

**Improving Business Functions Through Sentiment Analysis for
Turf Badger's Stevens Point Office**

Adam L. Bruce

DS745: Visualizations

Dr. Lauren Mauel

November 27th, 2024

Introduction

Turf Badger is an S corporation based in Wisconsin that focuses on lawn care, mosquito, and pest control customer services. To date, the company operates ten offices across four states in the US. At the end of 2022, they opened an additional office in Stevens Point, Wisconsin, whose customer feedback data from January 2022 through November 2024 serve as the source for this report. Ultimately, an investigation of sentiment was performed utilizing R software with the goals of improving customer experiences and building on the company's strong points by gaining insights with natural language processing techniques (Sharma, 2024).

Anonymization & Cleaning

To ensure customer anonymity, highly sensitive information, such as customer name and address, was removed from the dataset used in this analysis. For personal identification purposes, a unique "Customer ID" column was used. Collectively, information on the rating for the review out of five stars, technician for which the review was associated with, the day of the service and day of review posting, and content of the review were also available. The original 186 reviews data are attached in the report's `Customer_Feedback.csv` file. Prior to analysis, significant cleaning of the data was also performed.

Initially, the entire feedback text was tokenized by converting each word from a review into an individual row in the dataset (Silge & Robinson, 2017). Further, because of the emphasis on identifying key words from the text, common English stop words like "the", "of", and "to" for example were removed from the data. Overall, this cleaning process reduced the total word count from 4,472 to 113 of the most valuable, unique words in the data.

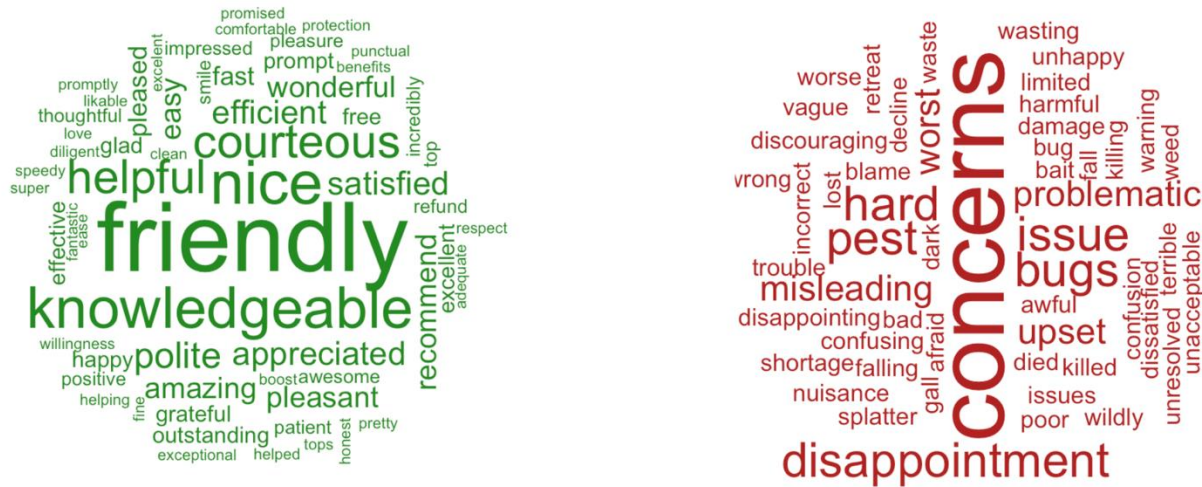
Sentiment Analysis

Sentiment analysis allows businesses to understand the opinions, emotions, and attitudes of their customer base to deliver actionable insights (Goodey, n.d.). Sentiment tools, like Bing Liu's classifier algorithm, can categorize words as positive or negative (Liu & Hu, 2004). Meanwhile, more complex tools like Dr. Saif M. Mohammad's NRC Word-Emotion Association Lexicon can connect English words with eight basic emotions in anger, fear, anticipation, trust, surprise, sadness, joy, and disgust (Mohammad & Turney, 2010). Here, feedback was classified as positive or negative to build a word cloud and score technicians with Liu's algorithm while Mohammad's algorithm was used to build bar plots for analyzing emotions in customer feedback. Because the dataset linked customer's reviews to their service technicians, both collective and individual technician level plots were produced.

