

Customer Lifetime Value Analysis

Customer lifetime value analysis serves to gauge the entirety of a customer's value to a business across their relationship's duration. It aids companies in gauging the appropriate allocation of resources towards customer acquisition and retention, while also pinpointing the highest-value customers deserving of retention initiatives.

Customer lifetime value (CLV or CLTV) serves as a measure indicating the total revenue anticipated from an individual customer account over the course of the business relationship. Through CLV analysis, businesses can discern the most efficient marketing channels and campaigns for attracting high-value customers. Moreover, they can craft tailored retention strategies aimed at fostering ongoing engagement and loyalty among these valuable customers.

In [1]: *# Import necessary libraries*

```
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"
```

In [2]: *# Read input CSV file*

```
df = pd.read_csv("../Dataset//CLV.csv")
df
```

Out[2]:

	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
...
795	796	social media	9.546326	0.167592	2813
796	797	email marketing	5.246263	0.043822	3439
797	798	social media	9.546326	0.167592	2101
798	799	paid advertising	30.450327	0.016341	813
799	800	email marketing	5.246263	0.043822	4820

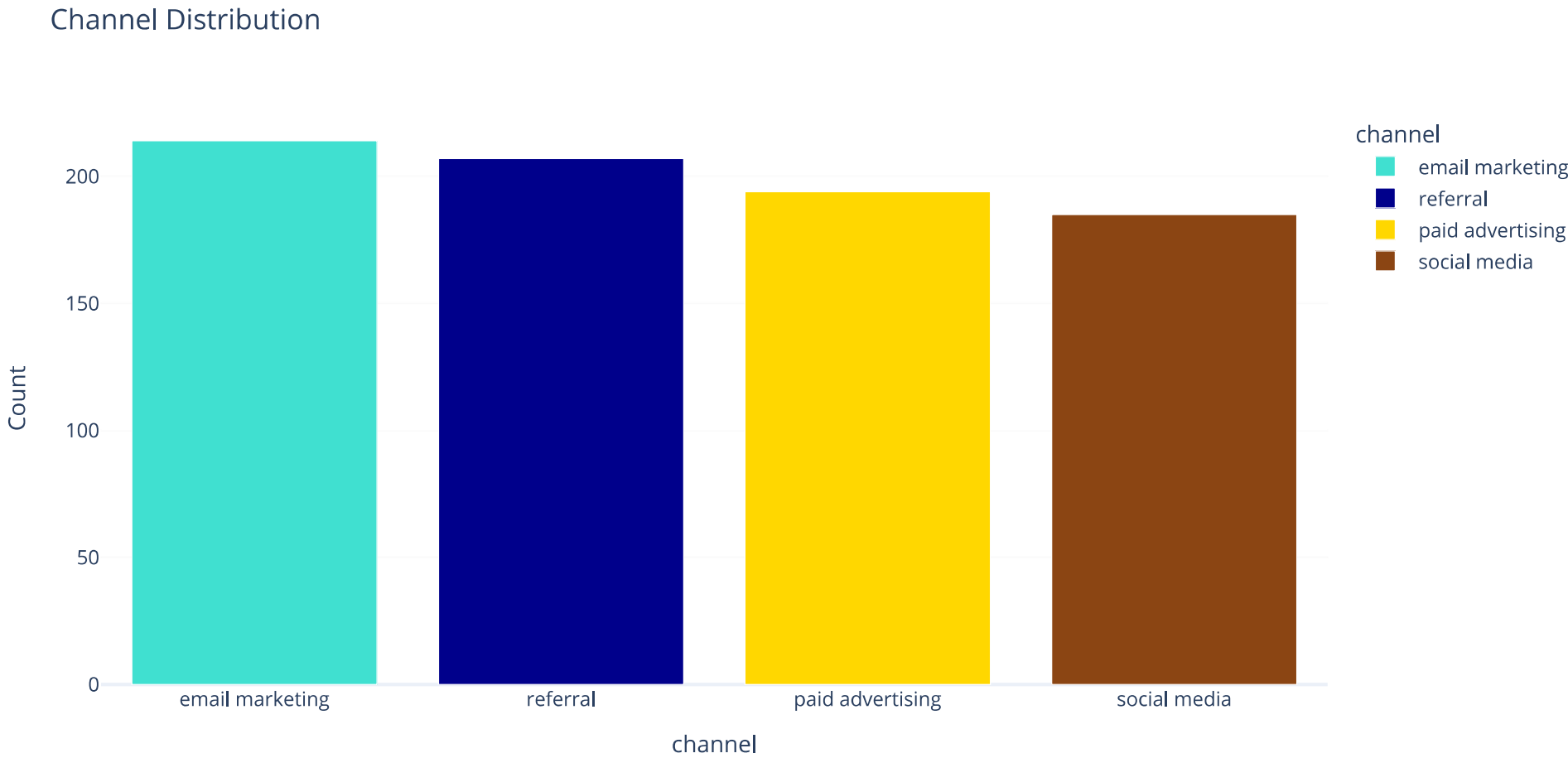
800 rows × 5 columns

```
In [3]: # Channel Distribution

custom_colors = {
    'email marketing': 'turquoise',
    'referral': 'darkblue',
    'paid advertising': 'gold',
    'social media': 'saddlebrown'
}

# Channels
Channel_counts = df['channel'].value_counts().reset_index()
Channel_counts.columns = ['channel', 'Count']
fig = px.bar(Channel_counts, x='channel', y='Count', color='channel', color_discrete_map=custom_colors, title='Channel Distribution')

fig.show()
```



