# Import Libraries and Load Data

In [7]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")

# Load dataset
df = pd.read_csv(r"C:\Users\Akash shah\Downloads\Wellness_centredata.csv")
df.head()
```

Out[7]:

|   | cityName | wellnessCentreName | card_type | count |
|---|---|---|---|---|
| **0** | AHMEDABAD | VEJALPUR | Serving | 2177 |
| **1** | AHMEDABAD | NAVRANGPURA | Pensioner | 3891 |
| **2** | AHMEDABAD | GANDHI NAGAR | Ex MP | 19 |
| **3** | AHMEDABAD | LALDARWAJA | Pensioner | 1562 |
| **4** | AHMEDABAD | RAMBAUG,MANINGAR | Serving | 3596 |

# Data Cleaning and Initial Checks

In [8]:

```
print("Dataset Info:")
print(df.info())

print("\nMissing Values:\n", df.isnull().sum())

# Standardize string data
df['cityName'] = df['cityName'].str.strip().str.upper()
df['card_type'] = df['card_type'].str.strip().str.title()
df['wellnessCentreName'] = df['wellnessCentreName'].str.strip().str.title()
```

```
Dataset Info:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1284 entries, 0 to 1283
Data columns (total 4 columns):
 #   Column              Non-Null Count  Dtype 
---  ------              --------------  ----- 
 0   cityName            1284 non-null   object
 1   wellnessCentreName  1284 non-null   object
 2   card_type           1284 non-null   object
 3   count               1284 non-null   int64 
dtypes: int64(1), object(3)
memory usage: 40.2+ KB
None

Missing Values:
 cityName              0
wellnessCentreName    0
card_type             0
count                 0
dtype: int64
```

# Descriptive Statistics

In [9]:

```
print("🔹 Descriptive Statistics:\n", df['count'].describe())

print("\n🔹 Unique Values:")
print("Cities:", df['cityName'].nunique())
print("Centres:", df['wellnessCentreName'].nunique())
print("Card Types:", df['card_type'].nunique())
```

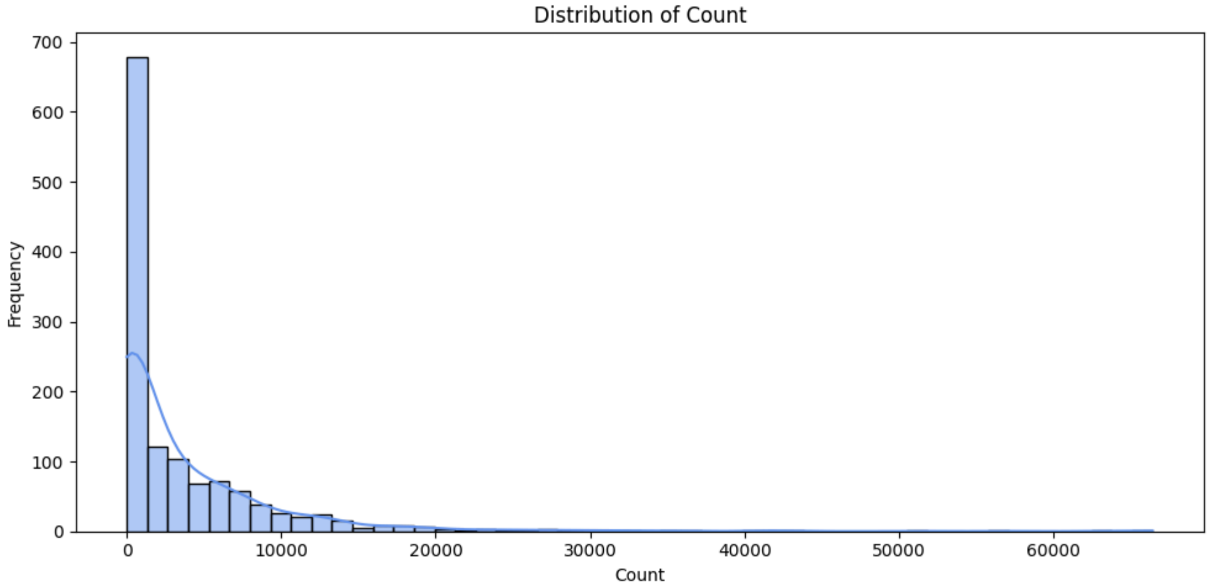
```
🔹 Descriptive Statistics:
 count     1284.000000
mean      3616.672118
std       6507.888634
min          1.000000
25%          8.000000
50%        892.000000
75%       5221.750000
max      66423.000000
Name: count, dtype: float64

