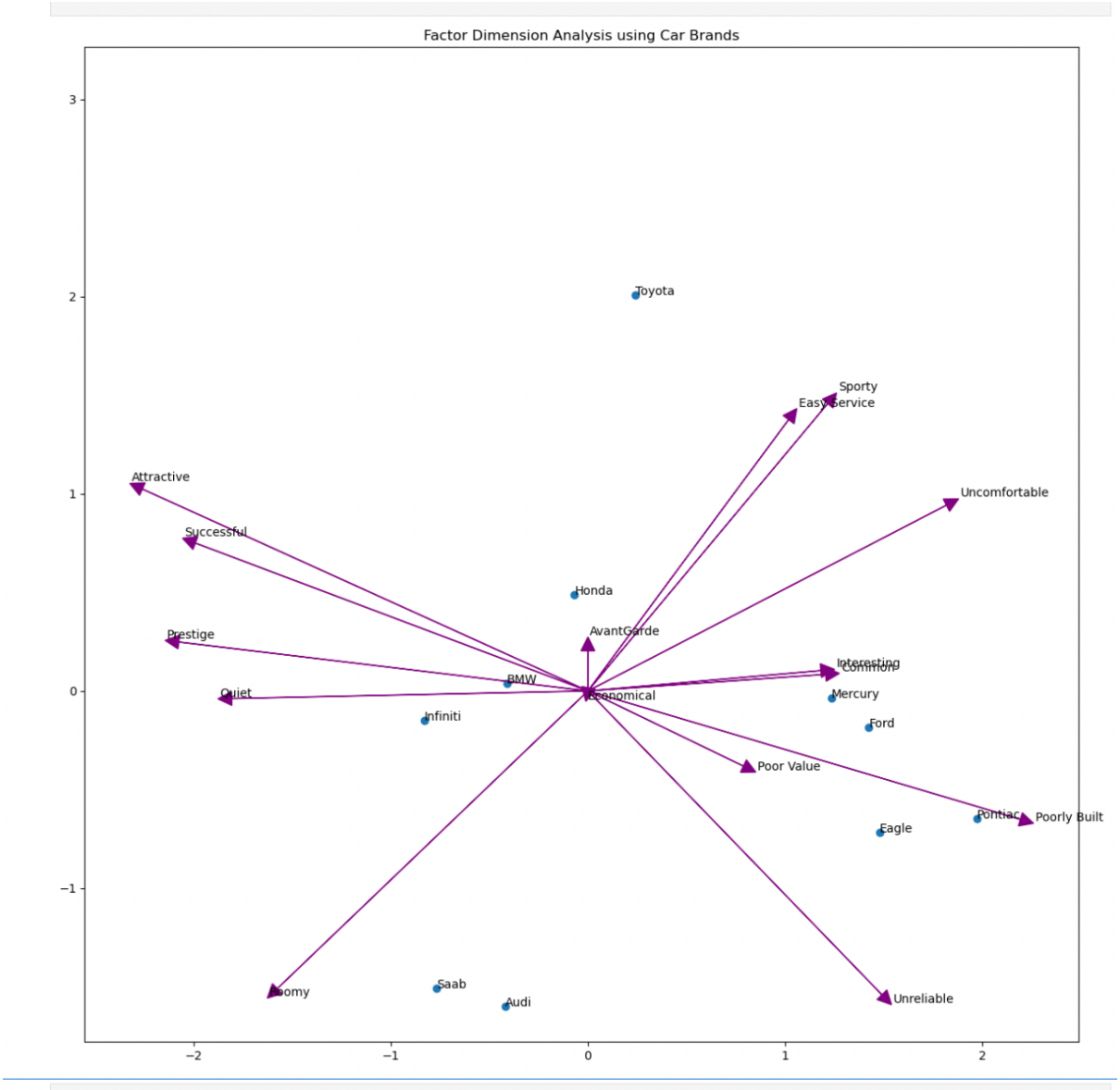
The vertical axis seems to denote sporty(performance) . Brands positioned higher up, like Audi and Saab, are typically linked with enhanced sportiness and spacious interiors, providing a superior driving experience. On the contrary, brands lower on the axis, such as Toyota and Honda, though known for reliability, are often regarded as offering more pragmatic and budget-friendly vehicles that prioritize practicality over sportiness.

Part C:



GOF Value Increase till n = 6: There is a rapid and steady increase in the goodness of fit as more dimensions are added. This increase continues up to n = 6 Beyond n = 6, from n = 7 to n = 10, the GOF values show a much more marginal increase. This suggests that the addition of further dimensions beyond n = 6 contributes very little to improving the model's fit.

Conclusion: Based on this analysis, using n = 6 as the number of dimensions is justified because it provides a significantly improved fit without the diminishing returns observed in higher dimensions.



In the provided Factor Analysis graph, the orientation has been conceptually rotated by 55 degrees :

Graph Orientation and New Axis Explanation:

Y-Axis: Y-axis evaluates the 'attractiveness' of the auto brands, taking into account elements including prestige, success, and brand quality. Higher up on this axis are brands that are thought to be successful and appealing, like BMW, signifying a significant market presence and high consumer respect. Because of alleged problems with quality or desirability, brands at the bottom end of this axis, such as Eagle and Pontiac, may be seen as less desirable.
X-Axis: The X-axis compares and contrasts two characteristics: roominess and sportiness. Positive values on this axis correspond to companies that are thought to be sportier which is consistent with a design that might put performance features or visual appeal ahead of economic value. Conversely, brands with negative scores are poorly build generally economical and are low performing eg potniac .

Detailed Brand Analysis according to the Factor Analysis :

Toyota: Positioned towards the dynamic but less spacious end, Toyota is celebrated for its sleek designs and agile performance, albeit with interiors that may feel snug. Nevertheless, its reputation for dependability and low maintenance costs remains a key draw.

Ford: Despite its association with powerhouse models like the Mustang which explains its inclinations towards sportiness, while Ford's positioning also suggests a struggle to consistently deliver on reliability, hence towards the lower end of attractiveness

Honda: Honda is revered for crafting vehicles that seamlessly blend style, functionality, and reliability, solidifying its status as a preferred choice for quality-conscious buyers. Thus, its position is towards the positive end of attractiveness but not super high and its almost in the middle for comfort and sportiness.

BMW: One of the top attractive car manufactures which maintains a fine balance between sportiness and roominess, BMW is the perfect example of how strong engineering and athletic design can work together, which is why it will always be popular with drivers.

Pontiac: It depicted as less appealing, prioritize performance but falter in terms of comfort and reliability, diminishing their overall brand image.

Eagle: It was a less attractive car brand that place a higher priority on performance but fall short when it comes to dependability and comfort, which damages their reputation as a whole.

Mercury: Situated towards the lower end of both axes, Mercury is perceived as cost-effective but grapples with a reputation for subpar craftsmanship and reliability, hindering its market penetration.

Infiniti: Embracing a refined aesthetic and commendable build quality, Infiniti strikes a balance between elegance and durability, positioning itself as a formidable contender in the luxury segment.

Saab: Saab, known for its roomy interiors and comfort, keeps a favourable position on the roominess axis at the expense of some sportiness, which is consistent with its positioning as a manufacturer of pleasant vehicles.

Audi: Despite its reputation for roominess and attractiveness, Audi occasionally grapples with reliability issues, influencing its placement on the Y axis.