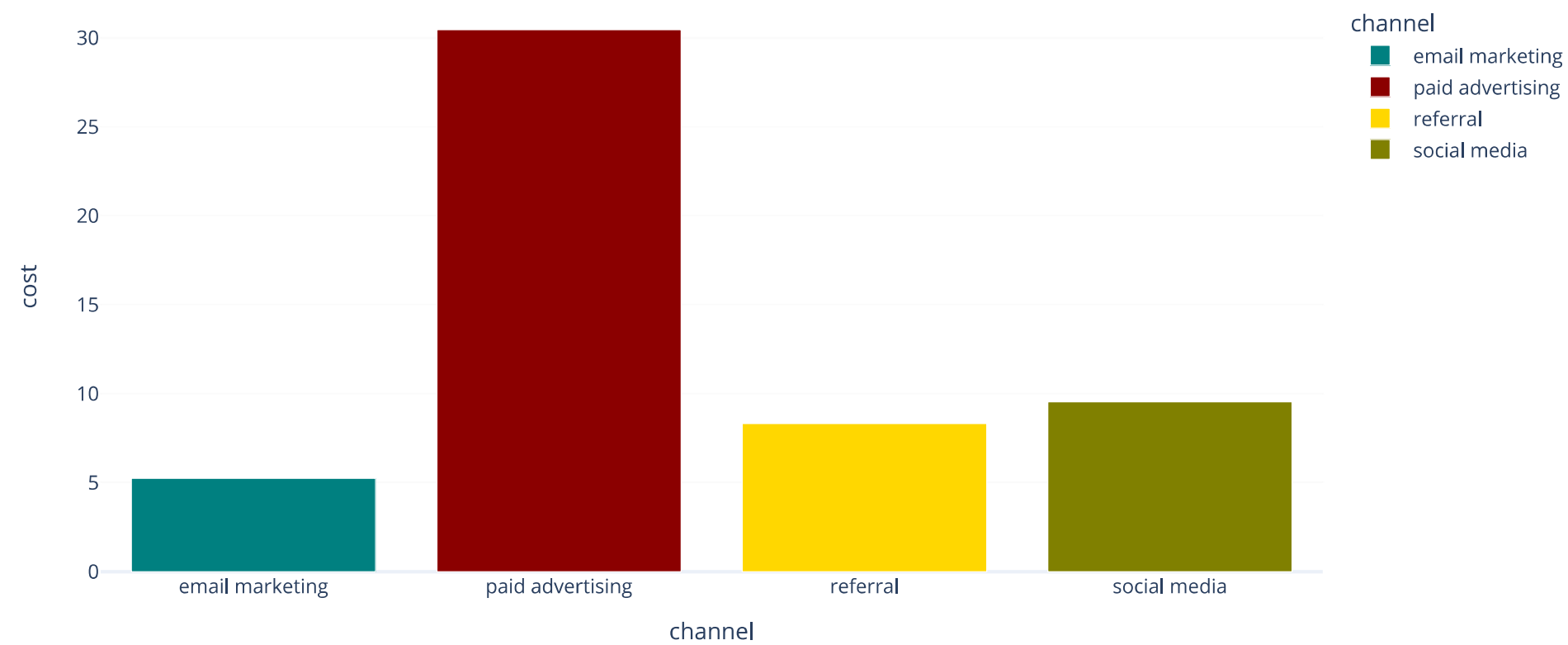
```
In [4]: # Cost by each Channel

custom_colors = {
    'email marketing': 'teal',
    'referral': 'gold',
    'paid advertising': 'darkred',
    'social media': 'olive'
}

cost_by_channel = df.groupby('channel')['cost'].mean().reset_index()

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

Customer Acquisition Cost by Channel



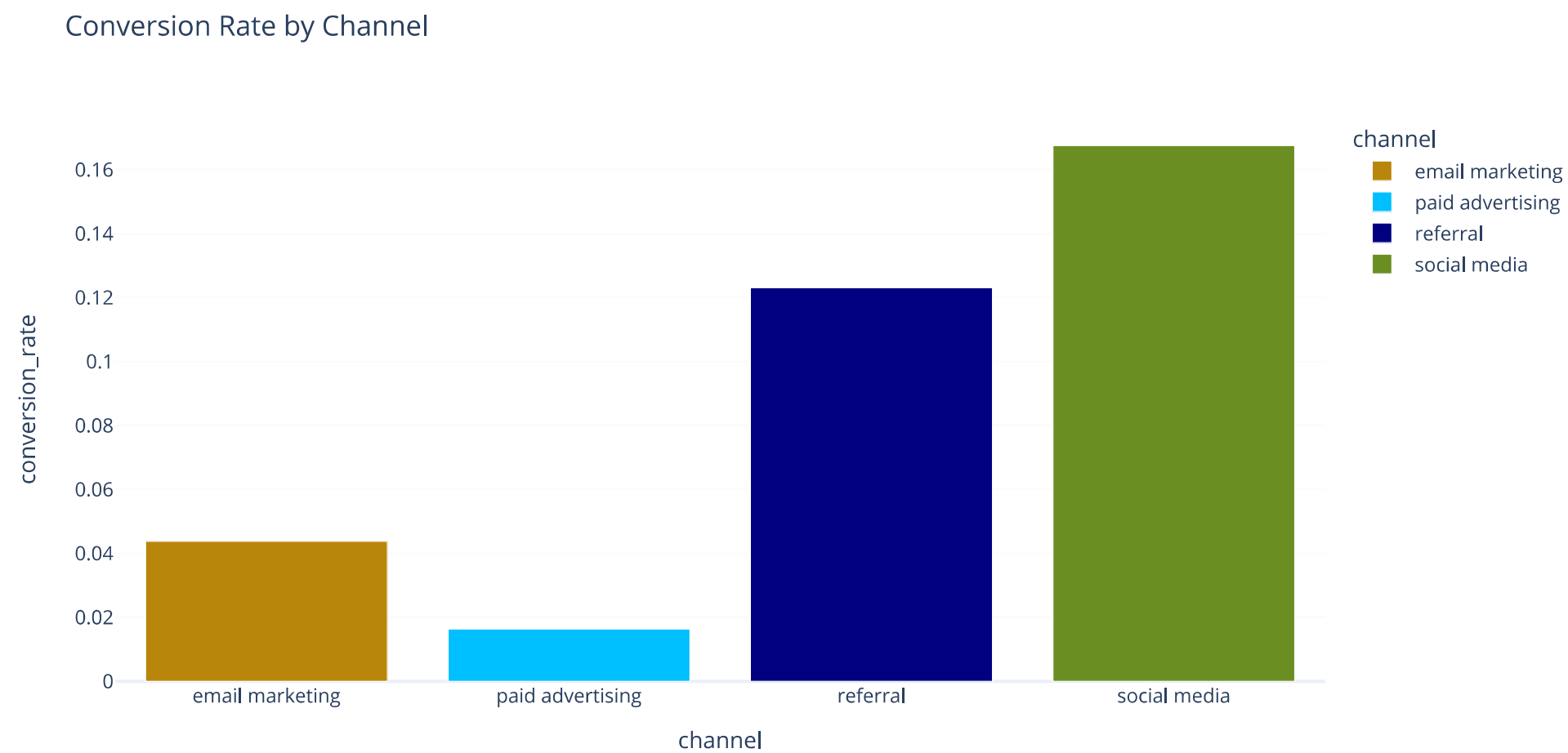
```
In [5]: # Conversion rate of each Channel

