AI-POWERED CUSTOMER SEGMENTATION MARKETING CAMPAIGNS FOR SMALL BUSINESSES: REVOLUTIONIZING CUSTOMER ENGAGEMENT

- Turning Clicks into Connections

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BACKGROUND

Personalization in marketing has been a buzzword for many years, but the development of artificial intelligence (AI) has opened a wide range of new possibilities for customer segmentation experiences. The concept of personalization involves tailoring marketing messages and experiences to individual customers based on their behavioural patterns.

Small scale industries face unique challenges in the highly competitive market, where resources are often limited. One crucial aspect of successful marketing campaigns is understanding and effectively targeting the right audience. Customer segmentation, the process of dividing a customer base into distinct groups with similar characteristics, plays a vital role in tailoring marketing strategies to specific customer needs. Utilizing Artificial Intelligence (AI) for customer segmentation can significantly enhance the efficiency and effectiveness of marketing efforts.

PROBLEM STATEMENT

Small scale industries often operate on tight budgets with limited resources for marketing. Identifying and targeting the most profitable customer segments becomes crucial to maximize the return on investment (ROI). AI can help optimize resource allocation by precisely identifying and prioritizing potential customer segments. Small businesses may lack the expertise and resources to collect, process, and analyze large volumes of customer data. Implementing AI-driven customer segmentation requires technical skills and resources that may be beyond the scope of small-scale enterprises. Addressing this limitation is essential for unlocking the benefits of AI in marketing.

Without sophisticated tools, small businesses may resort to generic marketing strategies, leading to inaccurate targeting. AI-driven segmentation can pinpoint specific customer characteristics, behaviours, and preferences, ensuring that marketing efforts are tailored to resonate with the intended audience.

Market/Customer/Business Need Assessment

- **Increasing Competition**:

The small scale industries face growing competition in the market. As the number of businesses in various sectors rises, there is a critical need for more effective marketing strategies to stand out and attract customers.

- **Limited Budgets:**

Small businesses often operate on constrained budgets. There is a pressing need to optimize marketing expenses by precisely identifying and targeting the most promising customer segments to ensure the best return on investment.

- **Data-Driven Decision Making**:

The modern business landscape demands data-driven decision-making processes. Small businesses need tools and methodologies to leverage the available data for strategic marketing decisions, and AI-based customer segmentation provides a solution.

- **Personalized Marketing:**

Consumers increasingly demand personalized experiences. Small businesses need the ability to tailor their marketing efforts to individual customer needs and preferences, which can be efficiently achieved through AI-driven customer segmentation.

Efficient resource allocation is crucial for small scale industries. By understanding customer segments more accurately, businesses can allocate resources more efficiently, ensuring that marketing efforts are directed towards the segments with the highest potential for conversion.

- **Targeted Marketing:**

Small business owners are seeking ways to reach their target audience more effectively. They need tools that can identify and define specific customer segments, allowing them to tailor marketing campaigns to the unique needs of each group.

- **Simplicity and User-Friendly Solutions:**

Small business owners often lack advanced technical skills. There is a demand for user-friendly AI solutions that can be easily integrated into existing workflows without requiring extensive training or expertise.

- **Cost-Effective Solutions:**

Affordability is a critical factor for small businesses. They need cost-effective AI solutions that provide tangible benefits, helping them achieve their marketing goals without significant financial burdens.

- **Adaptability to Changing Markets:**

Small businesses operate in dynamic markets. They require solutions that can adapt to changing customer behaviours and market trends, ensuring that their marketing strategies remain relevant and effective over time.

- **Improved Marketing ROI:**

Small scale industries aim to maximize their return on marketing investment. The development and implementation of an AI-driven customer segmentation solution will contribute to improved targeting accuracy, resulting in enhanced marketing ROI.

- **Competitive Advantage:**

Gaining a competitive advantage is crucial for small businesses. A sophisticated customer segmentation strategy powered by AI can differentiate a business from its competitors by delivering more personalized and compelling marketing campaigns.

- **Efficiency in Marketing Operations:**

Small businesses are seeking ways to operate more efficiently. AI-based customer segmentation can streamline marketing operations by automating the process of identifying and targeting customer segments, reducing manual effort and increasing overall efficiency.

- **Long-Term Customer Engagement:**

Building long-term relationships with customers is a key business objective. A targeted approach through AI-driven segmentation can contribute to increased customer satisfaction, loyalty, and sustained engagement over time.