🔹 Unique Values:
Cities: 24
Centres: 363
Card Types: 7
```

# Data Visualization

# 1. Histogram of Count

In [10]:

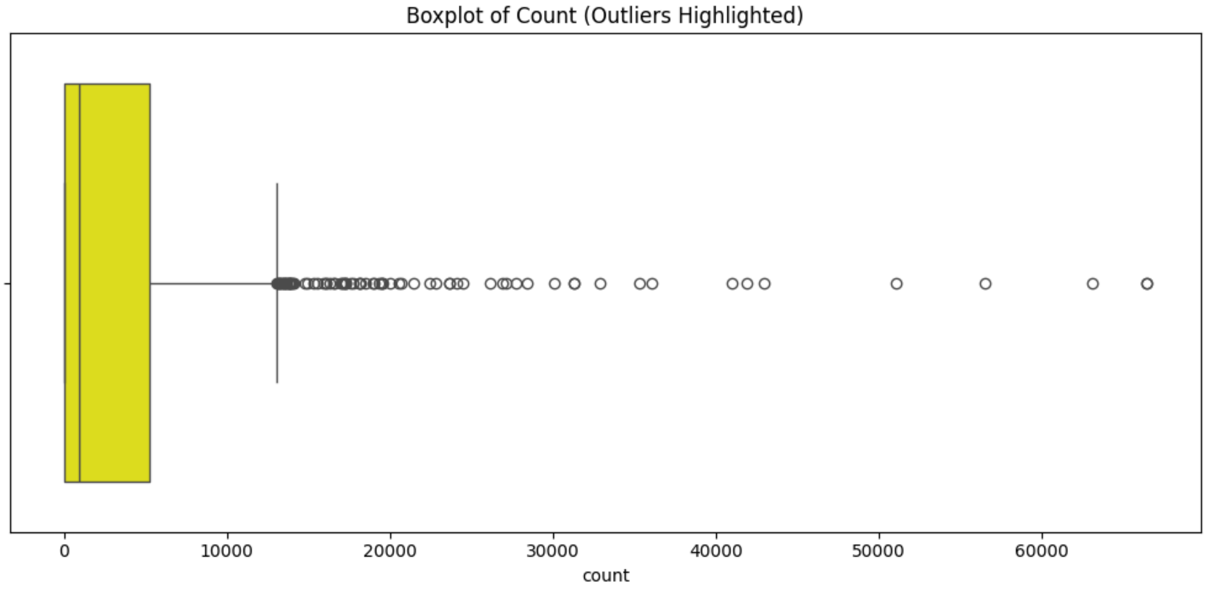
```
plt.figure(figsize=(10, 5))
sns.histplot(df['count'], bins=50, kde=True, color='cornflowerblue')
plt.title("Distribution of Count")
plt.xlabel("Count")
plt.ylabel("Frequency")
plt.tight_layout()
plt.show()
```



## 2. Boxplot for Outlier view

In [12]:

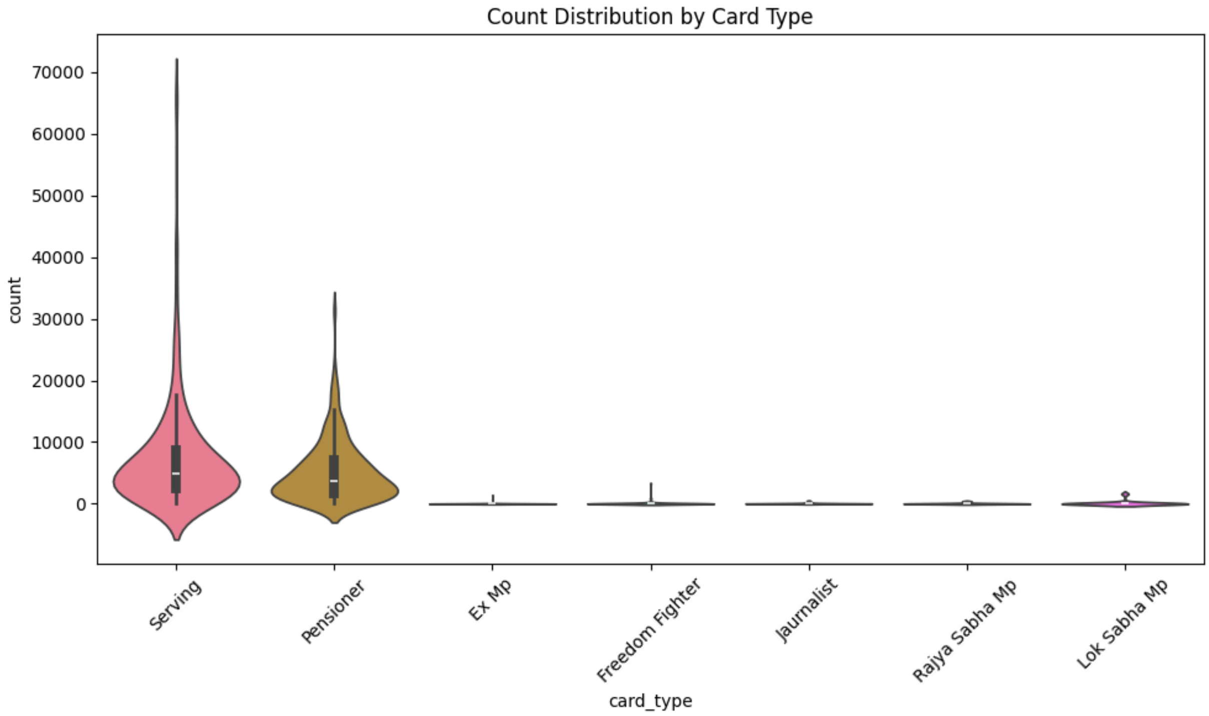
```
plt.figure(figsize=(10, 5))
sns.boxplot(x='count', data=df, color='Yellow')
plt.title("Boxplot of Count (Outliers Highlighted)")
plt.tight_layout()
plt.show()
```



# 3. Violin Plot - Card Type Distribution

In [23]:

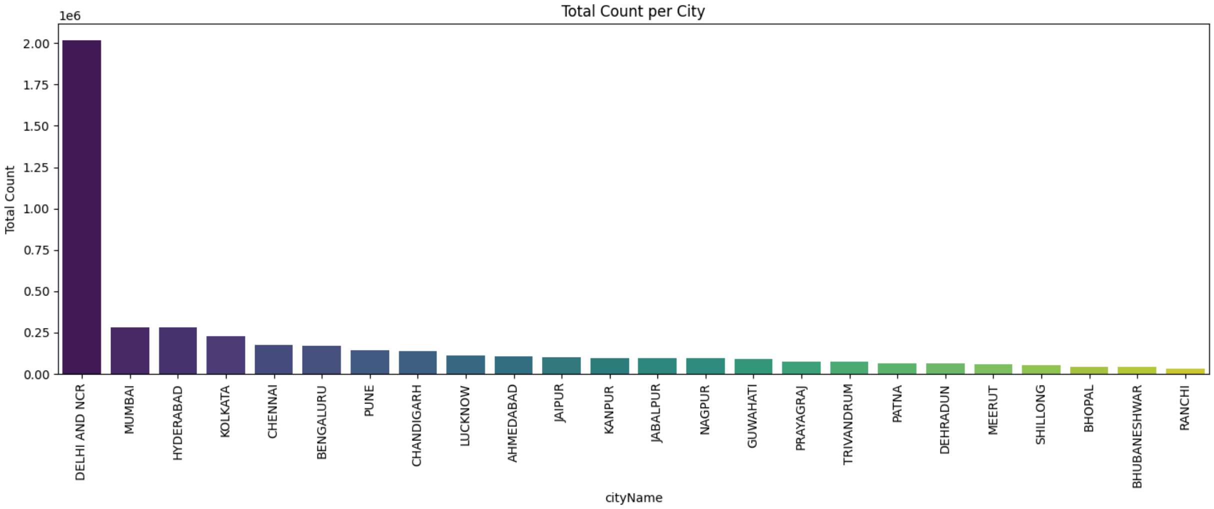
```
plt.figure(figsize=(10, 6))
sns.violinplot(x='card_type', y='count', data=df, palette="husl")
plt.title("Count Distribution by Card Type")
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```