custom_colors = {
    'email marketing': 'darkgoldenrod',
    'referral': 'navy',
    'paid advertising': 'deepskyblue',
    'social media': 'olivedrab'
}

conversion_by_channel= df.groupby("channel")["conversion_rate"].mean().reset_index()

fig = px.bar(conversion_by_channel,
             x= "channel",
             y="conversion_rate",color='channel', color_discrete_map=custom_colors,
             title= "Conversion Rate by Channel")

fig.show()
```



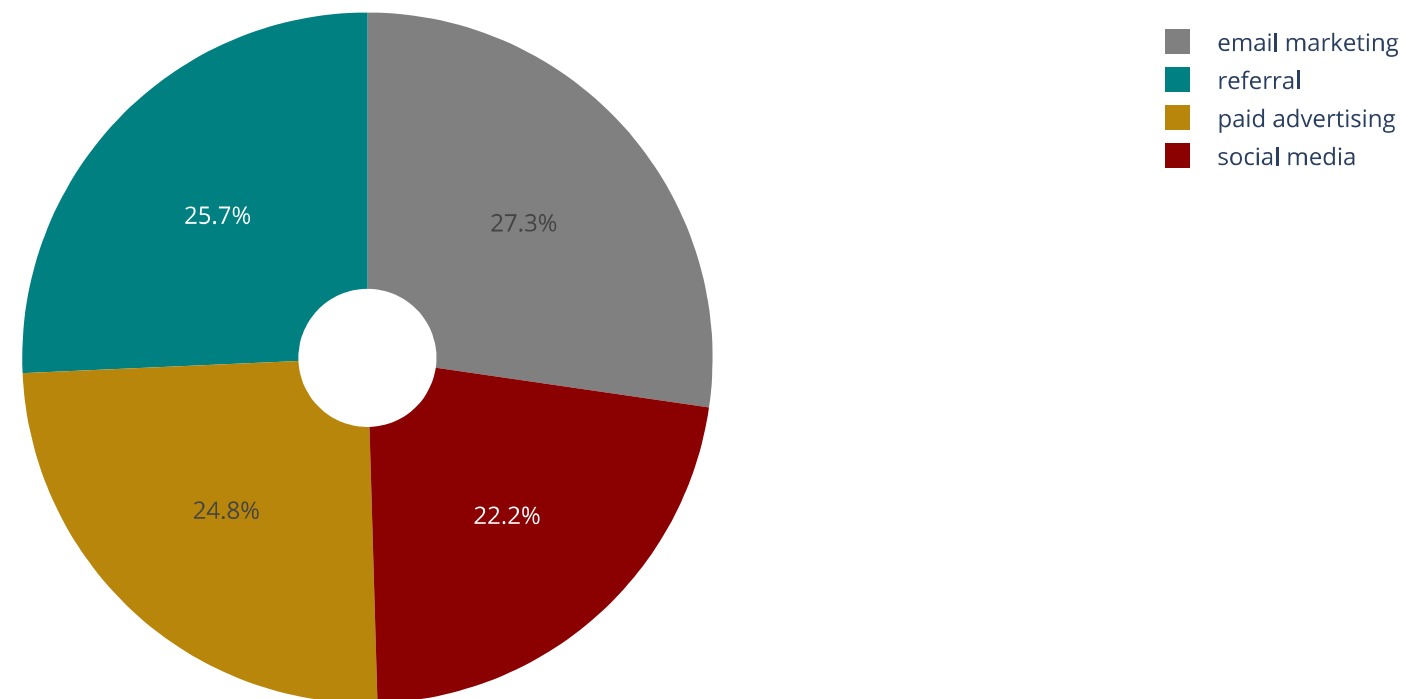
```
In [6]: # Revenue by each Channel

custom_colors = {
    'email marketing': 'gray',
    'referral': 'teal ',
    'paid advertising': 'darkgoldenrod',
    'social media': 'darkred'
}

revenue_by_channel = df.groupby("channel")["revenue"].sum().reset_index()