- **Integration with Existing Systems:**

Seamless integration with existing marketing and CRM systems is essential for small businesses. The need for a solution that can work harmoniously with current infrastructure without disrupting operations is critical for the successful implementation of AI-driven customer segmentation.

By addressing these market, customer, and business needs, the proposed solution aims to provide small scale industries with a strategic advantage in their marketing efforts, helping them achieve sustainable growth and success in a competitive business environment.

Here' are few examples why Customer segmentation Marketing Campaigns are important:

Example 1: <u>Enhanced Customer Engagement:</u>

Consider a local boutique using AI-powered marketing to analyse customer purchase history. By understanding preferences, the boutique can send customer segmentation recommendations or exclusive offers, fostering a deeper connection with each customer.

Example 2: <u>Increased Conversion Rates:</u>

An online subscription service using AI to analyse user behaviour can personalize its promotional messages. By sending targeted incentives based on past interactions, the service is more likely to convert casual visitors into paying customers.

Example 3: <u>Improved Brand Loyalty:</u>

A neighbourhood coffee shop implementing AI for customer segmentation loyalty programs can reward customers based on their preferences and purchase history. This fosters a sense of appreciation, encouraging customers to return regularly.

Example 4: <u>Personalization at Scale:</u>

An artisanal craft store, with the help of AI, can offer customer segmentation promotions to a diverse customer base. The ability to scale personalization ensures that even businesses with varied customer profiles can tailor their marketing efforts effectively.

Example 5: <u>Data-Driven Decision-Making</u>:

 A local service provider employing AI analytics can gain insights into customer demographics, preferences, and behaviour. This data-driven approach allows informed decision-making, steering marketing strategies in the most effective direction

Business Models(Monetization idea)

<u>1. Subscription-Based Model</u>:

Offer a subscription-based pricing model where small businesses pay a monthly or annual fee to access the AI-driven customer segmentation solution. The subscription can be tiered based on the level of features, support, and the volume of customer data processed.

2. Freemium Model:

Introduce a freemium model where basic features of the customer segmentation tool are offered for free, enticing small businesses to try the solution. Premium features, advanced analytics, and additional support can be provided under a paid subscription.

3. Pay-Per-Use Model:

Implement a pay-per-use pricing model where businesses are charged based on the number of customer records processed or the frequency of segmentation analyses. This model allows small businesses to pay only for the services they actively use.

4. Customization and Consultation Services:

Offer customization services where the solution is tailored to meet the specific needs of individual businesses. Additionally, provide consultation services to help businesses interpret segmentation results and optimize their marketing strategies. Charge a fee for these personalized services.

5. Integration Fees:

Charge a one-time or recurring fee for seamless integration with existing CRM and marketing systems. This can be an attractive option for businesses looking to ensure a smooth transition and maintain compatibility with their current infrastructure.

SOFTWARES AND ALGORITHMS

Jupyter Notebook

Workflow

Data Collection:

Customer data is collected from various sources and fed into the system.

Preprocessing:

The preprocessing engine cleans and prepares the data for analysis.

Segmentation:

The AI-driven segmentation model processes the data, identifying distinct customer segments based on predefined criteria.

Visualization and Interaction:

The user interface presents visualizations of segmented customer groups, allowing users to interact with the data, customize segmentation criteria, and gain actionable insights.

Integration:

The integration layer ensures seamless compatibility with existing CRM and marketing systems, facilitating a smooth implementation process.

Implementing K-means clustering in Python

K-Means clustering is an efficient machine learning algorithm to solve data clustering problems. It's an unsupervised algorithm that's quite suitable for solving customer segmentation problems.

Code Snippets (Segmentation using K-Means)

Unlike supervised learning algorithms, K-means clustering is an unsupervised machine learning algorithm. This algorithm is used when we have unlabelled data. Unlabelled data means input data without categories or groups provided. Our customer segmentation data is like this for this problem.

The algorithm discovers groups (cluster) in the data, where the number of clusters is represented by the K value. The algorithm acts iteratively to assign each input data to one of K clusters, as per the features provided. All of this makes k-means quite suitable for the customer segmentation problem.

Given a set of data points are grouped as per feature similarity. The output of the K-means clustering algorithm is:

The centroids values for K clusters,

Labels for each input data point.

At the end of implementation, we're going to get output such as a group of clusters along with which customer belongs to which cluster.

First, we need to import the required Python libraries as shown in the table.

```python
import pandas as pd
import numpy as np
from sklearn.cluster import KMeans
import plotly.express as px
import plotly.graph_objects as go
import matplotlib.pyplot as plt
```

We've imported the pandas, NumPy sklearn, plotly and matplotlib libraries. Pandas and NumPy are used for data wrangling and manipulation, sklearn is used for modelling, and plotly along with matplotlib will be used to plot graphs and images.