# 4. Total Count Per City

In [19]:

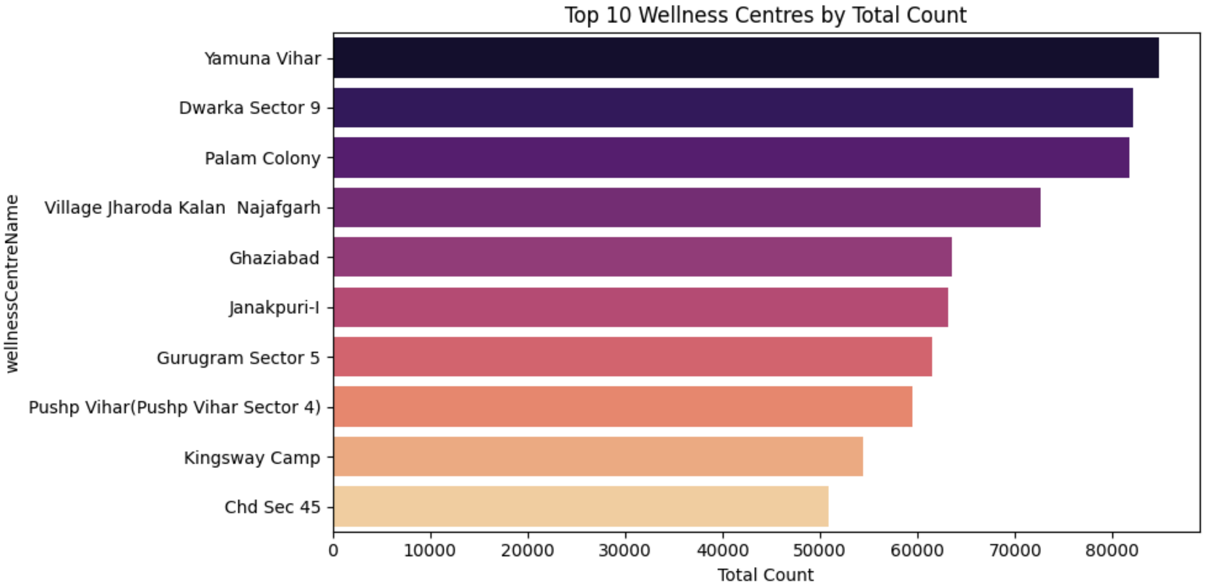
```
city_counts = df.groupby('cityName')['count'].sum().sort_values(ascending=Fa

plt.figure(figsize=(14, 6))
sns.barplot(x=city_counts.index, y=city_counts.values, palette='viridis')
plt.title("Total Count per City")
plt.xticks(rotation=90)
plt.ylabel("Total Count")
plt.tight_layout()
plt.show()
```