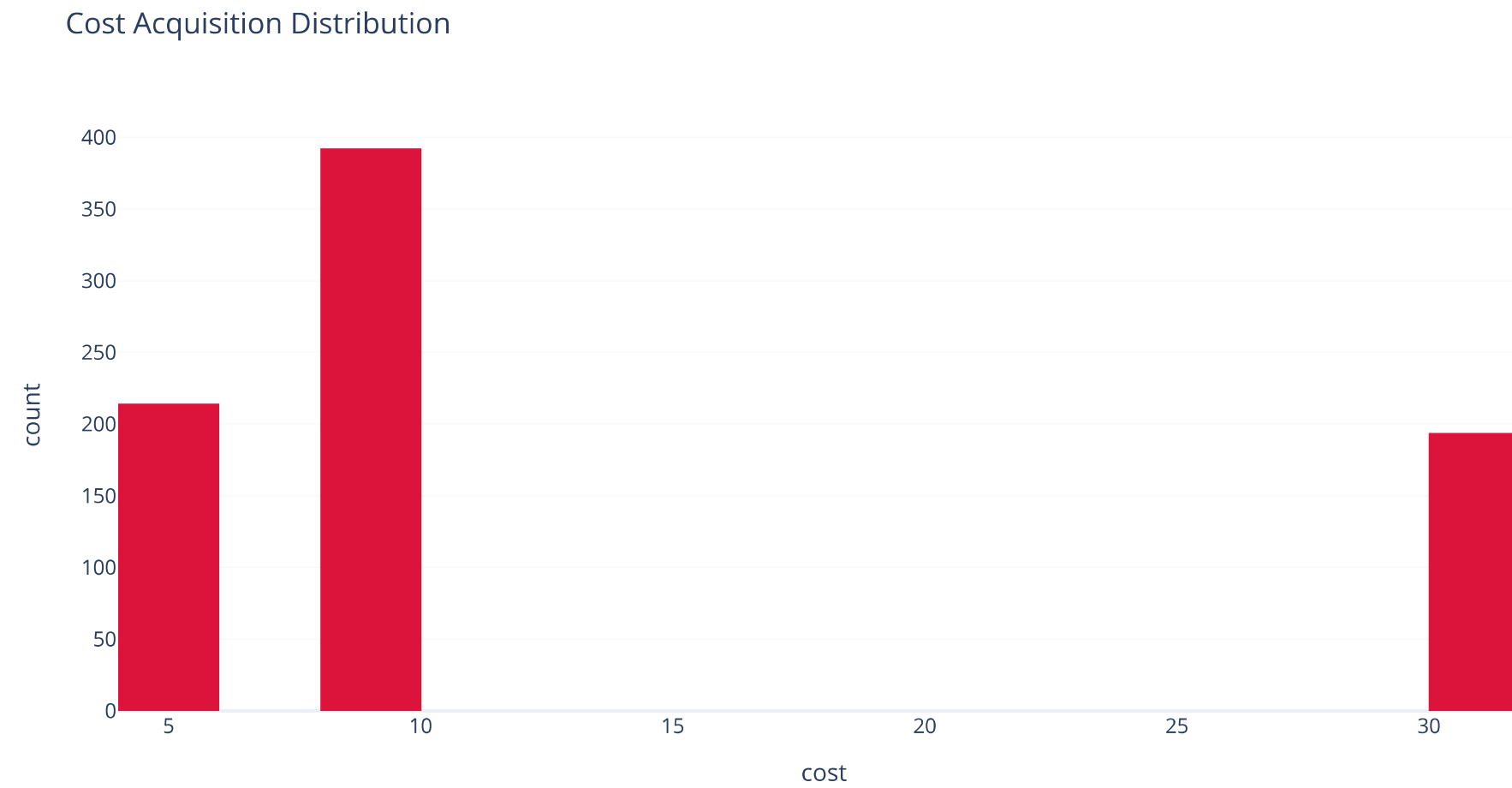
fig = px.pie( revenue_by_channel,
              values='revenue',
              names='channel',color='channel', color_discrete_map=custom_colors,hole=0.2,
              title = "Revenue by each Channel"
            )
fig.show()
```

Revenue by each Channel