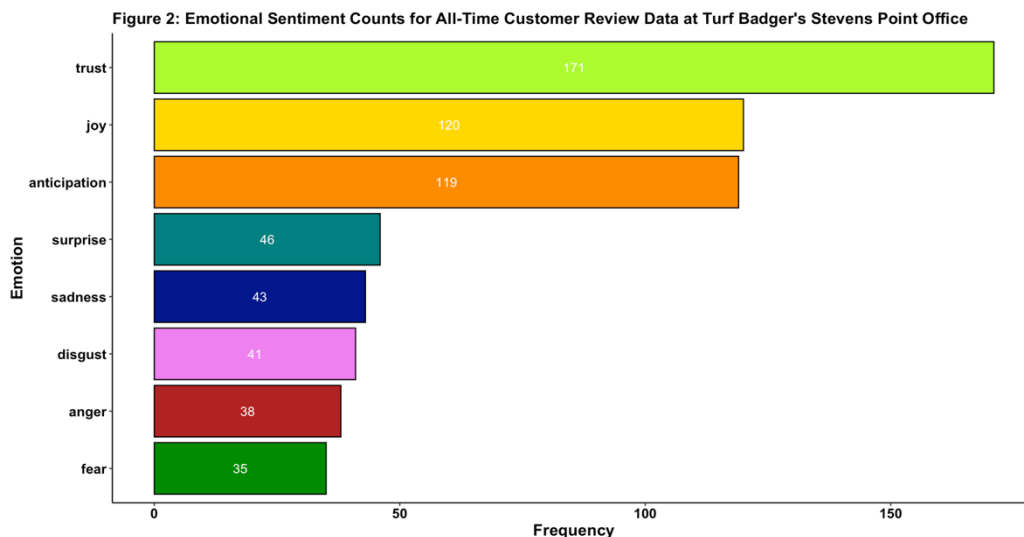
Collective Sentiment

Of the 113 unique classified words according to Liu's algorithm, 60 were positive and 53 were negative sentiment. Each word was ranked according to its use frequency and utilized to create a word cloud by sentiment type (Figure 1). Collectively, the top five positive sentiment words were "friendly", "nice", "knowledgeable", "courteous", and "helpful" at 24, 14, 13, 10, and 10 uses respectively. Alternatively, the top five negative sentiment words were "concerns", "bugs", "disappointment", "hard", and "issue" at 7, 3, 3, 3, and 3 uses respectively.

Figure 1: Positive (Green) and Negative (Red) Sentiment Word Clouds for Turf Badger's Stevens Point Office Customer Reviews