# 5. Top 10 Wellness Centres

In [24]:

```
top_centres = df.groupby('wellnessCentreName')['count'].sum().sort_values(as

plt.figure(figsize=(10, 5))
sns.barplot(y=top_centres.index, x=top_centres.values, palette='magma')
plt.title("Top 10 Wellness Centres by Total Count")
plt.xlabel("Total Count")
plt.tight_layout()
plt.show()
```

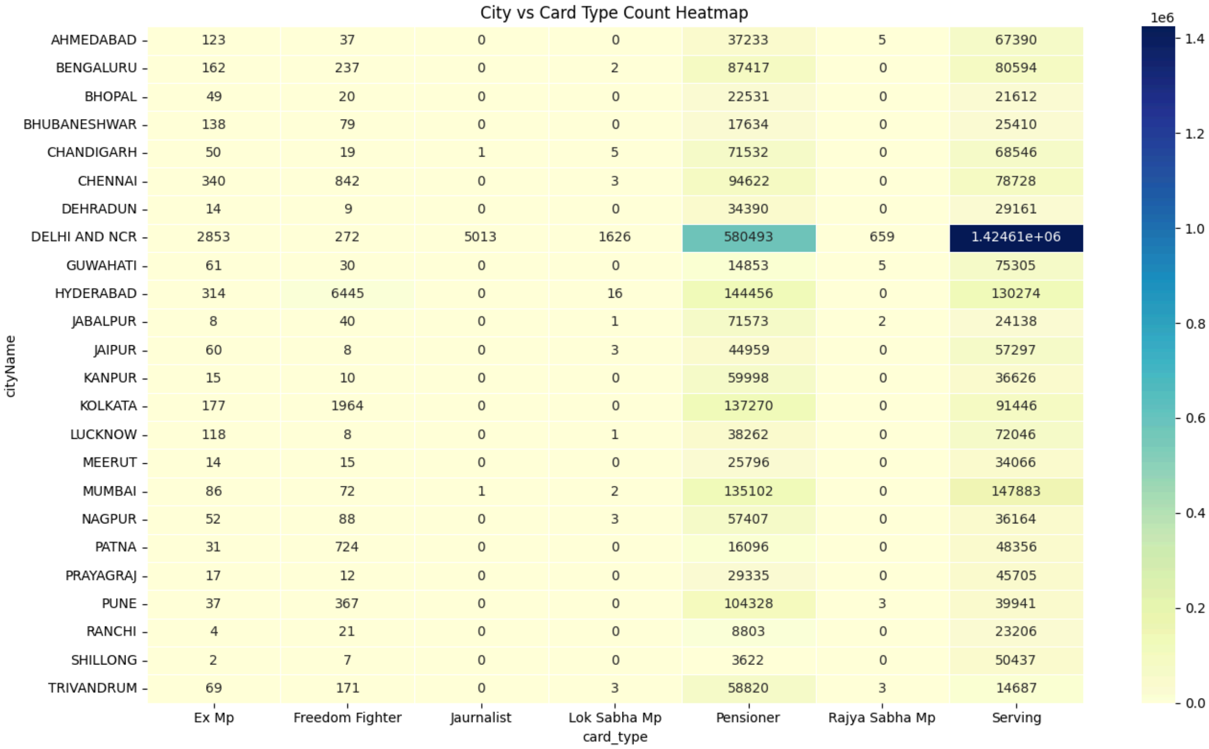


# 6. Heatmap - City Vs Card Type

In [25]:

```
pivot_table = df.pivot_table(index='cityName', columns='card_type', values='

plt.figure(figsize=(14, 8))
sns.heatmap(pivot_table, cmap="YlGnBu", linewidths=0.5, annot=True, fmt="g")
```

```
plt.title("City vs Card Type Count Heatmap")
plt.tight_layout()
plt.show()
```