```
In [7]: # Cost Acquisition Distribution

fig = px.histogram(df,
                    x="cost",
                    nbins=20, color_discrete_sequence=['crimson'],
                    title='Cost Acquisition Distribution')
fig.show()
```

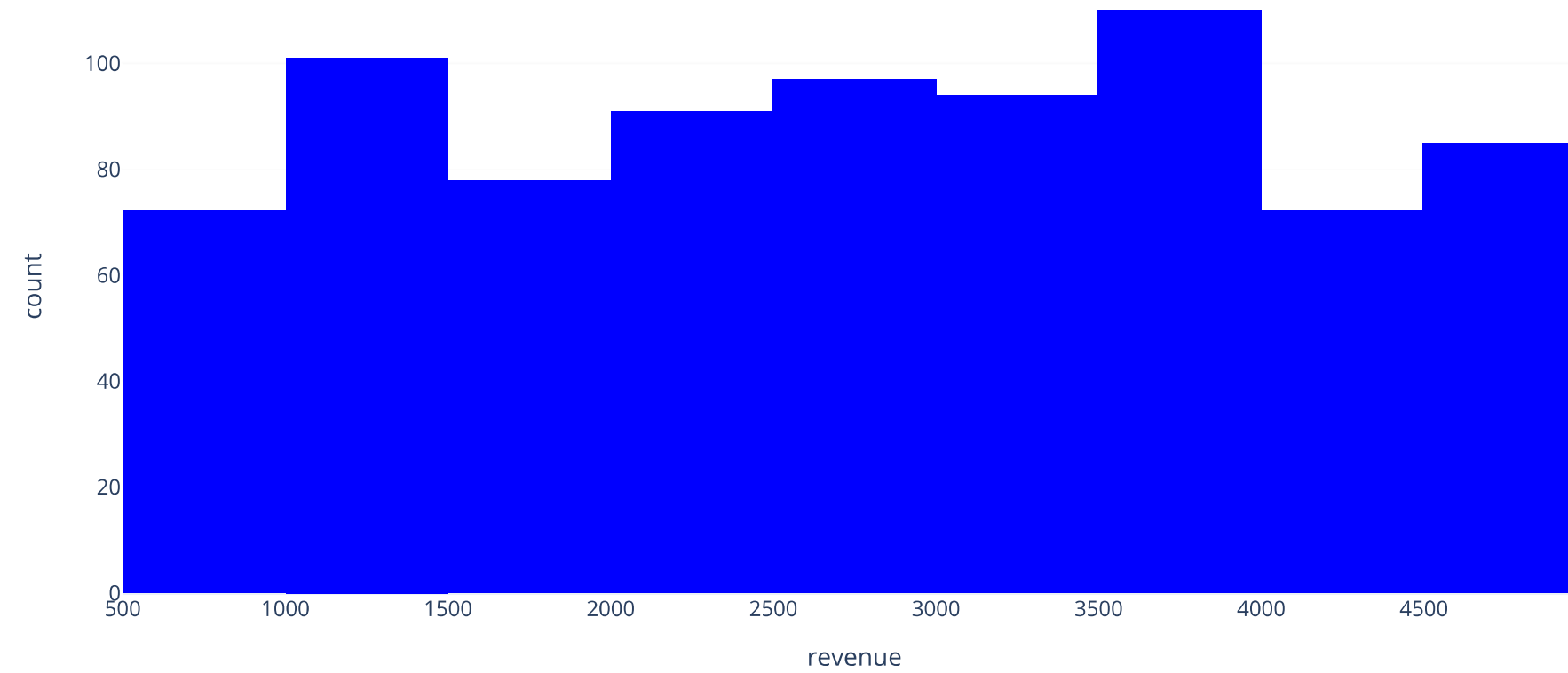


