Quantitative Smart Marketing Analysis using Glove Vectors: A Boom Sonar Performance Comparison

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Abstract: This study delves into the Smart Marketing approach, particularly using Novel Global Vectors for Word Representation (GloVe) on a selected dataset. It also offers a comparison with the BOOMSOONAR algorithm. The effectiveness of the Smart Marketing strategy was assessed based on accuracy. With a sample size of 22, both the Novel GloVe and BoomSonar algorithms were assessed, utilising G power calculated at an 80% power level. Although the Novel GloVe algorithm displayed an accuracy rate of 77.45%, it was marginally overshadowed by BoomSonar's 78.05%. However, statistical evaluations suggest no significant variance between the two. The p-value stood at 0.886, suggesting the mean accuracy for both algorithms fell within a 2-standard deviation range. Thus, in terms of Smart Marketing, while the Novel GloVe had commendable accuracy, BoomSonar slightly edged it out.

1 INTRODUCTION

NLP (Natural Language Processing) is a branch of computer science and an integral component of artificial intelligence (Dargan et al. 2019). NLP enables machines to understand, analyse, manipulate, and interpret human languages. This aids in tasks like summarisation and relationship extraction (Hu et al. 2019). NLP's inception can be traced back to the 1940s and 1950s, marking intersections between linguistics and computer science. NLP is generative, facilitating rapid questioning on subjects for direct responses. It's systematically applied in companies aiming to enhance documentation accuracy and database information retrieval. Notably, NLP has its pros and cons. Its limitations include the inability to adapt to new domains with only a few functions, being tailored for specific tasks. NLP is divided into two main components: Natural Language Understanding (NLU) and Natural Language Generation (NLG) (Li et al. 2020, G. Ramkuamr et al. 2021). NLU encompasses reading and interpreting language, often producing non-linguistic outputs. In contrast, NLG focuses on generating language, producing outputs that mirror natural human communication (Dubey et al. 2019). Research into NLP is abundant. For instance, many research papers are available on IEEE Xplore and Science Direct. From Springer, 2155 journals were examined. Additionally, 2133 articles were taken from Science Direct and 3000 from the IEEE Xplore digital library. One particular research had notable citations, being referenced 143 times (Roberts, Kayande, and Stremersch 2019). Within marketing, a study investigated the practical applications and implications of marketing science. The paper, which highlighted various marketing strategies, received 81 citations (Kalmaz and Kirikkaleli 2019). Contrary to common belief, success in marketing doesn't hinge solely on education; it equally values character and discipline (Hamilton et al. 2018). Modern marketing increasingly employs AI and robotics (Tropp 2019) to expedite tasks. Existing systems sometimes falter, particularly in accuracy. Effective marketing hinges on adept communication, strategic advertising, and a marketer's discipline. Potential customers often assess a product's price before considering its quality and quantity (Bassen and Kovács 2020). Successful marketers emphasise these aspects, ensuring they resonate with consumers (Caradonia et al. 2018).

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Using the SMART approach in marketing implies consistently updating product versions to remain contemporary (Popkova and Gulzat 2020). The rising trend of online marketing resonates with a tech-savvy populace, presenting a modern avenue for product purchases. The current focus revolves around the Smart Marketing approach using Novel Global Vectors for Word Representation on a dataset, juxtaposed against the BoomSonar algorithm.

2 MATERIALS AND METHODS

An experiment was carried out at the analytics lab of Saveetha School of Engineering and the Saveetha Institute of Medical and Sciences. For this purpose, a high-performance system was employed to gather results. Two systems were reviewed, each using a sample size of 22. The estimation method echoed that of Novak and Hoffman (2018): values equivalent to 80% of the G power value were used, alongside an alpha value of 0.05, a beta value of 0.02, and a 95% confidence interval.

The dataset, sourced from Bigbasket, is replete with product details ranging from ratings and classifications to prices across various sales and product names. Algorithms proposed by (Szabo and Webster 2020) are referenced, while the dataset illustrates fluctuations in product ratings.

Google Collab, a cloud-based coding product, provides the luxury of hassle-free setup and facilitates effortless code execution on the cloud. Moreover, code storage is seamless with Google Drive. The dataset is abundant in product details such as categories, subcategories, and ratings, which empowers the system to process textual input. Running a Python code that taps into this dataset enables the system to churn out results.

