

Customer Lifetime Value Analysis

Customer lifetime value analysis is used to estimate the total value of customers to the business over the lifetime of their relationship. It helps businesses make data-driven decisions on how to allocate their resources and improve their customer relationships.

By analyzing customer lifetime value, companies can identify the most effective marketing channels and campaigns for acquiring high-value customers, as well as develop targeted retention strategies to keep those customers engaged and loyal.

```
In [1]: #Lets start this task by importing the necessary Python Libraries and the dataset
import pandas as pd
import plotly.graph_objs as go
import plotly.express as px
import plotly.io as pio
pio.templates.default = "plotly_white"

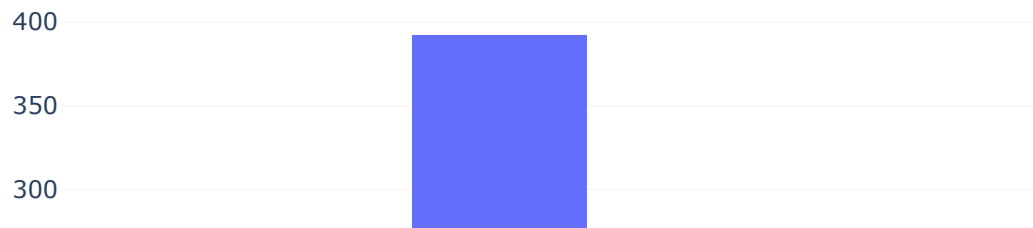
data = pd.read_csv("customer_acquisition_data.csv")
print(data.head())
```

	customer_id	channel	cost	conversion_rate	revenue
0	1	referral	8.320327	0.123145	4199
1	2	paid advertising	30.450327	0.016341	3410
2	3	email marketing	5.246263	0.043822	3164
3	4	social media	9.546326	0.167592	1520
4	5	referral	8.320327	0.123145	2419

```
In [2]: #The distribution of acquisition cost and revenue generated by the customer using
fig = px.histogram(data,
                    x="cost",
                    nbins=20,
                    title='Distribution of Acquisition Cost')

fig.show()
```

Distribution of Acquisition Cost



```
In [3]: fig = px.histogram(data,  
                           x="revenue",  
                           nbins=20,  
                           title='Distribution of Revenue')  
  
fig.show()
```

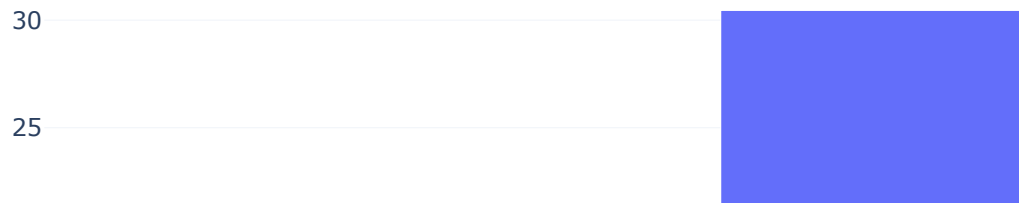
Distribution of Revenue



```
In [4]: # Let's compare the cost of acquisition across different channels and identify the most effective channel
cost_by_channel = data.groupby('channel')['cost'].mean().reset_index()

fig = px.bar(cost_by_channel,
              x='channel',
              y='cost',
              title='Customer Acquisition Cost by Channel')
fig.show()
```

Customer Acquisition Cost by Channel



```
In [5]: #The most expensive channel, and email marketing is the least expensive channel.
conversion_by_channel = data.groupby('channel')['conversion_rate'].mean().reset_index()

fig = px.bar(conversion_by_channel, x='channel',
              y='conversion_rate',
              title='Conversion Rate by Channel')
fig.show()
```

Conversion Rate by Channel

0.16

0.14

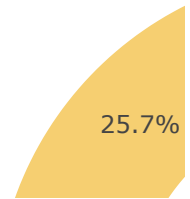
0.12

```
In [6]: #Social media is the most effective channel for converting customers, while paid
revenue_by_channel = data.groupby('channel')['revenue'].sum().reset_index()

fig = px.pie(revenue_by_channel,
              values='revenue',
              names='channel',
              title='Total Revenue by Channel',
              hole=0.6, color_discrete_sequence=px.colors.qualitative.Pastel)

fig.show()
```

Total Revenue by Channel



```
In [7]: #The email marketing is the most profitable channel in terms of generating revenue  
# Now Let's calculate the return on investment (ROI) for each channel:  
data['roi'] = data['revenue'] / data['cost']  
roi_by_channel = data.groupby('channel')['roi'].mean().reset_index()  
  
fig = px.bar(roi_by_channel,  
             x='channel',  
             y='roi', title='Return on Investment (ROI) by Channel')  
fig.show()
```

Return on Investment (ROI) by Channel



The ROI from email marketing is way higher than all other channels, while the ROI from paid advertising is the lowest. Now let's calculate the customer lifetime value from each channel. Based on the data we have, we can use the formula mentioned below to calculate CLTV:

$$\text{CLTV} = (\text{revenue} - \text{cost}) * \text{conversion_rate} / \text{cost}$$

```
In [8]: data['cltv'] = (data['revenue'] - data['cost']) * data['conversion_rate'] / data['cost']

channel_cltv = data.groupby('channel')['cltv'].mean().reset_index()

fig = px.bar(channel_cltv, x='channel', y='cltv', color='channel',
             title='Customer Lifetime Value by Channel')

fig.update_xaxes(title='Channel')
fig.update_yaxes(title='CLTV')

fig.show()
```

Customer Lifetime Value by Channel

40

So the customer lifetime value from Social Media and the referral channels is the highest.

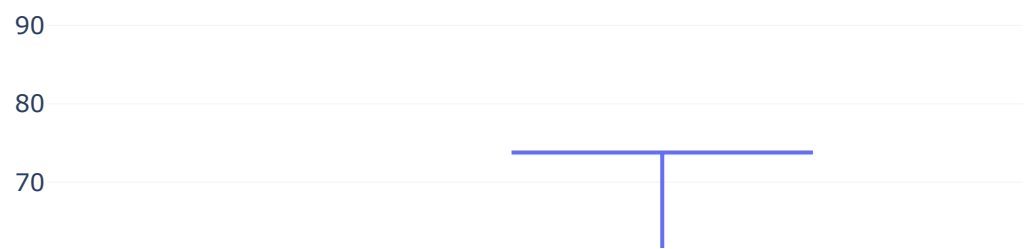
```
In [9]: #Now Let's compare the CLTV distributions of the social media and referral channels
subset = data.loc[data['channel'].isin(['social media', 'referral'])]

fig = px.box(subset, x='channel', y='cltv', title='CLTV Distribution by Channel')

fig.update_xaxes(title='Channel')
fig.update_yaxes(title='CLTV')
fig.update_layout(legend_title='Channel')

fig.show()
```


CLTV Distribution by Channel



There’s not much difference, but the Customer Lifetime Value from the Social Media channel is slightly better than the referral channel.