```
In [8]: # Revenue Distribution

fig= px.histogram(df,
                  x= "revenue",
                  nbins=20,color_discrete_sequence=['blue '],
                  title= "Revenue Distribution")

fig.show()
```

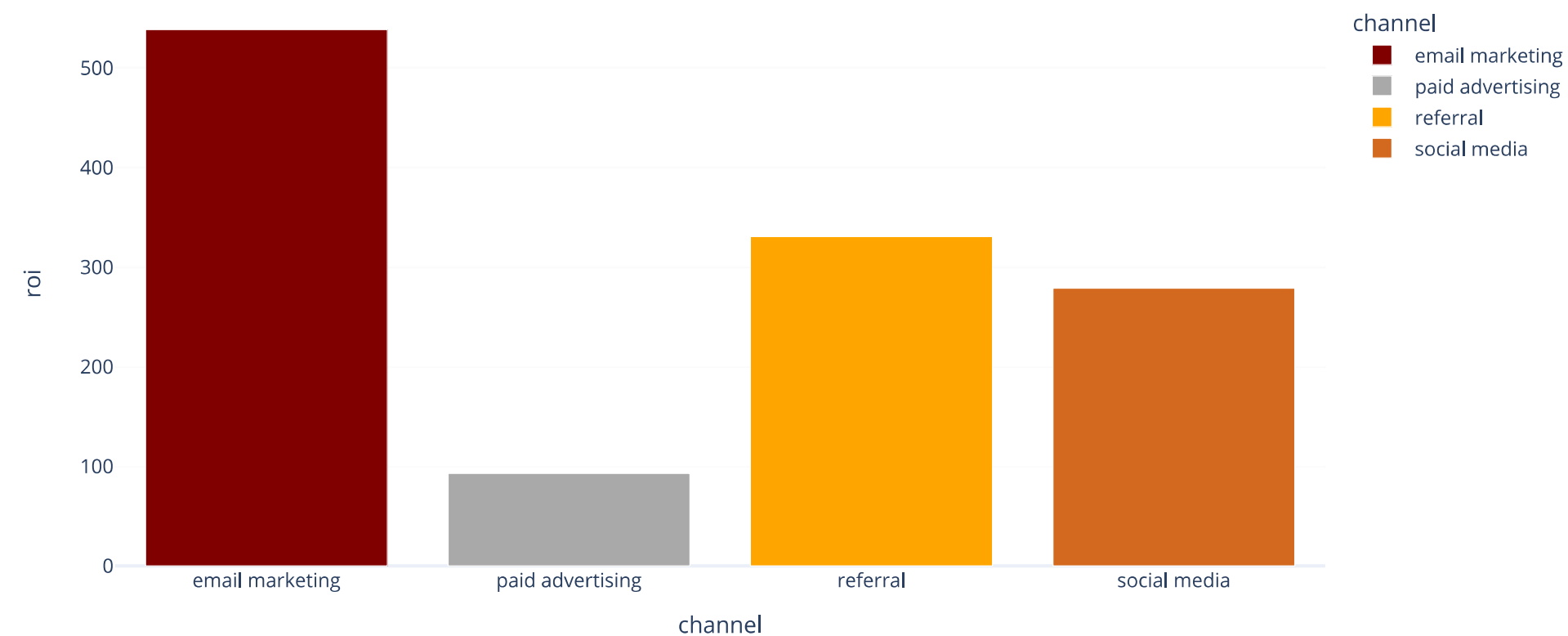
Distribution of Revenue



In [9]: *# Calculate the return on investment (ROI) for each channel*