After importing the library, our next step is to load the data in the pandas data frame. For this, we're going to use the read_csv method of pandas.

```python
customersdata = pd.read_csv("customers-data.csv")
```

```python
customersdata.head()
```

	customer_id	products_purchased	complains	money_spent
0	649	1	0.0	260.0
1	1902	1	0.0	79.2
2	2155	3	0.0	234.2
3	2375	1	0.0	89.0
4	2407	2	0.0	103.0

After loading the data, we need to define the K- means model. This is done with the help of the KMeans class that we imported from sklearn, as shown in the code below.

```python
# Define K-means model
kmeans_model = KMeans(init='k-means++',  max_iter=400, random_state=42)
```

After defining the model, we want to train is using a training dataset. This is implemented with the use of the fit method, as shown in the code below.

```
# Train the model
kmeans_model.fit(customersdata[['products_purchased','complains',
'money_spent']])
```

 Though we have trained a K-means model up to these points, we haven't found the optimal number of clusters required in this case of customer segmentation. Finding the optimal number of clusters, for the given dataset is important for producing a high-performant k-means clustering model.

Finding the optimal number of clusters

Finding the optimal number of clusters is one of the key tasks when implementing a k-means clustering algorithm. It's worth noting that a k-means clustering model might converge for any value of K, but at the same time, not all values of K will produce the best model.

For some datasets, data visualization can help understand the optimal number of clusters, but this doesn't apply to all datasets. We have a few methods, such as the elbow method, gap statistic method, and average silhouette method, to assess the optimal number of clusters for a given dataset. We are going to use elbow method.

For implementing the elbow method, the below function named "try_different_clusters" is created first. It takes two values as input:

- K (number of clusters)
- data (input data).

```
Create the K means model for different values of K
def try_different_clusters(K, data):

    cluster_values = list(range(1, K+1))
    inertias=[]

    for c in cluster_values:
        model = KMeans(n_clusters = c,init='k-
means++',max_iter=400,random_state=42)
        model.fit(data)
        inertias.append(model.inertia_)

    return inertias
```

The method try_different_clusters is called using the below code, where we pass the values of K from 1 to 12 and calculate the inertia for each value of k.

```
# Find output for k values between 1 to 12
outputs = try_different_clusters(12,
customersdata[['products_purchased','complains','money_spent']])
distances = pd.DataFrame({"clusters": list(range(1, 13)),"sum of squared
distances": outputs})
```

Using the below code, we plot the value of K (on the x-axis) against
corresponding values of inertia on the Y-axis.

```
# Finding optimal number of clusters k
figure = go.Figure()
figure.add_trace(go.Scatter(x=distances["clusters"], y=distances["sum of
squared distances"]))

figure.update_layout(xaxis = dict(tick0 = 1,dtick = 1,tickmode = 'linear'),
                xaxis_title="Number of clusters",
                yaxis_title="Sum of squared distances",
                title_text="Finding optimal number of clusters using
elbow method")
figure.show()
```
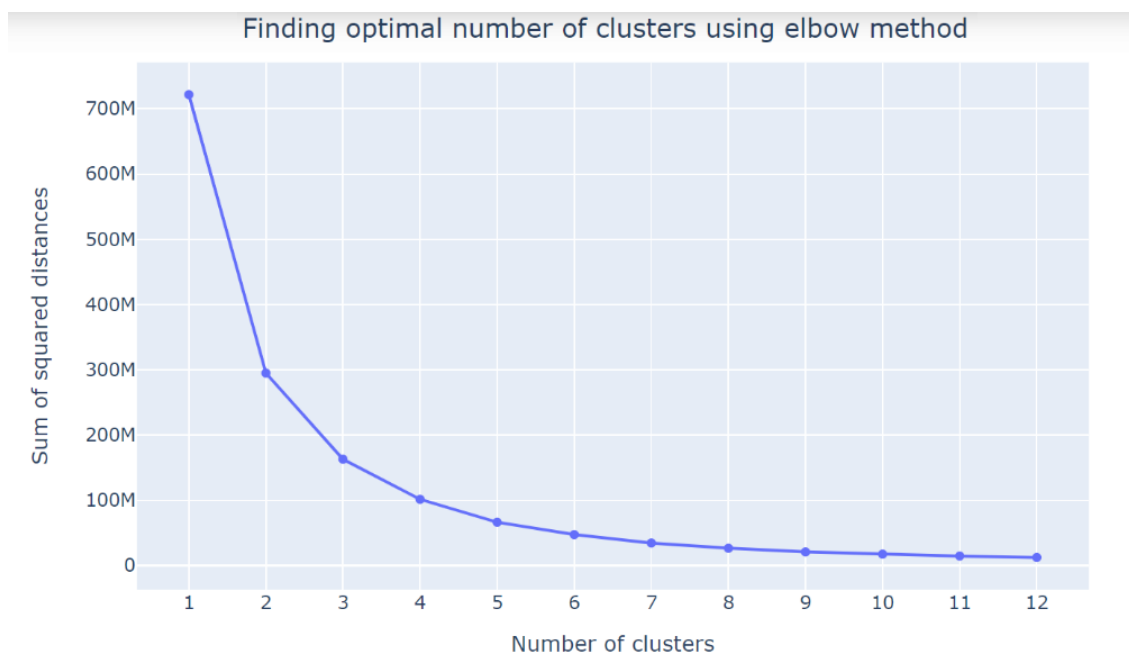

