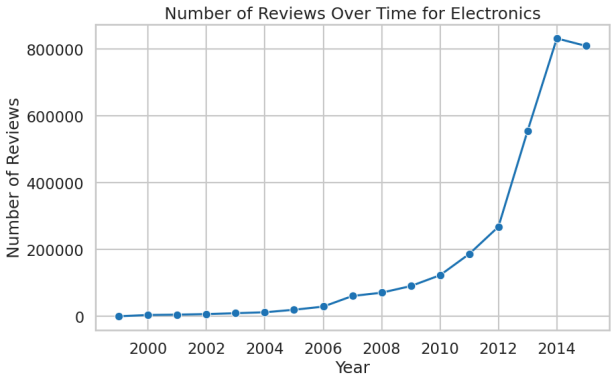
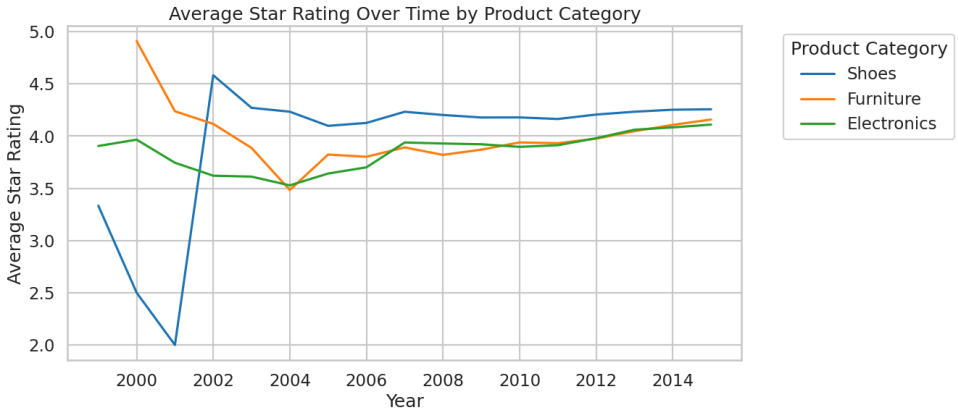
The primary objective of this analysis was to determine whether Amazon product quality has declined over time, as reflected in customer reviews. This study examines trends in star ratings, review sentiment, review length, engagement (measured by helpful votes), and category-specific variations. I hypothesized that Amazon product reviews have become more negative over time, particularly in perceived product quality. I expect to observe a decrease in average star ratings, an increase in negative sentiment in written reviews, and possible changes in review length and engagement. Additionally, I would like to know whether this trend varies across different product categories. The dataset used for this analysis is the Amazon US Customer Review Dataset, which I pulled from Kaggle.



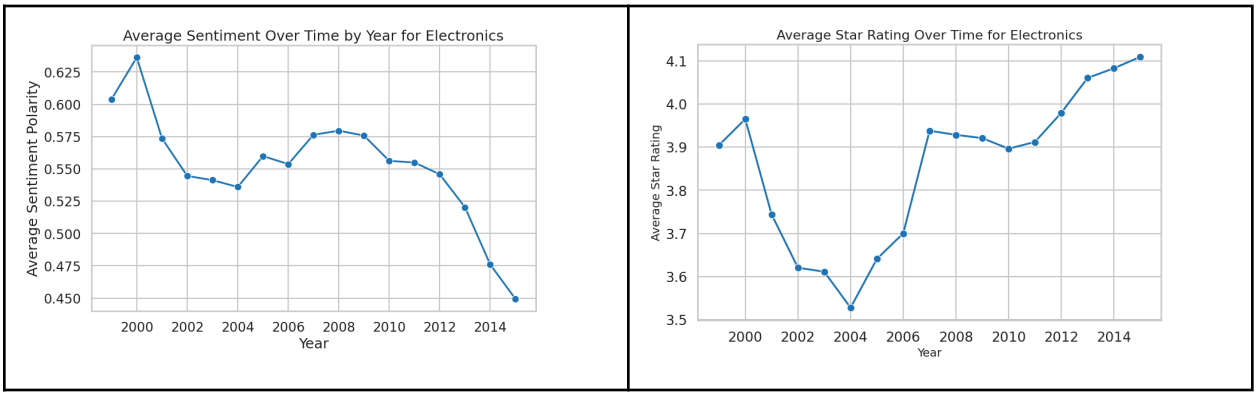
After the initial data cleaning, I looked at how the average number of reviews per year changed over time. It increased exponentially with a huge spike from 2012 to 2014 specifically for the category Electronics. I found out that 2014 was the year Amazon released the Fire TV device as well as the Fire Phone, which I thought may have been a contributing factor. Then I checked the top ten products that were reviewed for each year from 2012 to 2014 and none of the top products contained anything of the sort. There were a lot of Falcon ham radios and antennas though!

As certain categories, such as books, only had reviews until 2005, and some categories, for example, mobile apps, started recording reviews in 2010, I chose to analyze categories that recorded data for similar time ranges. I decided on the following categories to look more in-depth at: Electronics, Furniture, Shoes. I plotted the average star rating of reviews over time for these three categories. They all started at very different points, and started with a lot more spikes, but as the number of reviews increased the lines averaged out closer to an average 4.3



star rating. This disproved my hypothesis as I had predicted that average reviews would go down over time and while the average rating definitely did for the category Furniture, it stayed the same for Electronics and went up for Shoes!

I selected the product category Electronics to dive more in-depth to, simply because I thought it would be interesting. I wanted to analyze the tone of the review so I found a function that analyzes the sentiment polarity of review, and I ran it for every review in the category of Electronics. Then I took the average sentiment for every year and plotted it over time. We can see that while the average sentiment polarity decreases over the years it still leans slightly positive, implying there are more negative or neutral reviews. I compared this to the average star rating for the same category. It's interesting to not that while in the beginning the star ratings and sentiment polarity show the same trends, though with the rating it is more exaggerated, this shifts from 2008 onwards. From then the average sentiment is far more neutral while the average star rating is continually increasing.



In conclusion, this analysis aimed to understand the trends in Amazon product reviews over time, particularly in relation to perceived product quality. While I initially hypothesized that product reviews would become more negative over time, the results were more complex than I expected. Although the Furniture category did see a decline in average star ratings, the Electronics and Shoes categories remained relatively stable or even showed an increase in ratings. When I examined sentiment in the Electronics category, I found that while the sentiment polarity became more neutral over time, it still leaned slightly positive, which contradicted my expectation of a more negative trend. Interestingly, even though the average sentiment became more neutral, the average star rating continued to rise. These findings suggest that while product quality perceptions may vary across categories, the overall trend does not support the idea of a widespread decline in product quality on Amazon.

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