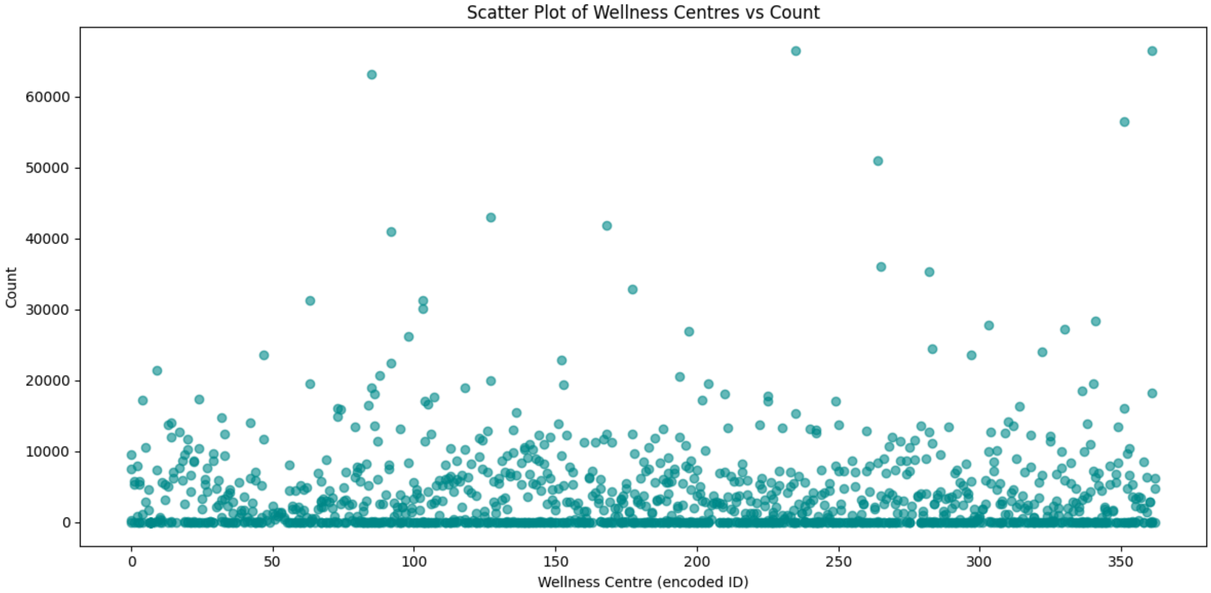


| cityName | Ex Mp | Freedom Fighter | Jaurnalist | Lok Sabha Mp | Pensioner | Rajya Sabha Mp | Serving |
|---|---|---|---|---|---|---|---|
| AHMEDABAD | 123 | 37 | 0 | 0 | 37233 | 5 | 67390 |
| BENGALURU | 162 | 237 | 0 | 2 | 87417 | 0 | 80594 |
| BHOPAL | 49 | 20 | 0 | 0 | 22531 | 0 | 21612 |
| BHUBANESHWAR | 138 | 79 | 0 | 0 | 17634 | 0 | 25410 |
| CHANDIGARH | 50 | 19 | 1 | 5 | 71532 | 0 | 68546 |
| CHENNAI | 340 | 842 | 0 | 3 | 94622 | 0 | 78728 |
| DEHRADUN | 14 | 9 | 0 | 0 | 34390 | 0 | 29161 |
| DELHI AND NCR | 2853 | 272 | 5013 | 1626 | 580493 | 659 | 1.42461e+06 |
| GUWAHATI | 61 | 30 | 0 | 0 | 14853 | 5 | 75305 |
| HYDERABAD | 314 | 6445 | 0 | 16 | 144456 | 0 | 130274 |
| JABALPUR | 8 | 40 | 0 | 1 | 71573 | 2 | 24138 |
| JAIPUR | 60 | 8 | 0 | 3 | 44959 | 0 | 57297 |
| KANPUR | 15 | 10 | 0 | 0 | 59998 | 0 | 36626 |
| KOLKATA | 177 | 1964 | 0 | 0 | 137270 | 0 | 91446 |
| LUCKNOW | 118 | 8 | 0 | 1 | 38262 | 0 | 72046 |
| MEERUT | 14 | 15 | 0 | 0 | 25796 | 0 | 34066 |
| MUMBAI | 86 | 72 | 1 | 2 | 135102 | 0 | 147883 |
| NAGPUR | 52 | 88 | 0 | 3 | 57407 | 0 | 36164 |
| PATNA | 31 | 724 | 0 | 0 | 16096 | 0 | 48356 |
| PRAYAGRAJ | 17 | 12 | 0 | 0 | 29335 | 0 | 45705 |
| PUNE | 37 | 367 | 0 | 0 | 104328 | 3 | 39941 |
| RANCHI | 4 | 21 | 0 | 0 | 8803 | 0 | 23206 |
| SHILLONG | 2 | 7 | 0 | 0 | 3622 | 0 | 50437 |
| TRIVANDRUM | 69 | 171 | 0 | 3 | 58820 | 3 | 14687 |

# 7.A)Scatter Plot of Centres Vs Count

In [26]:

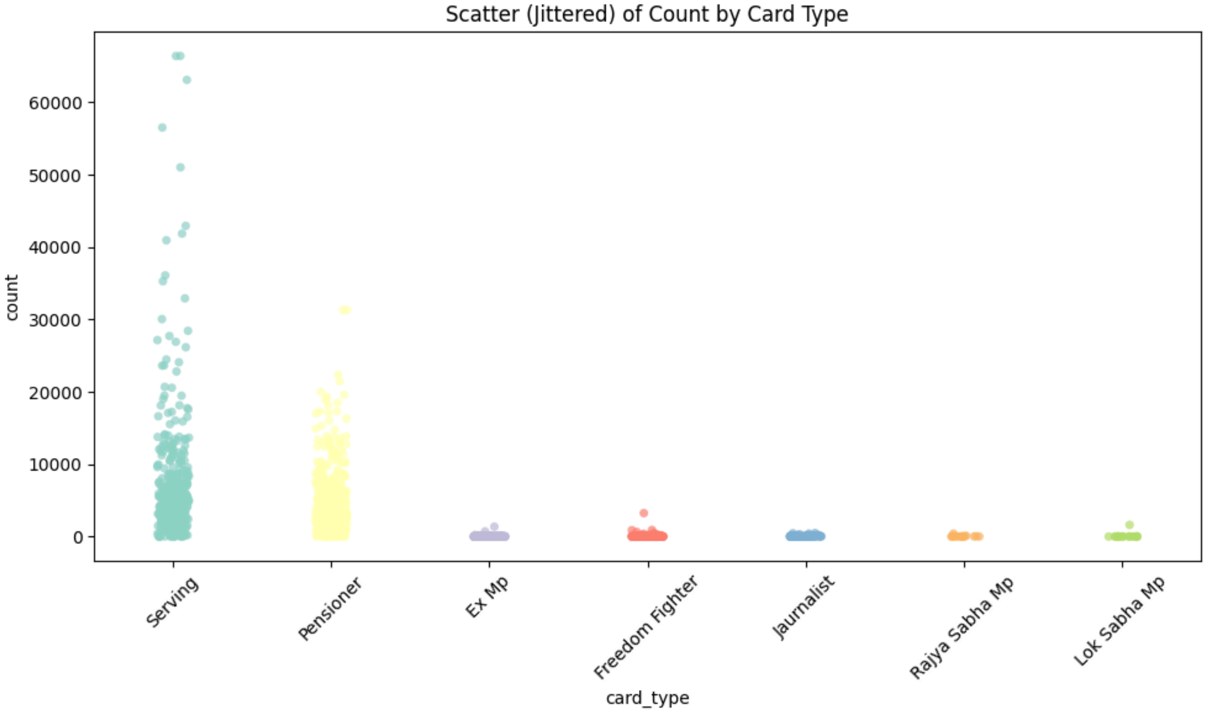
```
# Encode centre names to numerical values for plotting
df['centre_id'] = df['wellnessCentreName'].astype('category').cat.codes

plt.figure(figsize=(12, 6))
plt.scatter(df['centre_id'], df['count'], alpha=0.6, c='darkcyan')
plt.title("Scatter Plot of Wellness Centres vs Count")
plt.xlabel("Wellness Centre (encoded ID)")
plt.ylabel("Count")
plt.tight_layout()
plt.show()
```