Optimal value of K=5.

As discussed before, we need to train the k-means clustering model again with
the optimal number of clusters found. We're using the fit_predict method to
train the model.

```
# Re-Train K means model with k=5
kmeans_model_new = KMeans(n_clusters = 5,init='k-
means++',max_iter=400,random_state=42)

kmeans_model_new.fit_predict(customersdata[['products_purchased','complains
','money_spent']])
```

Visualization

In this section, we'll be implementing some code using plotly express. This way we'll visualize the clusters in three dimensions, formed by our k-means algorithm. Plotly express is a library based on plotly that works on several types of datasets and generates highly-styled plots.

First, let's add a new column named 'clusters' to the existing customer data dataset. This column will be able to tell which customer belongs to what cluster.

```
# Create data arrays
cluster_centers = kmeans_model_new.cluster_centers_
data = np.expm1(cluster_centers)
points = np.append(data, cluster_centers, axis=1)
points
```

```
# Add "clusters" to customers data
points = np.append(points, [[0], [1], [2], [3], [4]], axis=1)
customersdata["clusters"] = kmeans_model_new.labels_
```

After adding the new column, named clusters, the customer data dataset will look as below.

```
customersdata.head()
```

	customer_id	products_purchased	complains	money_spent	clusters
0	649	1	0.0	260.0	4
1	1902	1	0.0	79.2	0
2	2155	3	0.0	234.2	4
3	2375	1	0.0	89.0	0
4	2407	2	0.0	103.0	0

```
# visualize clusters
figure = px.scatter_3d(customersdata,
                       color='clusters',
                       x="products_purchased",