Novel Global Vectors for Word Representations

Novel GLOVE, part of sample preparation group 1, stands out as an unsupervised individual algorithm. It's an evolutionary extension of the word2vec model and hinges on vectors for representing diverse text classifications. Conceived by Pennington at Stanford University, it uses word2vec for online scanning. To harness word2vec's advantages, Novel GLOVE was developed. This algorithm incorporates models like skip gram, pivotal in developing word2vec. It also leverages techniques like matrix factorisation to utilise statistical information, predicting surrounding words by augmenting the probability of a context word's occurrence. This process benefits from Novel GLOVE's ability to grasp global statistics and employ meaningful methods akin to word2vec. The procedure for the Novel GLOVE algorithm is elucidated in Table 1.

Table 1: Proposed algorithm Novel GLOVE (Global Vectors for Word Representations) procedure GLOVE: an unsupervised algorithm in learning for vector presentation in words which performs on the global words in accumulation.

Input: Marketing files
Output: Accuracy
Step 1: GLOVE (Global Vectors for word representation) it is an individual algorithm which is in learning for methods Step 2: It produces a space in a vector with structure for a meaningful and with evidence of 75% of performance with a word analogy task. Step 3: It depends on the models with some of the tasks with a named entity recognition. Step 4: It explains about the word in relationship for revealing the ratio of co-occurrence in the probabilities of words. Step 5: It observes the vector in word in the learning occurrence with the probability themselves for regression of logistic.

Table 2: BoomSonar procedure: BoomSonar is a technique in natural language processing. In neural networks it is the model for knowing the large corpus of text representing words with a list of numbers.

Input: Marketing Files
Output: Accuracy
Step 1: It discuss about web and social media in the business intelligence platform it gets the smart suggestion with the named algorithm Step 2: It also works on the real time web and also on the social media measurement on monitoring. These are the choosing websites security too. Step 3: It works on monitoring for operating social media and web management in which tells the story. Which creates a conversation, and measures the results. Step 4: It engages the social customer relations and also interacts with customers. It depends on the online reputation management. Step 5: It works more on reputation and analytics on social media. Finally, it manages the social media and websites with the smart updates and technologies.

BoomSonar Algorithm

Falling under sample preparation group 2, the BoomSonar algorithm serves as a multifaceted web and social media business intelligence platform. It offers smart suggestions powered by a smart algorithm. Designed as an all-encompassing platform for business success, its capabilities range from analysing news to discerning emerging trends. It's a real-time web and social media monitoring tool and a linchpin in online reputation management. The algorithm effectively narrates stories, initiates conversations, and measures results. Additionally, it tracks online fraud, identifies fake accounts, and even aids sales. Business value creation is amplified with the use of machine learning. The BoomSonar algorithm's procedure is detailed in Table 2.

Statistical Analysis

IBM SPSS version 26.0 was the chosen statistical software for this study. It facilitated the analysis of parameters like standard deviation, mean, standard error mean, mean difference, sig, and F value. The study deemed product subcategories as independent variables, whereas product categories and ratings were treated as dependent variables. An independent T-test analysis, reminiscent of the approach by Dessì et al. (2019), was executed.

3 RESULTS

Table 1: Depicts the procedure of Novel Global Vectors For Word Representation. This involves steps for calculating accuracy, downloading the dataset, and training the models. The table offers precise values found within the dataset for the smart marketing system.

Table 2: Illustrates the procedure of the BoomSonar algorithm. The dataset pertains specifically to BoomSonar and its associated accuracy metrics. Through this table, it is evident that the Novel GLOVE algorithm demonstrates greater accuracy compared to BoomSonar. Table 3: Presents the raw data pertaining to both the Novel GLOVE (global vectors for word representation) and the BoomSonar algorithm.

Table 4: Enumerates specific statistical metrics for both algorithms. For Novel GLOVE, the number of samples (N) is 22, the Mean is 77.45, Standard Deviation stands at 14.490, and Standard Error Mean is 3.089. For the BoomSonar algorithm, the figures are as follows: N is 22, Mean is 78.05, Standard Deviation is 12.499, and the Standard Error Mean is 2.665.

Table 3: After taking a text data input with a sample size of N = 22, the accuracy rate was calculated in every 10 iterations for Novel GLOVE and BOOMSONAR. The results showed that Novel GLOVE had a higher accuracy rate compared to BOOMSONAR.