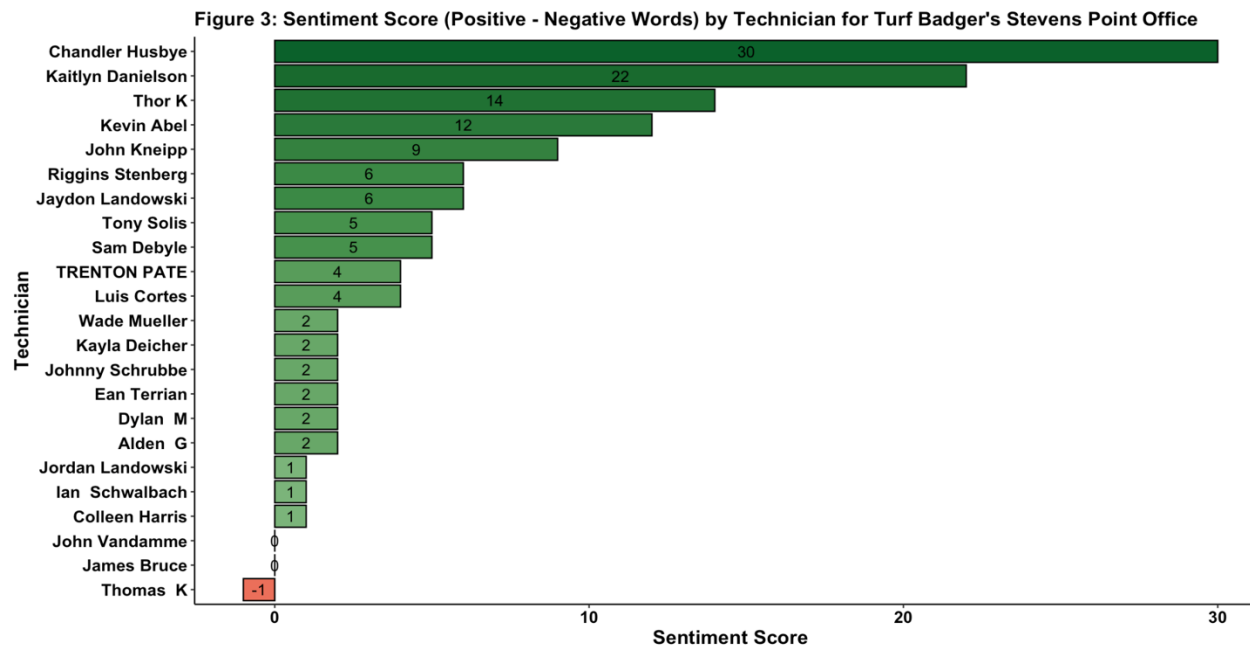


In terms of Mohammad's algorithm for emotional sentiment, each of the 186 total reviews was broken down by their association with each of the eight emotions. After classification, the counts of each emotion were totaled and plotted by descending frequency (Figure 2). Thematically, the color representation for the plot follows Dr. Robert Plutchik's model of emotional associations where trust, joy, anticipation, surprise, sadness, disgust, anger, and fear are represented by yellow-green, yellow, orange, green-blue, blue, violet, red, and green respectively (Lampert, 2023).



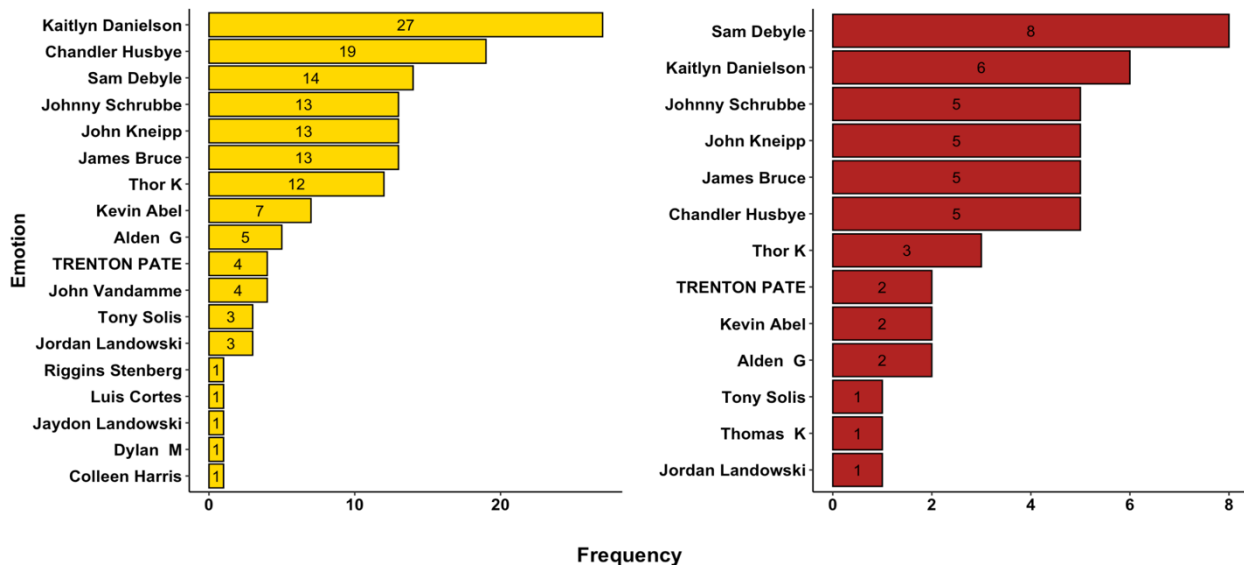
Technician-Specific Sentiment:

In full, 25 technicians were received a review in the dataset. Of these, 23 had reviews with at least one word successfully classified as positive or negative while all 25 had at least one word classified within one of the eight emotions. To gain insights into how technicians are performing individually, sentiment scores were assigned to the 23 with classified positive or negative review words (Figure 3). Each score was calculated by subtracting the sum of the total positive words from the sum of the total negative words associated with the technician.



Next, to gather insights regarding the emotions customers associate with technicians, emotional word classifications were performed for each technician and counts for the eight emotion groups were calculated. While plots for comparisons of counts for all emotions could be made, a single plot for comparing technicians by joy and anger was made for brevity in this report (Figure 4). Such a plot utilized two strong emotions for comparison of alternative states of customer mindsets for technicians.

Figure 4: Sentiment Counts for Customers Whose Reviews Showed Joy (Yellow) and Anger (Red) by Their Technician at Turf Badger's Stevens Point Office



Findings & Recommendations

For field service businesses like Turf Badger, feedback provides the opportunity to improve several business functions such as customer experience, satisfaction, and loyalty. Initially, capitalizing on the top service descriptions can be achieved through marketing initiatives that highlight the positive sentiment of customers to their services. For example, sharing the most frequent positive descriptions, such as “friendly”, online would help foster emotional connections to current and potential customers. Additionally, marketing through a slogan or a commercial utilizing from the most frequent descriptors from the writing of current customers could increase trust in their brand (Adams, 2023).

As for the negative descriptors, the company can improve customer pain points by emphasizing the most frequent descriptors in technician training and performance reviews (Qualtrics, n.d.). For example, we see that frequently utilized negative words include “pest”, “bugs”, “problematic”, and “disappointment”. This tells us that many concerns are related to the

branch's pest-based service plans. Coupling this with words like "confusing", "misleading", "killed", "harmful", and "damage" they should emphasize training technicians to be more thorough on explaining pest services to customers and ensure they understand both how and where to apply pesticide products at prior to starting work at job sites. By following up with the customers who left these negative reviews regarding how their concerns were addressed, increased feelings of value can be instilled in customers. This translates to more positive brand perceptions and increased loyalty.

Based on the emotional analysis results, the office should utilize the findings to show positive recognition towards the technicians at the branch. Trust between customers and a business improves the customer experience and makes it more likely that customers will work collaboratively to resolve larger issues (Chahal, 2024). Such a trusting relationship reduces churn and increases retention. Thus, with the feeling of trust being the highest frequency emotion found in the feedback data, the branch can with confidence recognize their technicians for fostering this feeling in customers. Positive recognition builds a sense of value to the company in employees, which fosters motivation to continue their good work (Hastwell, 2023). Therefore, the branch should take the opportunity to utilize the findings here for such recognition.

Finally, with the sentiment score and emotion count plots, executives can determine the best employees to train future hires and identify employees most in need of training and feedback. For example, Kaitelyn Danielson and Chandler Husbye, who have high sentiment scores and produce a lot of joy in their customers, would be ideal team members for training new hires. Meanwhile, technicians like Johnny Schrubbe who have relatively low sentiment

scores and present moderately high feelings of anger in customers could be identified as primary targets for further training and provided with constructive feedback based on these findings.

Collectively, this report provides insights into how to improve business functions based on customer feedback on technician services. Moving forward, the company should act swiftly on these suggestions while also seeking to gather more alternative forms of feedback from their customers to improve the analysis. For example, in addition to optional technician service feedback, they could consider sending out surveys, emails, or phone calls to customers regarding their entire lifetime experience with the company. Utilizing a promotional discount or prize drawing for those who answer these feedback mechanisms could help increase the frequency of responses.

References

- Adams, K. (2023, August 17th). 4 Reasons Why Building Customer Relationships is Especially Important Now. *Octane AI*.
<https://www.octaneai.com/blog/customer-relationships>
- Chahal, A. (2024, August 6th). Why is Customer Trust Important? *HyperComply*.
<https://www.hypercomply.com/blog/why-is-customer-trust-important>
- Goodey, B. (n.d.). Customer Sentiment Analysis | Definition, DIY Template, & More. *SentiSum*.
<https://www.sentisum.com/customer-sentiment-analysis>
- Hastwell, C. (2023, March 2nd). Creating a Culture of Recognition. *Insights*.
<https://www.greatplacetowork.com/resources/blog/creating-a-culture-of-recognition>
- Hu, M. & Liu, B. (2004). Mining and Summarizing Customer Reviews. *Proceedings of the ACM SIGKDD International Conference on Knowledge Discovery & Data Mining*.
<https://www.cs.uic.edu/~liub/publications/kdd04-revSummary.pdf>
- Lampert, D. (2023, November 21st). Colors & Emotions | Overview, Theories, & Connections. *Study*.
<https://study.com/academy/lesson/color-theory-emotions.html>
- Mohammad, S. M., & Turney, P. (2010). Emotions Evoked by Common Words and Phrases: Using Mechanical Turk to Create an Emotion Lexicon. *Proceedings of the NAACL-HLT 2010 Workshop on Computational Approaches to Analysis and Generation of Emotion in Text*.
<http://saifmohammad.com/WebDocs/Mohammad-Turney-NAACL10-EmotionWorkshop.pdf>

Porter, M. F. (1980). An algorithm for suffix stripping. *Program*, 14(3), 130–137.

https://www.cs.toronto.edu/~frank/csc2501/Readings/R2_Porter/Porter-1980.pdf

Sentiment Analysis and How to Leverage it (n.d.). Qualtrics.

<https://www.qualtrics.com/experience-management/research/sentiment-analysis/>

Sharma, S. (2024, July 25th). Sentiment Analysis: Unlocking the Intent Behind Customer Feedback. *Zonka*.

<https://www.zonkafeedback.com/blog/sentiment-analysis-customer-feedback>

Silge, J., & Robinson, D. (2017, June). *Text Mining with R*. O'Reilly.

<https://www.tidytextmining.com/>