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Research Article

Artificial Intelligence & Machine Learning Architecture Of Demand Generation

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ABSTRACT

Artificial Intelligence is the most sought-after technology in today's era, there are many domains where Artificial intelligence has started impacting, and one of the domains which I bring here is Digital marketing, which I specifically discussed in the field of Demand Generation.

Demand generation is a marketing approach that considers the consumer's needs, the product you are offering, and how best to raise awareness of the product in a way that will ideally result in qualified leads down the road.

There are various other stages in the process of Demand generation where we can apply Artificial Intelligence and machine learning approaches; however, it's very crucial to analyze which machine learning model we need to use and, more importantly, how we can train the data.

The process of training the machine learning model is essential to achieving process accuracy; therefore, it needs the right infrastructure to stream the large amounts of data needed and a computing engine to analyze and filter the data according to the model's training requirements.

Artificial Intelligence can be attained by machine learning, which combines a variety of methods. Depending on the situation, we can use the appropriate technique and data set, which is essential to the model being trained.

Keywords: Intelligence, Machine learning, Demand generation, machine learning model, firmographic

INTRODUCTION

Demand generation is a subset of inbound marketing and refers to the entire marketing plan (sometimes known as the "marketing funnel") used to generate interest in the goods or services offered by your company.

An easier method to conceptualize demand generation is by considering how a potential consumer feels about your product or service. Technically, a demand generation plan covers the complete customer experience, from interest to lead creation. Finding ways to introduce your brand to a new buyer group, gauging the audience's level of familiarity with it, and building authority and trust are the first steps in a demand-generation marketing campaign. What issue does your brand claim to be able to resolve this, and to what extent does your customer trust you to do so? This is especially crucial for business-to-business (B2B) demand development because other companies are looking for ways to establish their brands.

Demand generation strategies range from thought leadership in your business's industry (webinars, eBooks, white papers, etc.) to social media campaigns to raise brand recognition. Demand generation is ultimately primarily about making sure your target market is aware of the brand you represent, the value it offers, and the level of trust a consumer should have in it.
Demand generation can benefit the entire customer journey, from the sales team pursuing qualifying leads to managing the creation of demand for the product.
Managing brand awareness and reputation Brand awareness is a significant asset from demand generation,

as it introduces a brand to new customers and builds long-lasting relationships. This reputation not only results in quality leads but also strengthens the brand's reputation as a thought leader through published case studies and webinars.

However, in today's world, using AI and ML approaches, we can significantly improve brand awareness and customer repurchases.

I. PROBLEM STATEMENT

There are various inherited problems in the brand generation business, A few of them are: which segment of business do we need to target, In that segment, do we have enough data in the form of digital footprint?
And if this digital footprint is not available, then how do we generate the digital footprint of the particular brand to generate the brand awareness of the target customer?
In a nutshell, there are two problems we need to solve, first is how we gather the digital footprint of data where the customer is providing feedback or discussing the particular brand, However, the main challenge we need to solve here is how effectively and timely we can gather this data and how cleanly we can process it so that it can be fed into the AI and ML models to get the desired data, which we can further evaluate to understand the particular brand awareness.
Another problem that I am particularly discussing is: if there is not much awareness of a particular brand, how we can increase the awareness?
To increase awareness we need to identify the target segment and category where we can feed brand value data.

II. INBOUND DATA PROCESSING ENGINE

In AI and ML models, one of the primary requirements is the quality of the inbound data, which needs to be fed. To scrape and search the data, like comments, reviews, and discussions, we gather this data from different channels, however, this data has a lot of noise that needs to be filtered before being fed into the data store.
The role of the data processing engine comes into play when it streams data; it performs different processes that can bring the intended data.
There is various category of data processing engine Firmographic data Demographic data Intentded data Category data Sentiments data
first step of **THE INBOUND DATA PROCESSING ENGINE** is to consume the data from various sources and perform the preprocessing and data cleansing work, As part of this process, we filter out the data that has noise in it, like, data discrepancies. As a part of this engine, it performs several checks and removes or discards the data that doesn't satisfy the clean dataset criteria.
As a part of the next step, data curing is performed, where we enrich the data and do a certain standardization process, which helps the data be ready for further processing.
Data transformation is the next crucial step, where we map the data to the desired dataset and transform the data accordingly.
The next crucial step we perform is data segmentation, where we extract the data for different segments and load it into the desired data store, This is one of the vital processes where we are expecting to generate different categories of datasets, which is the kind of required dataset that needs to be fed into AI and ML models.

Data engine workflow

Data standardization is the process of flattening data into a standard format. This is necessary because, when we aggregate data from various sources, different aggregator agencies have their own predefined formats, which are occasionally different from the standard format. Therefore, before moving on to the next step, we must bring the data into standard formatting.

Data validation: Data cleaning is an essential step in the data consumption process that allows us to remove null values and empty information from any record that doesn't adhere to the intended data type standard. These types of data are filtered out during this process because they pose the greatest risk of adding noise to the dataset and increasing the amount of data in the data store, which will ultimately result in higher costs and a decrease in the effectiveness of machine learning models.

Data curing is a crucial procedure that allows us to make necessary corrections to improve the data and help ensure that it is excellently curated, safe, easily available, and well-maintained. By following specific best practices, organizations may ensure the efficient use of their data and make the most of it.

Data sampling, also known as data segmentation, is the process of obtaining a selection of the desired data

based on the requirements.
Third-party aggregators typically provide vast amounts of data; nevertheless, we must obtain the specific set of data needed to meet our needs. Therefore, during this procedure, we sample the subset of data that meets our needs.

Data Transformation: One of the main processes is data transformation, which involves mapping the gathered dataset into desired entities and attributes that may be in a structured or unstructured format. This transformation typically takes a while to complete, but the end product is the intended data, which is then loaded and fed into machine learning models.

Data loading: This is usually the last step, during which the data is loaded into the desired data mart, data warehouse, data lake, or data storage. In this procedure, we load the data gradually based on the requirements; alternatively, we might load the data randomly or based on the timestamp.

The failover scenario plays a vital role here, we also need to check if any failure happens, and the failover recovery option should be there so that we can make sure data loads effectively.

Refer to section X.a for the architecture diagram

III. SENTIMENT ANALYSIS ENGINE.

Artificial Intelligence plays a critical role in implementing categorization techniques. Categorization is a way to create a different product category and an association with the demographic data.
Identifying and creating different product categories will require proper datasets and algorithms. In our study, we employed the supervised machine learning technique to categorize possible customers. Initially, we preprocessed the data after gathering it from social media and search engines, which is a digital footprint of customer behavior. Features are defined as the number of events that happen to the customer in the intended product. To label the data, we can build the dataset. We have trained our supervised model for classification using this labeled data. Following the evaluation of a customer's purchasing behavior. Computational measures relating to classification are acquired from these approaches. pre-processing of data is a major part of this system. total understanding of the information needed to identify the current features. To improve accuracy, features were designed.

Refer section X.b the architecture diagram

IV. MAP SENTIMANT DATA WITH BRAND

Mapping of sentiment analysis data needs to be map with the brands. for this, we need to use the sentiment data and using Natural Language Processing algorithm, we can filter out context, which particular product they are discussing, where this product falls in which category, what are the different brands that belong to this category and which intended brands the sentiment data meant for.

For this mapping, there are various calculation required, and for this, we input the various category data
And category data maps to a list of brands after getting sentiment data, which can be calculated using a mathematical model called Naïve Bayes and determines the likelihood that a word or phrase is positive or negative. Its straightforward categorization capabilities make it one of the most often used machine learning techniques for sentiment analysis since they enable it to ascertain the general sentiment of a conversation.
As a part of this process, we will get data about the customer's feelings for that particular product and its associated brand.

Refer to section X.c for the architecture diagram

V. LEAD GENERATION EXTRACTION

Once we successfully mine the mapping of sentiment data with product and brand, the next step is to further map with customer demographic and firmographic information, which can help us get vital and accurate lead data that can further strengthen brand promotion and demand augmentation.
For this, we need to find and further analyze the firmographic and demographic data and association of this data with sentiment data. To achieve this data, the analytical engine need to perform matching with customer reaction in the form of sentiment data and this data belongs to number of customer and their demographic and firmographic information

VI. CONCLUSION

The terms artificial intelligence (AI) and machine learning refer to techniques that let computers perform cognitive activities that require human intelligence. They include learning, thinking, and interacting with the machine's surroundings. The two most popular AI techniques are deep learning and machine learning. AI can tailor brand experiences, which encourages user loyalty and engagement. Language-based artificial intelligence is evolving swiftly. It automatically "learns" from its failures and gets better the next time, yielding even better outcomes.
Scapping the brand reputation of the product on an online platform through the given architecture and machine learning algorithms is possible; however, there is still scope for improvement as there are still hidden pieces that need to solved.
Contacting them for better leads to turn prospects into target customers can assist marketers and businesses in obtaining more accurate leads about customer demographics and firmographic data.

By using this method, we can provide organizations with data-driven consumer profiling that will enable them to increase sales performance and fortify client connections. Online business platforms display a broad spectrum of customer needs, behaviors, and preferences, which facilitate the raw data collection process and enable the creation of many taxonomies of customer information based on the aforementioned data.

VII. Practical Implication

We used the aforementioned research in our practice and developed a solution based on artificial intelligence (AI), machine learning, and data processing engines. We saw that this allowed us to filter various customer data taxonomies, such as firmographic, demographic, sentiment data, product, and product category.
We are also able to map the product with corresponding brand and the sentimental data with corresponding product category and associated with the corresponding brand.
We were able to find and analyze sentimental data from our investigation that was about 60–75% accurate. However, there are still several unanswered questions that require further study in order to increase accuracy.

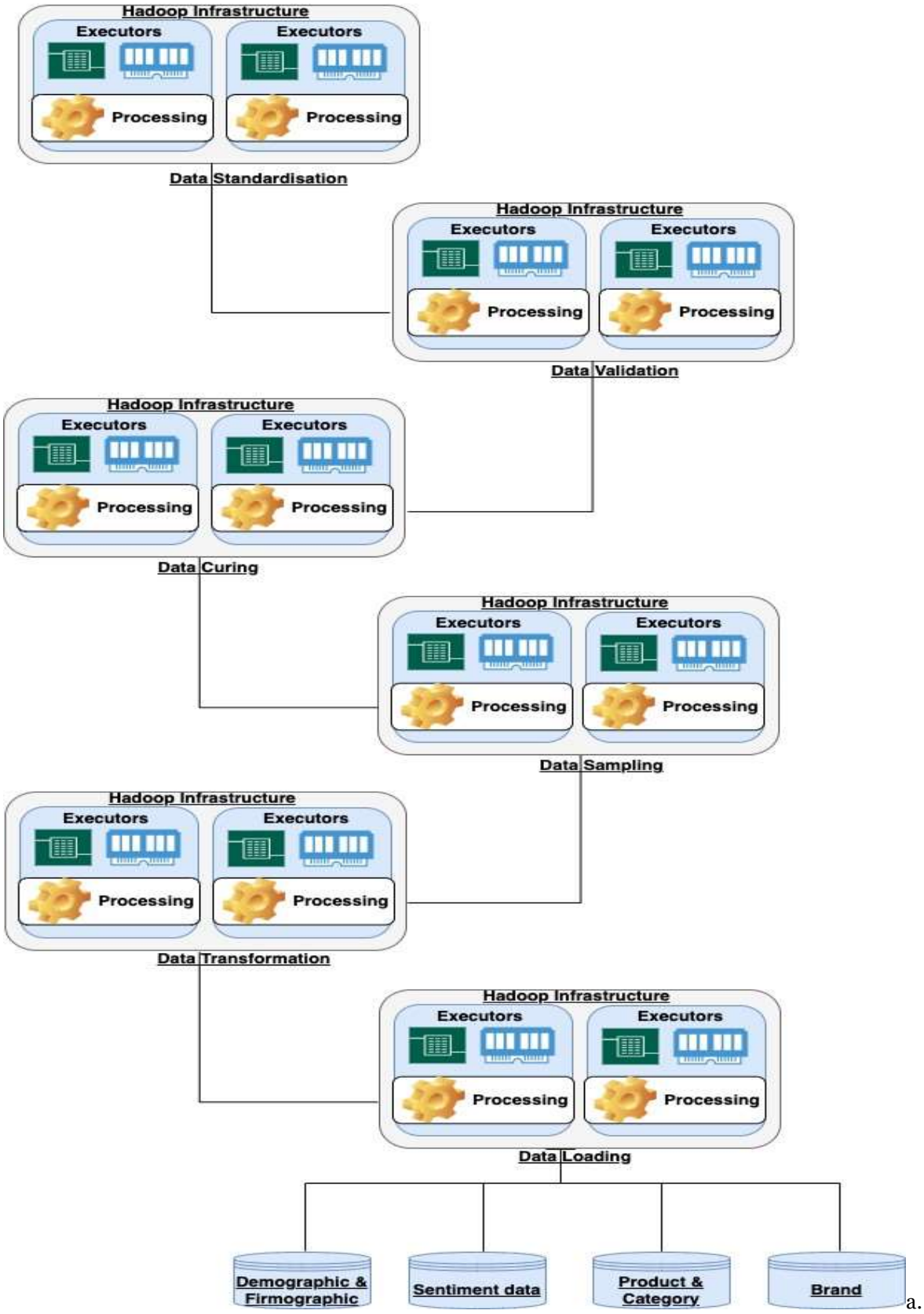
VIII. Future scope

During the course of this research and its practical ramifications, we encountered a few issues that required more investigation. This is one of the issues I want to talk about.
A few patterns stood out to us: We process and extract the firmographic and demographic data when we process the aggregated data. While firmographic data is time-based and constantly changes in response to real-world factors, such as when an individual changes their organization, title, phone number, or location, demographic data is more static in nature. The issue is that it looks hard to validate this one because there is so much data that we are unable to update it on any social network or search engine platform.

IX. Declaration

Conflict of interest The authors declare no conflicts of interest related to this work.

A. Abbreviations andAcronyms
AI (Artificial Intelligence) ML Machine Learning
ETL Extract Transform Load
B. Figures and Tables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Hadoop Infrastructure
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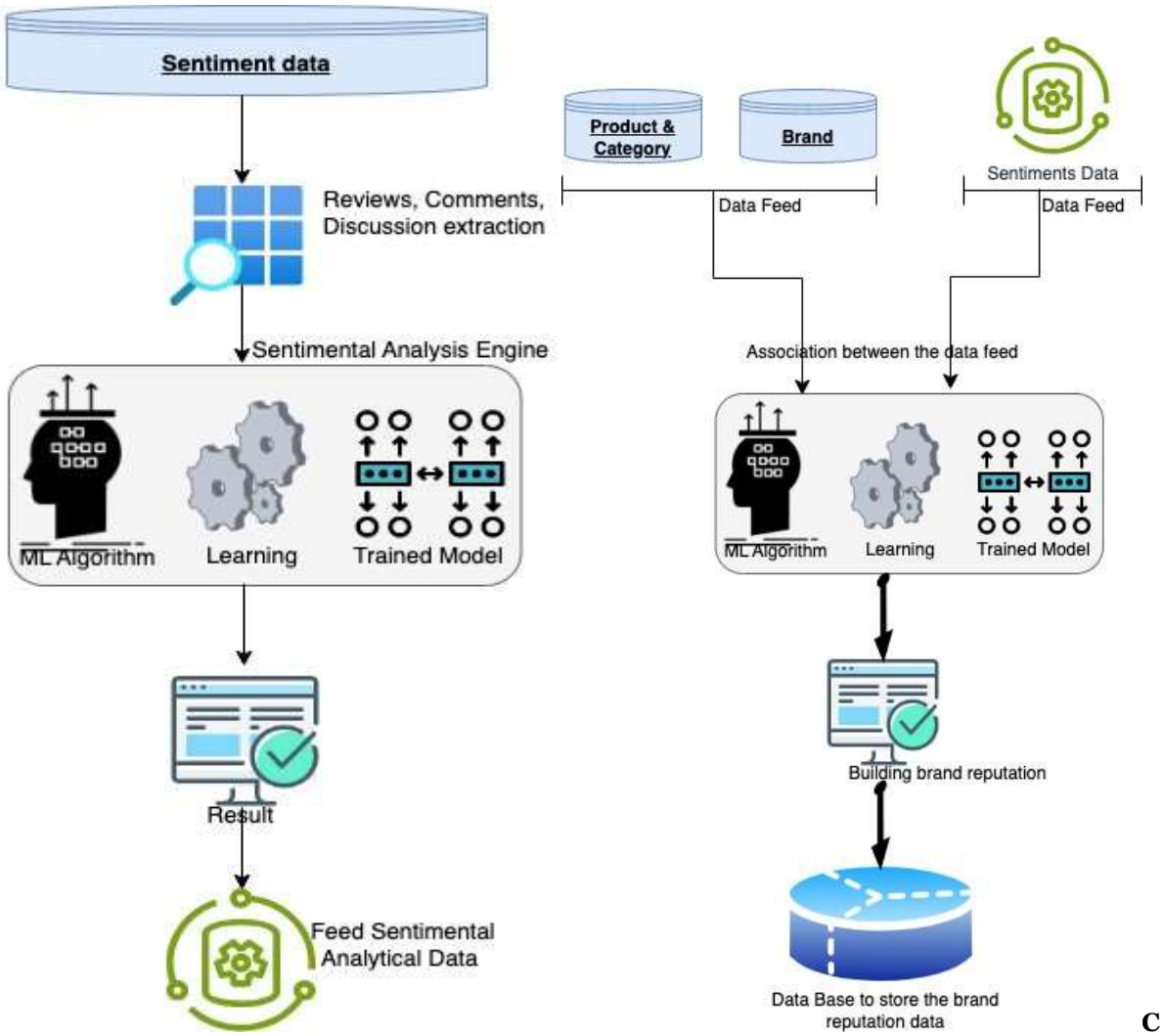
Processing
Data Loading
Demographic & Firmographic
Sentiment data
Product & Category
Brand

a.

b.



c. **C**

REFERENCES

1. S. Kuchlous and M. Kadaba, "Short Text Intent Classification for Conversational Agents," 2020 IEEE 17th India Counc. Int. Conf. INDICON 2020, 2020, doi: 10.1109/INDICON49873.2020.9342516.
2. J. Schuurmans and F. Frasincar, "Intent Classification for Dialogue Utterances," IEEE Intell. Syst., vol. 35, no. 1, pp. 82–88, 2020, doi: 10.1109/MIS.2019.2954966.

I. S. Jacobs and C. P. Bean, "Fine particles, thin films and exchange anisotropy," in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.

A. Patra and D. Singh, "A Survey Report on Text Classification with Different Term Weighing Methods and Comparison between Classification Algorithms," Int. J. Comput. Appl., vol. 75, no. 7, pp. 14–18, 2013, doi: 10.5120/13122-0472.

3. Fayyad, U., Piatetsky-Shapiro, G., and Smyth, P. From data mining to knowledge discovery in databases ArtificialIntelli- gence Magazine, (1996), 37-53.
4. Han, J., and Fu, Y. Discovery of multiple-level association rules from large databases. Proc. International Conference Very Large Databases, Zurich, (1995).
5. Alsayat A (2023) Customer decision-making analysis based on big social data using machine learning: a case study of hotels in mecca. Neural Comput Appl 35:4701–4722
6. Das S, Nayak J (2021) Customer segmentation via data mining techniques: state-of-the-art review. Comput Intell Data Min: Proc ICCIDM 2022:489–507
7. T. E. Lin and H. Xu, "A post-processing method for detecting unknown intent of dialogue system via pre-trained deep neural network classifier," Knowledge-Based Syst., no. August 2019, 2019, doi: 10.1016/j.knosys.2019.104979.
8. Gronroos, Christian. "Relationship approach to marketing in service contexts: The marketing and organizational behavior interface." Journal of business research 20, no. 1, pp. 3-11, (1990).
9. Graves, Alex, Abdel-rahman Mohamed, and Geoffrey Hinton. "Speech recognition with deep recurrent neural networks." In Acoustics, speech and signal processing (icassp), 2013 ieee international conference on, pp. 6645-6649. IEEE, 2013.

10. Graves, Alex, Abdel-rahman Mohamed, and Geoffrey Hinton. ”Speech recognition with deep recurrent neural networks.” In Acoustics, speech and signal processing (icassp), 2013 ieee international conference on, pp. 6645-6649. IEEE, 2013.
11. Kashwan KR, Velu C (2013) Customer segmentation using clustering and data mining techniques. Int J Comput Theory Eng 5:856
12. Brito PQ, Soares C, Almeida S, Monte A, Byvoet M (2015) Customer segmentation in a large database of an online cus- tomized fashion business. Robot Comput-Integr Manuf 36:93–100
13. He X, Li C (2016) The research and application of customer segmentation on e-commerce websites. In: 2016 6th International Conference on Digital Home (ICDH), IEEE, pp 203–208