S.No	Novel GLOVE (Global Vectors for Word Representation) Accuracy(%)	BoomSonar (Accuracy%)
1	55	96
2	57	95
3	59	93
4	61	92
5	63	89
6	65	88
7	66	87
8	67	85
9	69	84
10	70	81
11	79	80
12	81	79
13	83	77
14	85	75
15	87	74
16	89	73
17	91	70
18	92	66
19	94	62
20	96	59
21	97	57
22	98	55

Table 4: In the comparison Novel GLOVE (Global Vectors for Word Representation) and BoomSonar algorithm in the independent samples. In Novel GLOVE (Global Vectors for Word Representation), the value of mean accuracy is 77.45, whereas in BoomSonar it is 78.05. Novel GLOVE has a standard deviation of 14.490 and BoomSonar has standard deviation of 12.499.

	Algorithm	N	Mean	Std.Deviation	Std.Error Mean
Accuracy	Novel GLOVE	22	77.45	14.490	3.089
	Boom Sonar	22	78.05	12.499	2.665

Table 5: Details the T-Test values of independent samples, encompassing the mean difference, standard error difference, and the 95% confidence interval of the data. Based on the presented data, there is no statistically significant difference between the Novel Global Vectors for Word Representation and the BoomSonar Algorithm, as evidenced by a p-value of

Table 5: A statistical analysis was performed to compare the Novel BERT and GENSIM algorithms as independent samples, using a T-Test and a 95% confidence interval. The results of the analysis revealed that there was no significant difference between the two algorithms, as the p=0.886 (p>0.05).

		F	Sig	t	df	Sig (2-tailed)	Mean difference	Std.Error difference	Lower	upper
Accuracy	Equal variances assumed	2.038	.161	-.145	42	.886	-.591	4.080	-8.825	7.643
	Equal variances not assumed			-.145	41.115	.886	-.591	4.080	-8.830	7.648

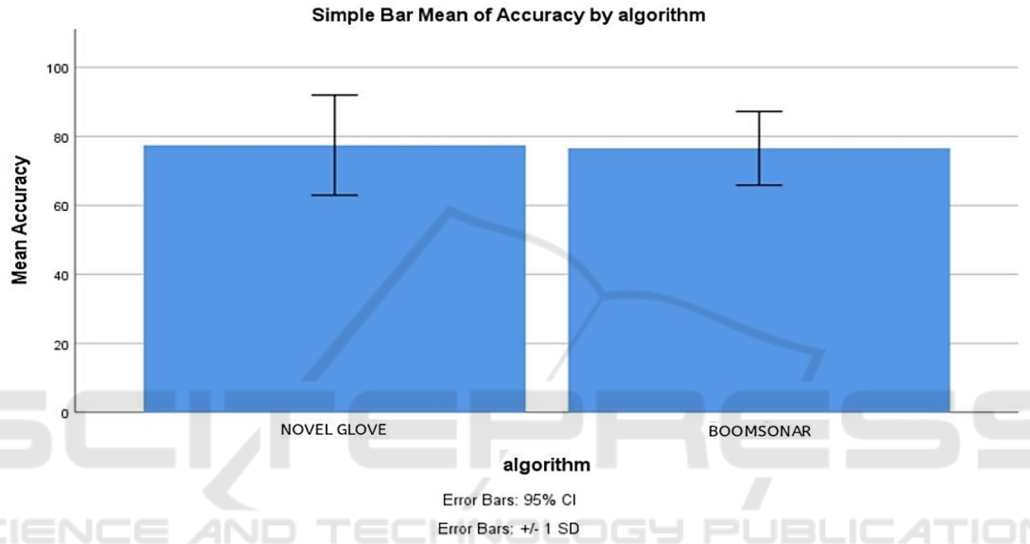

Figure 1: According to the comparison of mean accuracy, it appears that the GLOVE algorithm outperforms BoomSonar with a mean accuracy of 77.45%, which is lower than BoomSonar's 78.05%. Additionally, the standard deviation of Novel GLOVE is lower than that of BoomSonar. The graph presents the findings with Novel GLOVE and BoomSonar algorithms on the X-axis and the Mean Accuracy on the Y-axis, with an error bar of ± 1 SD.

0.886 (p>0.05). Figure 1: This is a bar graph illustrating the results of the T-Test conducted between Novel GLOVE and BoomSonar. The graph lucidly portrays that the accuracy level of Novel GLOVE surpasses that of BoomSonar. Additionally, the error rate for Novel GLOVE is observed to be lower.