```
custom_colors= {  
    'email marketing': 'maroon',  
    'referral': 'orange ',  
    'paid advertising': 'darkgray',  
    'social media': 'chocolate'  
}  
  
df['roi'] = df['revenue'] / df['cost']  
roi_by_channel = df.groupby('channel')['roi'].mean().reset_index()  
  
fig = px.bar(roi_by_channel,  
             x='channel',  
             y='roi', color = "channel" , color_discrete_map=custom_colors,  
             title='Return on Investment (ROI) by Channel')  
fig.show()
```

Return on Investment (ROI) by Channel




```
In [10]: # calculate the customer lifetime value from each channel
```

```
df['cltv'] = (df['revenue'] - df['cost']) * df['conversion_rate'] / df['cost']
```

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

```
custom_color = {  
    'email marketing': 'darkblue',  
    'referral': 'deepskyblue ',  
    'paid advertising': 'lightblue',  
    'social media': 'mediumblue'  
}
```

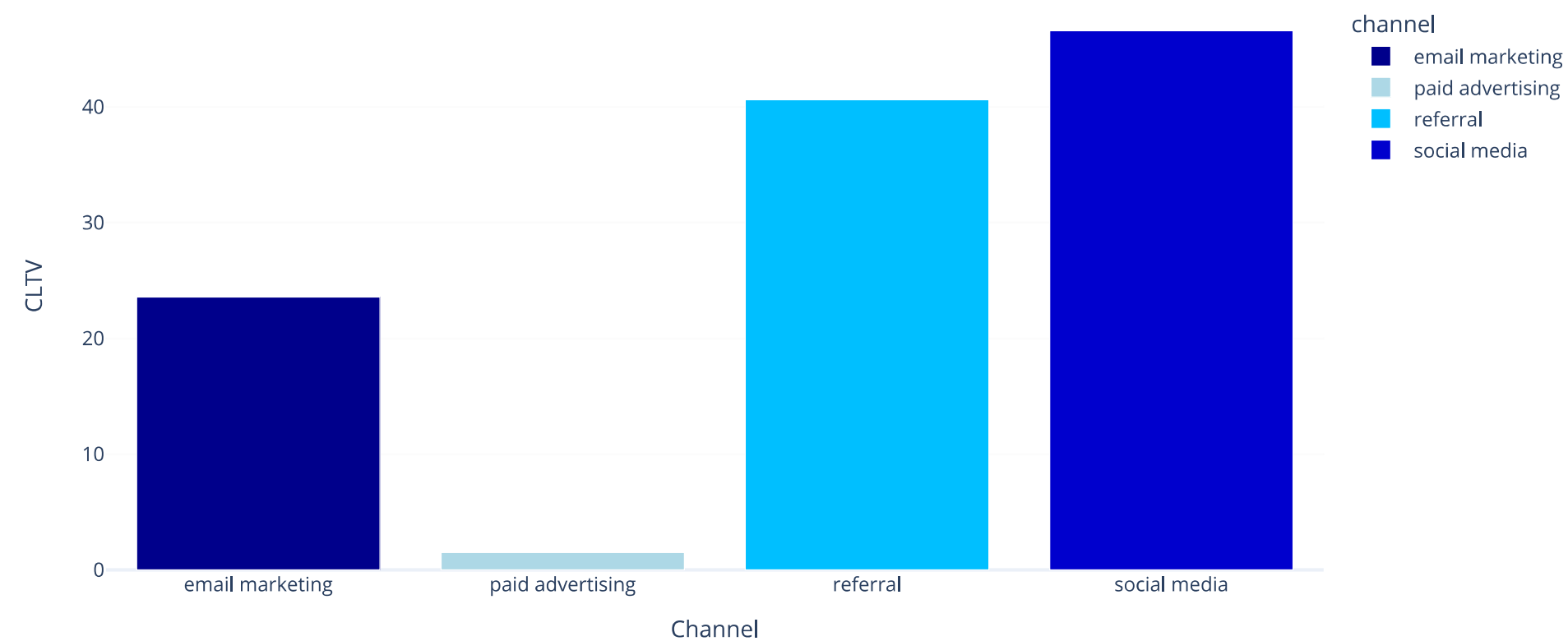
```
fig = px.bar(channel_cltv, x='channel', y='cltv', color='channel', color_discrete_map=custom_color,  
            title='Customer Lifetime Value by Channel')
```

```
fig.update_xaxes(title='Channel')
```

```
fig.update_yaxes(title='CLTV')
```

```
fig.show()
```

Customer Lifetime Value by Channel



```
In [11]: # Compare the CLTV distributions of the social media and referral channels:

subset = df.loc[df['channel'].isin(['social media', 'referral'])]

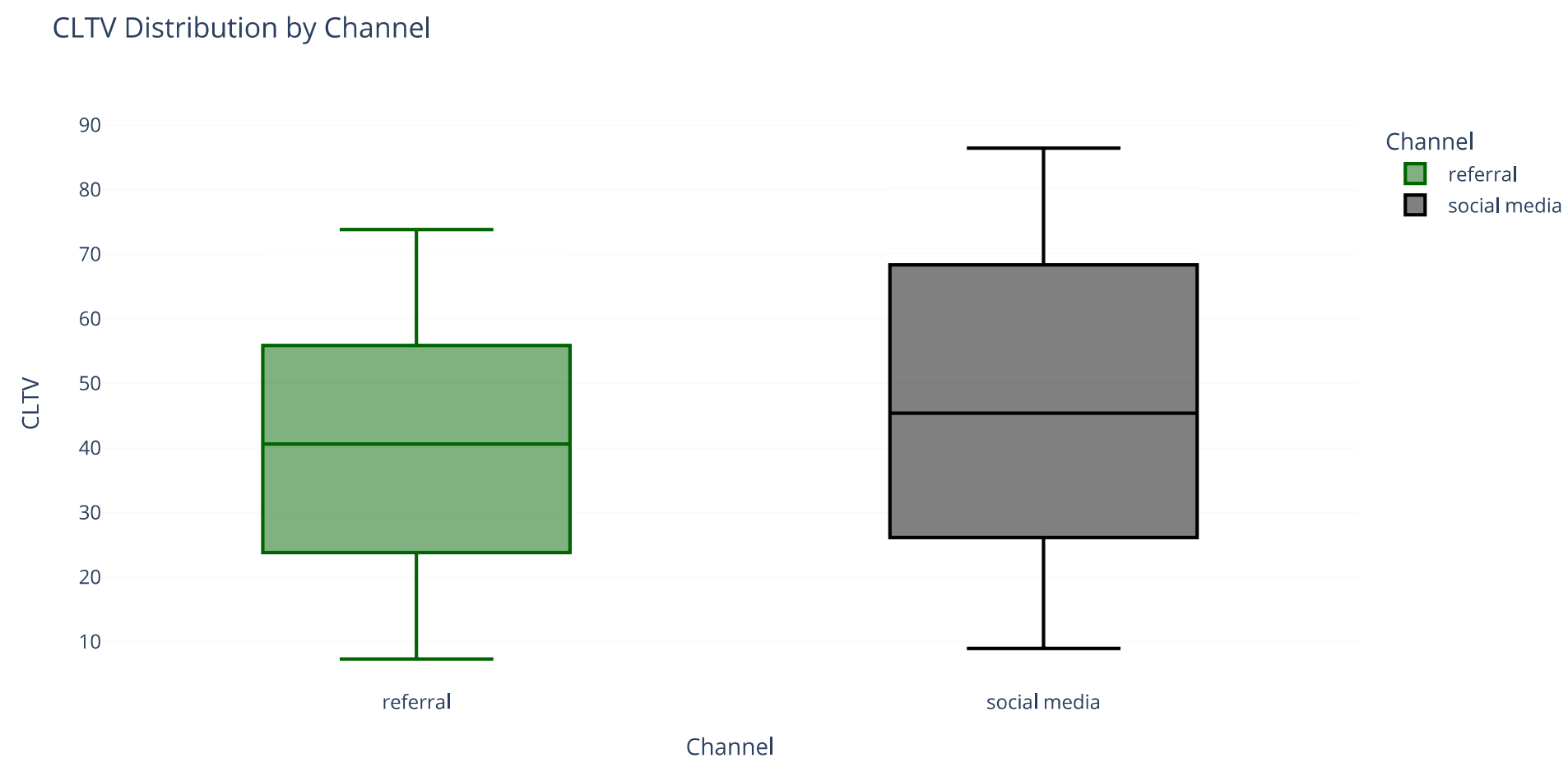
custom_color = {
    'referral': 'darkgreen',
    'social media': 'black'
}

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

# Update box colors
for channel, color in custom_color.items():
    fig.update_traces(selector=dict(name=channel), marker_color=color)

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

fig.show()
```



The discrepancy is minor, but the Customer Lifetime Value derived from the Social Media channel slightly outperforms that of the referral channel.

Conclusion

Customer lifetime value (CLV) analysis involves estimating the overall worth of customers to a business throughout their relationship's duration. This analysis aids companies in determining appropriate investments in