                       y="complains",
                       z="money_spent",
                       category_orders = {"clusters": ["0", "1", "2", "3",
"4"]}
                       )
figure.update_layout()
figure.show()
```
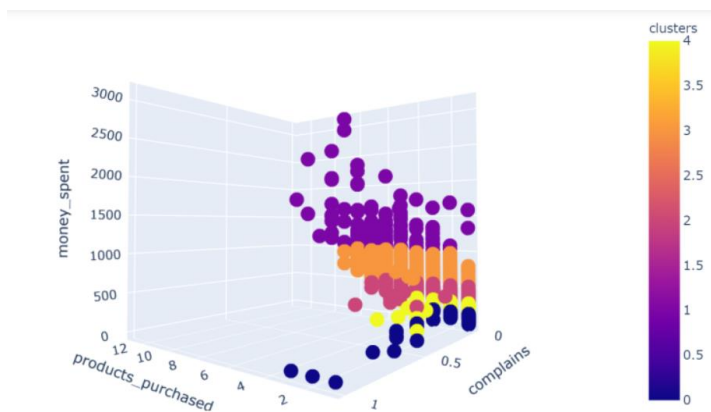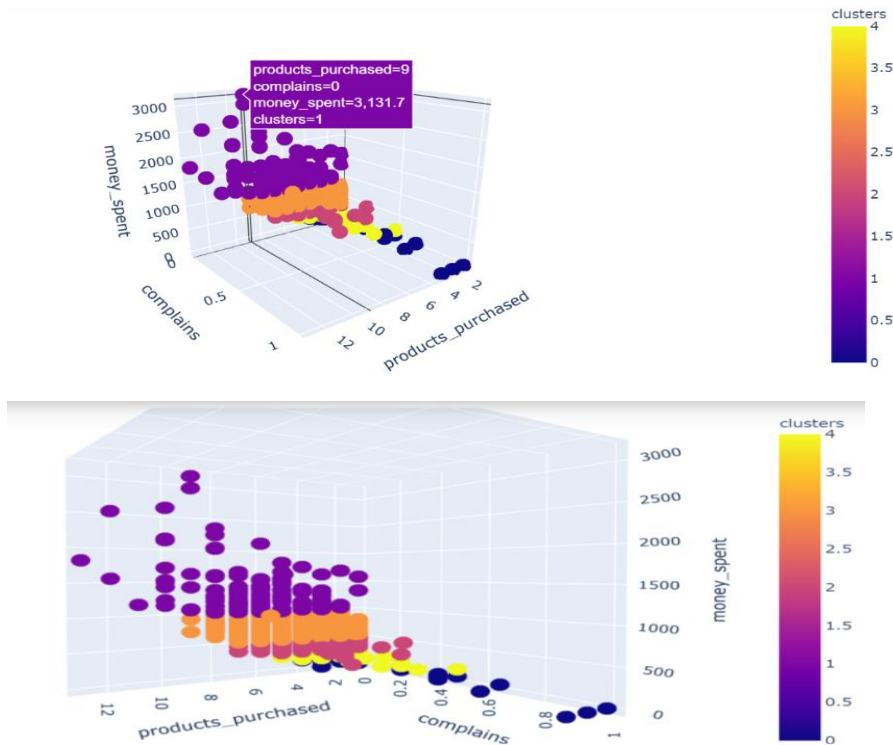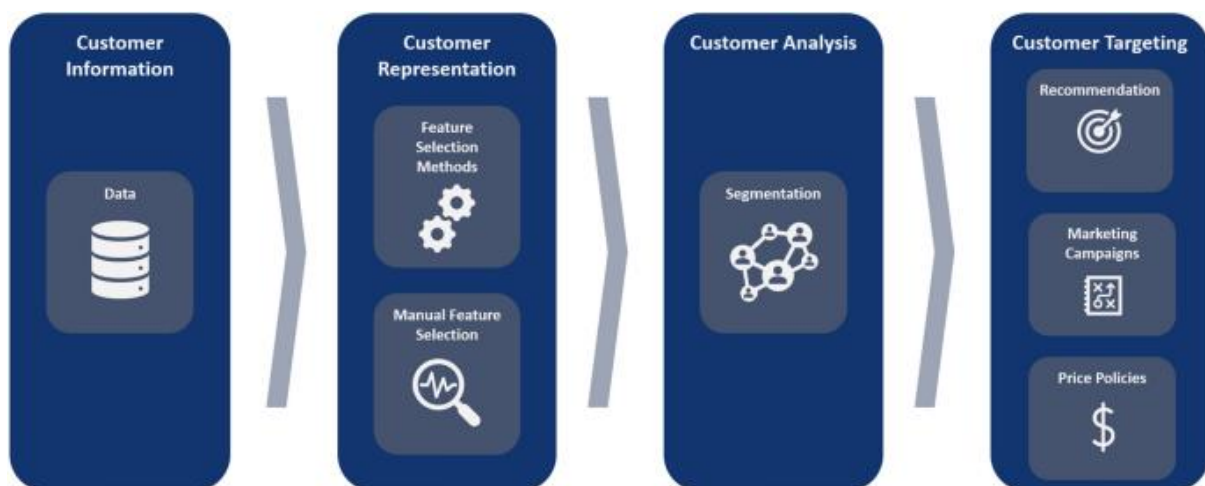
Visualization of clusters of data points is very important. Various edges of the graph provide a quick view of the complex input data set

PRODUCT PROTOTYPE:Schematic Diagram

CONCLUSION

It's not wise to serve all customers with the same product model, email, text message campaign, or ad. Customers have different needs. A one-size-for-all approach to business will generally result in less engagement, lower-click through rates, and ultimately fewer sales. Customer segmentation is the cure for this problem.

Finding an optimal number of unique customer groups will help you understand how your customers differ, and help you give them exactly what they want. Customer segmentation improves customer experience and boosts company revenue. That's why segmentation is a must if you want to surpass your competitors and get more customers. Doing it with machine learning is definitely the right way to go.

External Search – Links - Resources

https://www.analyticsvidhya.com/blog/2021/07/understanding-k-means-clustering-using-customer-segmentation/

https://www.sciencedirect.com/science/article/abs/pii/S1568494621008462

https://www.mdpi.com/2071-1050/14/12/7243

https://link.springer.com/article/10.1007/s10257-023-00640-

https://neptune.ai/blog/data-preprocessing-guide