# 7. B)Scatter Plot With Jitter: Count by Card Type

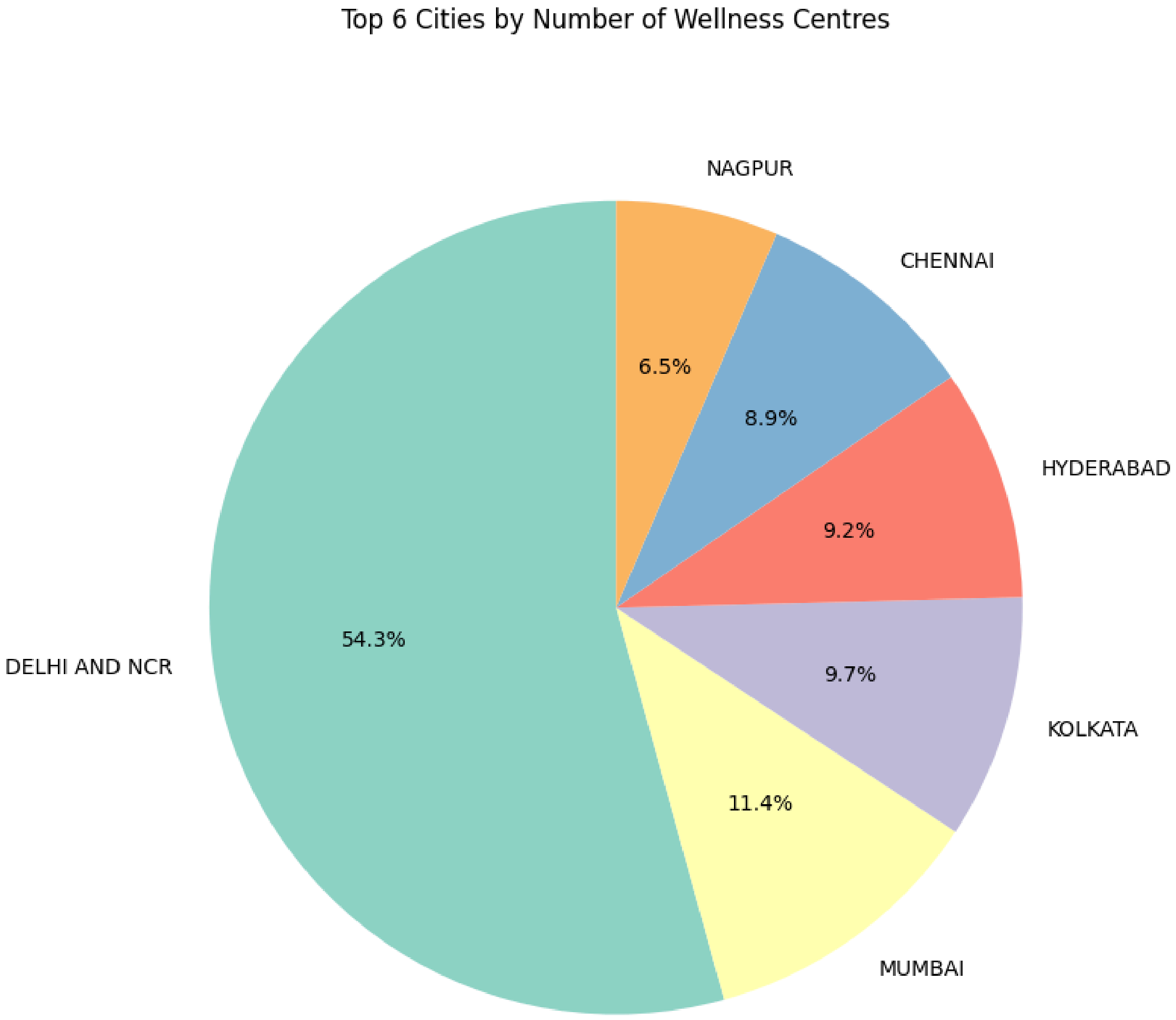
In [30]:

```
import random

plt.figure(figsize=(10, 6))
sns.stripplot(x='card_type', y='count', data=df, jitter=True, palette='Set3'
plt.title("Scatter (Jittered) of Count by Card Type")
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```



## 8. Pie Chart of Wellness Centre Distribution by City (Top 6 Cities)

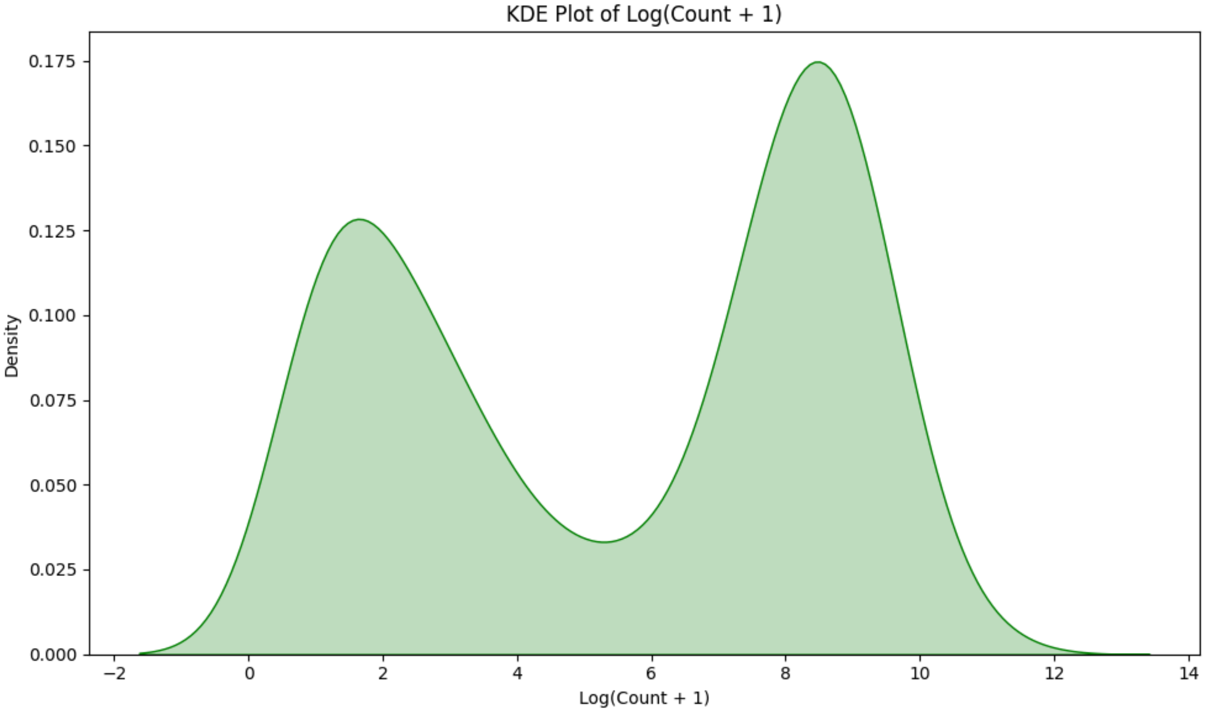
```
In [33]: # Count number of wellness centres per city
         centre_distribution = df['cityName'].value_counts().nlargest(6)