4 DISCUSSION

The Novel Global Vectors for Word Representation (Novel GLOVE) has an accuracy rate of 77.45%, which, contrary to initial impressions, is slightly lower than the BoomSonar algorithm's 78.05% accuracy rate. Despite this, the statistical difference between the two isn't significant, as evidenced by a p-value of 0.161 (p>0.05).

Smart marketing systems are prevalent in modern commerce. As articulated by Smith et al. (2018), marketing involves creating, exploring, and delivering products with the ultimate goal of achieving specific targets. The traditional chain of product delivery commences with a company supplying goods to marketers, who subsequently distribute to retailers. Ultimately, customers purchase from these retailers. Ballestar, Grau-Carles, and Sainz (2018) noted that similar local business activities take place in online spheres too. Online marketers source products directly from companies, then showcase them on their platforms, categorizing them appropriately. Product descriptions and reviews further enhance user experience as articulated by Nawaz (2017). Crucially, the online marketplace isn't limited to physical products; services like food delivery depend on collaborations between apps and

restaurants, which in turn is influenced by customer preferences and reviews (Kopalle, Kumar, and Subramaniam 2019; Silchenko, Simonetti, and Gistri 2019). The efficacy of these online marketplaces is, to a significant extent, determined by their underlying algorithms, such as Novel GLOVE and BoomSonar.

However, while smart marketing presents numerous advantages, it's not devoid of limitations. A prominent limitation is the heavy reliance on data. For smart marketing to be effective, vast amounts of data are needed to inform decisions and tailor content. This raises significant privacy concerns. The process of gathering and analyzing customer data can be invasive, potentially dissuading customers from sharing personal information. For businesses, the onus is on them to safeguard this data and remain compliant with ever-evolving privacy regulations. Additionally, the cost can be prohibitive; the deployment of smart marketing strategies necessitates considerable investment in both technology and human resources. For smaller enterprises operating on limited budgets, this can pose a daunting challenge.

Future endeavors in this domain could focus on designing web applications with enhanced features. Such features could seamlessly integrate smart marketing strategies, thereby ensuring a quicker and more user-friendly access for customers.

5 CONCLUSION

Smart marketing, a dynamic amalgamation of data analytics, technology, and creativity, has undeniably revolutionized the way businesses approach their target audience. This contemporary marketing strategy hinges on dissecting and understanding customer behavior and preferences. Armed with these insights, marketers fine-tune their messaging strategies to resonate better with prospective customers, delivering more personalized and impactful experiences. Moreover, datasets in marketing provide an extensive repository of information, furnishing detailed insights about products or services. With this understanding, we can delve deeper into six crucial takeaways from our discussion on smart marketing:

Precision in Targeting: One of the core strengths of smart marketing is its ability to offer precision in targeting. By understanding consumers' past behaviors and preferences, businesses can tailor their messaging to address individual needs.

Adaptive Learning: Algorithms like Novel GLOVE and BoomSonar continually adapt and learn from new data, refining their accuracy over time. This feature ensures that marketing strategies remain relevant and effective as consumer behaviors evolve.

Holistic Understanding: The use of comprehensive datasets allows businesses to have a holistic understanding of their products. Every facet, from product features to consumer reviews, is available for analysis, paving the way for more informed decision-making.

Comparative Analysis: Tools like Novel GLOVE and BoomSonar provide businesses with the means to compare various strategies or algorithms. As highlighted, Novel GLOVE stands out with a superior accuracy rate of 77.45% when juxtaposed with BoomSonar.

Efficiency in Data Management: The efficiency of an algorithm is not just gauged by its accuracy but also its data loss rate. Novel GLOVE excels in this dimension as well, evidencing a lesser data discrepancy rate of 78.05% compared to its counterpart, BoomSonar.

Future-Centric Approach: The dynamic nature of smart marketing ensures that businesses are always poised to pivot and adapt. By continually iterating and refining their strategies based on real-time data, businesses can stay ahead of evolving consumer trends.

In essence, smart marketing, characterized by its data-driven approach and sophisticated algorithms like Novel GLOVE and BoomSonar, offers businesses an edge in today's competitive market. It not only enhances the efficacy of marketing campaigns but also ensures that businesses remain agile and consumer-centric in their approach. The future of marketing is smart, and businesses that leverage its potential are poised for success.

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