         plt.figure(figsize=(8, 8))
         colors = sns.color_palette("Set3")
         plt.pie(centre_distribution, labels=centre_distribution.index, autopct='%1.1
         plt.title("Top 6 Cities by Number of Wellness Centres")
         plt.axis('equal')
         plt.tight_layout()
         plt.show()
```



## 9. KDE with Log Scale

In [36]:

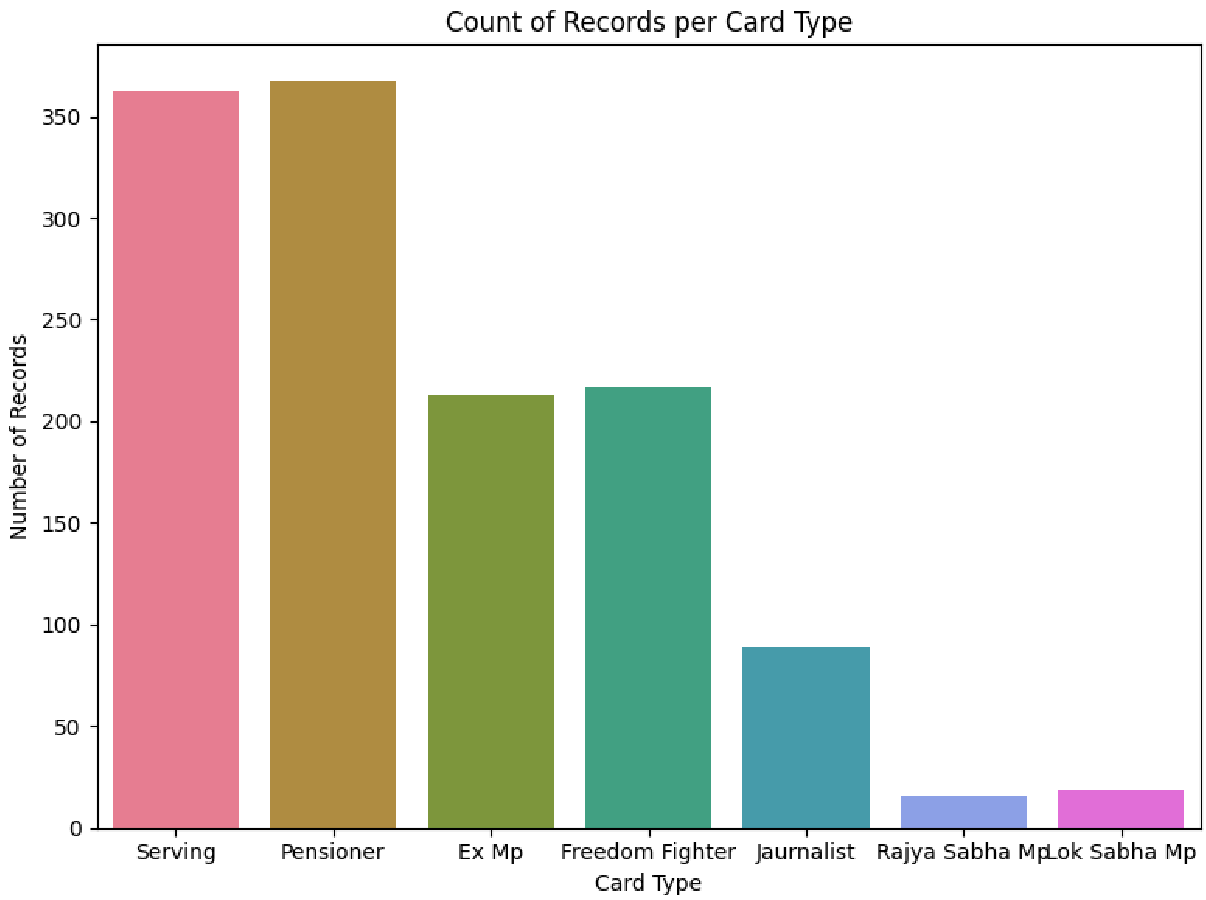
```
plt.figure(figsize=(10, 6))
sns.kdeplot(np.log1p(df['count']), shade=True, color='green')
plt.title("KDE Plot of Log(Count + 1)")
plt.xlabel("Log(Count + 1)")
plt.ylabel("Density")
plt.tight_layout()
plt.show()
```



# 10. Count Plot for card_type

In [38]:

```
plt.figure(figsize=(8, 6))
sns.countplot(x='card_type', data=df, palette='husl')
plt.title("Count of Records per Card Type")
plt.xlabel("Card Type")
plt.ylabel("Number of Records")
plt.tight_layout()
plt.show()
```



# Grouped Summary by City & Card Type

```
In [39]: grouped = df.groupby(['cityName', 'card_type'])['count'].agg(['sum', 'mean',
         grouped.head()
```

Out[39]:

| | cityName | card_type | sum | mean | median | max | min |
|---|---|---|---|---|---|---|---|
| **0** | AHMEDABAD | Ex Mp | 123 | 17.571429 | 10.0 | 61 | 1 |
| **1** | AHMEDABAD | Freedom Fighter | 37 | 7.400000 | 5.0 | 17 | 1 |
| **2** | AHMEDABAD | Pensioner | 37233 | 3723.300000 | 3779.0 | 8602 | 1562 |
| **3** | AHMEDABAD | Rajya Sabha Mp | 5 | 5.000000 | 5.0 | 5 | 5 |
| **4** | AHMEDABAD | Serving | 67390 | 6126.363636 | 5710.0 | 20681 | 16 |

# Top Centre per Card Type

```
In [40]: highest_by_type = df.loc[df.groupby('card_type')['count'].idxmax()][['card_t
         highest_by_type
```

Out[40]:

| | card_type | cityName | wellnessCentreName | count |
|---|---|---|---|---|
| **1143** | Ex Mp | DELHI AND NCR | North Avenue | 1361 |
| **165** | Freedom Fighter | HYDERABAD | Begumpet | 3237 |
| **334** | Jaurnalist | DELHI AND NCR | Laxmi Nagar | 487 |
| **1155** | Lok Sabha Mp | DELHI AND NCR | Pha (Annexe) | 1605 |
| **67** | Pensioner | DELHI AND NCR | Gurugram Sector 5 | 31321 |
| **776** | Rajya Sabha Mp | DELHI AND NCR | North Avenue | 402 |
| **596** | Serving | DELHI AND NCR | Yamuna Vihar | 66423 |

📝 Summary

- The dataset contains 1,284 records with no missing values.
- Most records belong to the *Pensioner* card type.
- *Ahmedabad, **Mumbai, and **Delhi* have the highest usage counts.
- Some wellness centres show significantly higher usage (outliers).
- Count distribution is *right-skewed*, as seen in the KDE plot.
- Visuals like pie chart, scatter plot, and count plot helped reveal key trends.
- Overall, the data gives clear insights into card usage and city-wise distribution.

In [ ]: